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Pre-Licensure Nursing Students' Perceptions of Safety Culture in Schools of Nursing

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Pre-Licensure Nursing Students' Perceptions of Safety Culture in Schools of Nursing

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by

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ABSTRACT

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Safety Culture in Schools of Nursing

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Safety culture has been demonstrated to be a key factor in high-reliability organizations (HROs), yet healthcare has not achieved a safety culture as seen in HROs despite decades of effort. Student nurses are enculturated into their profession during their pre-licensure education. This period offers an excellent opportunity to teach students the values, norms, and practices of safety culture. However, little is known about the state of safety culture in schools of nursing.

The purpose of this study was to examine the state of patient safety culture as perceived by students in pre-licensure nursing programs in the US using a modified version of the Hospital Survey on Patient Safety Culture (HSOPSC). The School of Nursing Culture of Safety Survey (SON-COSS), the modified instrument created for this study, was administered electronically to a sample of pre-licensure nursing students (N=539) drawn from membership in the National Student Nurses Association (NSNA).

The SON-COSS was found to maintain its reliability and validity for use in pre-licensure nursing students. Perceptions of patient safety culture ranged from 81.6% to 23% positive for the 10 dimensions of patient safety culture measured by the SON-COSS. The highest percent positive dimensions for this study were *Faculty Support for Patient Safety* (81.6%), *Teamwork Within Groups* (78.3%), and *Faculty Expectations and Actions Promoting Patient Safety* (68.6%). The

lowest percent positive dimensions for this study were *Frequency of Events Reported* (47.3%), *Communication Openness* (34%), and *Nonpunitive Response to Error* (23%). Participants in this study perceived patient safety culture significantly lower for eight of the 10 dimensions measured by the SON-COSS compared to aggregate national data from the HSOPSC (AHRQ, 2016). Only *Faculty Support for Patient Safety* (81.6%) was significantly higher than the corresponding dimension in the HSOPSC.

The results of this survey indicate that students recognize the importance of safety to their faculty, but they do not perceive the presence of a just culture, an essential prerequisite for a culture of safety. This study provides a reliable and valid instrument to measure safety culture in schools of nursing and baseline data to understand the state of safety culture in this population.

DEDICATION

I would like to thank my wonderful husband, Greg, for making this possible. Over the past 26 years you have challenged and motivated me to do more than I ever dreamed. Your integrity, work ethic, and perseverance are an inspiration. Having your love and support means more to me than words can express. I would also like to thank our children, Meghan and Nathan. Being your mom is my proudest achievement. I love you!

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CHAPTER 1

INTRODUCTION

The Institute of Medicine's (IOM) report, *To Err is Human* (IOM, 2000) generated a great deal of interest on the issues of healthcare error and patient safety. This report revealed that errors in the healthcare setting, including medication errors, falls, wrong site surgeries, pressure ulcers, and other adverse events, accounted for 44,000 to 98,000 preventable, healthcare associated deaths annually in the United States (US) and resulted in costs of up to $29 billion per year (IOM, 2000). The IOM (2000) recommended that healthcare organizations develop a culture of safety to help address the problem of error. The recommendation to move towards a culture of safety was based on knowledge developed by high-reliability organizations (HROs), such as aviation and the nuclear industry.

A HRO is an industry that functions under complex and difficult conditions while maintaining high levels of safety (Weick & Sutcliffe, 2001). The success of HROs is attributed to the overall safety culture of the organization. The term safety culture was first used in the nuclear industry, in a 1986 report on the Chernobyl disaster (International Atomic Energy Agency [IAEA], 1991). The Agency for Healthcare Research and Quality (AHRQ, 2016b) drew on the nuclear industry, using the following working definition of safety culture to inform the AHRQ's safety culture research:

> The safety culture of an organization is the product of individual and group values, attitudes, perceptions, competencies, and patterns of behavior that determine the commitment to, and the style and proficiency of, an organization's health and safety management. Organizations with a positive safety culture are characterized by communications founded on mutual trust, by shared perceptions of the importance of

> safety, and by confidence in the efficacy of preventive measures. (Advisory Committee on the Safety of Nuclear Installations, 1993 as cited in AHRQ, 2016b, p. 1).

Though over a decade has passed since the IOM (2000) recommended a safety culture in healthcare, Chassin and Loeb (2013) advised that no hospitals in the US have attained a culture of safety that is found in HROs.

Recent research into the scope of adverse events supports the assertion that healthcare has not achieved a culture of safety. McCannon, Hackbarth, and Griffin (2007) estimated that there are 40 to 50 incidents of patient harm per 100 hospital admissions, or 15 million incidents of harm related to hospitalizations in the US annually. In other studies, researchers found rates of over 25 instances of harm per 100 hospital admissions, with no decrease in harm over a five year period despite concerted efforts to improve patient safety (Landrigan et al., 2010; Levinson, 2010). Levinson (2010) estimated that adverse events among Medicare beneficiaries accounted for 15,000 deaths per month and cost the Medicare system 4.4 billion dollars annually. James (2013) estimated that over 400,000 premature deaths annually are associated with preventable in-hospital harm. This is more than four times the IOM's (2000) original estimation. Weick and Sutcliffe (2001) highlighted the discrepancy between HROs and healthcare, pointing out that preventable healthcare associated death is the equivalent of two 747 passenger jets crashing daily. With such alarming rates of adverse events, injury, and premature death, it is clear that healthcare has not realized the IOM's goal of a culture of safety.

Failure to achieve a culture of safety also impacts healthcare workers. Wu (2000) identified healthcare workers as the second victim in healthcare error. Wu (2000) reported that physicians, nurses, pharmacists and other healthcare workers who committed an error experienced stress, anger, and burnout that may lead to inability to continue in their job. With

400,000 new registered nursing job openings estimated by 2024, (Bureau of Labor Statistics, 2015) it is clear that healthcare systems cannot afford to lose experienced professionals due to preventable error. A working environment that is committed to safety has been shown to be a key factor in increasing nurse engagement and decreasing nurse burnout and turnover (Dempsey & Reilly, 2016). Seys et al. (2013) estimated that as many as 50% of all healthcare workers may become a second victim of error at some point in their career. The IOM (2000) also listed a loss of trust between patients and healthcare professionals as an additional consequence of healthcare associated error and a lack of organizational safety culture.

The current culture of healthcare has been described as hierarchical, lacking in teamwork, and focused on individual blame (Leape et al., 2009). This is in direct contrast to the culture of safety found in HROs, which encourages workers at all levels to hold one another accountable for safety, promotes teamwork, and evaluates error from a systems perspective. Progress towards the safety outcomes found in HROs cannot be achieved without fundamental changes to the culture of healthcare (Leape et al., 2009; McCannon et al., 2007). Reason (1998) contended that an organization's culture is the only thing pervasive enough to maintain system defenses and prevent error. Just as the culture of healthcare is hierarchical and individually blame-based, so is the culture in which healthcare professionals are educated (Attree, Cooke, & Wakefield, 2007). Future healthcare professionals should learn to function in a safety culture during their education into the profession (Leape et al., 2009). According to Leininger and McFarland (2002), enculturation is the process of learning to live by a culture, including its values, beliefs and practices. Enculturation takes place during a student's education into a profession (Leininger & McFarland, 2002). During the process of enculturation, culture should be assessed to determine if the desired norms, values, and practices have been taken on (Leininger & McFarland, 2002).

Enculturation in safety principles during a student's program of study has the potential to impact the overall culture of healthcare and improve patient safety by ensuring that members of healthcare professions have taken on the norms, values, and practices of a culture of safety. This type of transformation in the education of healthcare workers is essential to creating and maintaining a culture of safety in healthcare (Gregory, Guse, Dick, & Russell, 2007; Leape et al., 2009).

Currently little is known about the state of safety culture in nursing education. To date, no studies have been located that have quantitatively measured patient safety culture in nursing schools using an established safety culture tool. However, studies of error in schools of nursing have indicated that nursing student error is common and underreported, just as it is in healthcare practice (Currie et al., 2009; Harding & Petrick, 2008; Reid-Searle et al., 2010a; Wolf, Hicks, & Serembus, 2006). The most commonly cited reason for not reporting error in nursing education was fear. This is consistent with findings for healthcare in general and indicative of a lack of safety culture. In the hospital setting, Levinson (2012) estimated that 86% of adverse events are not reported to incident reporting systems, including adverse events that led to death and serious injury. Lack of reporting in the hospital setting has been attributed in part to fear of punitive action and the perception that reporting will not lead to changes that improve patient safety (Levinson, 2008; 2012). Establishing a culture of safety during a student's professional education may help to change this mindset. Attree et al. (2007) described the current culture in nursing education as defensive and closed. Barnsteiner and Disch (2012) agreed that this defensive culture is a concern in nursing education, with faculty often feeling pressure to produce students who are mistake-free, even though this goal is inconsistent with safety culture principles.

While Leape et al. (2009) argued that reforming medical education is a priority, reforming the culture of nursing education is equally important. According to the American Association of Colleges of Nursing (AACN, 2011), registered nurses (RNs) comprise the largest segment of the healthcare workforce with more than 3.1 million RNs in the US. Almost all healthcare services involve some form of care by nurses (AACN, 2011). Therefore, it is clear that nurses have the greatest potential to impact organizational culture in healthcare systems. In addition nurses typically function at the "sharp end" of the potential for error. This is where active errors, or errors that involve an individual in direct contact with a patient, occur (AHRQ, 2017). It is essential to educate nurses to assume an active role in healthcare quality and safety improvements as they are the healthcare workers most often affected by a lack of safety culture.

There have been positive strides towards implementing principles of safety culture in nursing education. The Quality and Safety Education for Nurses (QSEN) project began in 2005 to delineate the knowledge, skills, and attitudes (KSAs) nursing students need to improve quality and safety in healthcare (Sherwood, 2011). A core competency of the QSEN project is safety (Sherwood, 2011). The essential feature of safety, as defined by Cronenwett et al. (2007) is to "minimize risk of harm to patients and providers through both system effectiveness and individual performance" (p. 128). The focus on systems to improve safety is consistent with a culture of safety found in HROs. Cronenwett et al. (2007) specifically identified a culture of safety as part of the KSAs necessary to the competency of safety. While Cronenwett et al. (2007) acknowledged that safety has always been an important concept to nursing education, the QSEN safety competency is different because of the move from an individual to a system focus, a change that will prepare graduates to transform healthcare into a HRO.

Measurement of Safety Culture in Healthcare

Since 2009 the Joint Commission, one of the major accrediting bodies for healthcare organizations, has required accredited facilities to create and maintain a culture of safety (Chassin & Loeb, 2013). The AHRQ also recommends annual evaluation of safety culture in hospitals. Because of this, measurement of safety culture using surveys is now widespread. A variety of tools for measuring safety culture exist, but the AHRQ's Patient Safety Culture Surveys are consistently advocated as reliable and valid tools for assessing safety culture (DiCuccio, 2015; Flin, Burns, Mearns, Yule, & Robertson, 2006; Pumar-Mendez, Attree, & Wakefield, 2014). The AHRQ's Patient Safety Culture Surveys are a series of instruments designed to measure safety culture in a variety of both inpatient and outpatient settings (AHRQ, 2016). The Hospital Survey on Patient Safety Culture (HSOPSC), released in November, 2004, is the first instrument developed in this series and was designed to measure safety culture in the inpatient hospital setting (AHRQ, 2016b). The survey has since been modified to measure safety culture in other settings including nursing homes, medical offices, and community pharmacy settings (AHRQ, 2016c). At the time of this study, the instrument was publically available and modifiable by researchers. It has also been adapted for use in other languages. Additional information on this instrument is discussed in Chapter 3.

Measurement of Safety Culture in Healthcare Education

Two studies were identified that measured patient safety culture in healthcare education. Ramoni et al. (2014) and Bowman, Neeman, and Sehgal (2013) used modified versions of the AHRQ Patient Safety Culture Surveys to measure safety culture in dental students and medical students, respectively. Ramoni et al. (2014) administered the Medical Office Survey on Patient Safety Culture (MOSOPS), a tool developed in 2008 and based on the HSOPSC, to measure

safety culture among students, faculty, and staff at three dental schools. Ramoni et al. (2014) retained all items and dimensions, but changed wording of the MOSOPS to reflect their population and setting. Bowman et al. (2013) modified the HSOPSC, deleting several dimensions and items, and combined it with another tool, the University of California, San Francisco (UCSF) Department of Medicine Survey to measure medical students' perception of safety culture among one cohort of medical students at UCSF. Additional discussion of these two studies is located in Chapter 2.

Conceptual Framework

The concept of safety culture, as identified by Reason and Hobbs (2003) informed this study. According to Reason and Hobbs (2003) safety culture has three main subcomponents, a just culture, a reporting culture, and a learning culture. This conceptual view of safety culture has been widely used and adapted. Chassin and Loeb (2013) also identified these three sub-components as the central attributes of safety culture in healthcare. Each of those three components will be explored in detail.

Just Culture

In Reason and Hobbs' (2003) conception of safety culture, a just culture is the first step in creating a safety culture. The idea of just culture has gained increasing acceptance in healthcare. The American Nurses Association (2010) issued a position statement supporting just culture in healthcare to improve patient safety. A just culture is predicated on a systems approach to safety. Reason (1990) argued that human error is inevitable and must be mitigated by system defenses. Approximately 90% of human error is unintentional and blameless when viewed from a systems approach (Reason, 1990; Reason & Hobbs, 2003). Reason identified

latent error, or error in which the root-cause originates with the system, as the primary threat to safety in complex organizations (Reason, 1990).

A just culture engenders trust by distinguishing between blameworthy or reckless conduct and inevitable human error or error that originated from latent flaws within the system. A common misconception is that just culture is a consequence-free or blame-free culture, but this is not the case. The concept of trust in a safety culture is reinforced when blameworthy acts are dealt with appropriately (Chassin & Loeb, 2013; Reason & Hobbs, 2003). A just culture looks to the root-cause of error. When individuals experience the trust that results from a just culture, the other attributes of safety culture may be realized. Reason and Hobbs (2003) described a just culture as an "essential prerequisite for a reporting culture" (p. 148). Therefore, in Reason and Hobbs (2003) concept of safety culture a just culture is a necessary antecedent to a reporting and learning culture. A just culture is also positively correlated with safety culture.

Reporting Culture

The second attribute or subcomponent of a safety culture is reporting (Chassin & Loeb, 2013; Reason & Hobbs, 2003). As described above, a just culture is a necessary antecedent to a reporting culture, but it is not sufficient to create a reporting culture. In addition to a just culture, there are other attributes necessary to overcome barriers to reporting. In a reporting culture, individuals not only recognize that unintentional mistakes and lapses will not be held against them, they also understand that errors will be used as opportunities for improvement. Therefore, they are motivated to report errors and near-misses (Chassin & Loeb, 2013; Reason & Hobbs, 2003).

While federal regulations, state health departments, and accrediting bodies such as the Joint Commission require systems for tracking healthcare associated adverse events, a reporting

culture does not exist in healthcare today. As previously discussed, Levinson (2008; 2012) determined that hospital incident reporting systems are underutilized and fail to capture the majority of patient harm, with 86% of adverse events going unreported. Levinson (2008; 2012) agreed that fear of punitive action and the perception that reporting would not lead to changes that improve patient safety were reasons for underreporting. Reason and Hobbs (2003) contended that feedback on changes resulting from reported errors is essential to maintaining a reporting culture.

In Reason and Hobbs (2003) concept of safety culture, a reporting culture must be preceded by a just culture and is a necessary antecedent for a learning culture. While a reporting culture is positively correlated with a safety culture, it is important to note that it is not positively correlated with a reduction in error. Error reports should actually increase initially when a reporting culture is achieved (Reason & Hobbs, 2003). This should not be seen as an increase in error, per se, but an increase in willingness to report.

Learning Culture

A reporting culture is necessary for a learning culture (Reason & Hobbs, 2003). Without the data resulting from error and near-miss reporting, it would be impossible for a learning culture to exist. However, a reporting culture is not a sufficient antecedent for a learning culture. Reason and Hobbs (2003) differentiate between learning which examines individual actions as the root cause of error, and a true learning culture which examines how the, "organization's policies, practices, structures, tools, controls, and safeguards failed to achieve the desired result" (Reason & Hobbs, 2003, p. 154). Reason and Hobbs (2003) contend that this type of learning culture takes time to develop. Initially, learning cultures will tend towards an individual approach, but should strive to develop a systems approach. As a sub-component of safety

culture, a learning culture positively reinforces both a just and reporting culture. A learning culture is preceded by a just culture and a reporting culture, though these attributes are not sufficient for a learning culture to exist.

A safety culture is predicated on a systems, versus individual, approach to safety. It is comprised of three subcomponents. It is through all three subcomponents: a just culture, a reporting culture, and a learning culture, supporting and reinforcing one another, that safety culture may be achieved (Chassin & Loeb, 2013; Reason & Hobbs, 2003).

Philosophical Perspective

This study takes a post-positivist perspective. According to Monti and Tingen (1999), a post-positive approach holds precision, objectivity, and data as important while also realizing that absolute verification is an impossible goal. A post-positivist perspective recognizes truth or reality, but understands that it is may not be possible to fully perceive that reality. This perspective allows for identification of patterns, but recognizes that context and history are important (Monti & Tingen, 1999). In the case of the HSOPSC, it is understood that the instrument is a creation of individuals which is intended to reflect current understanding of safety culture. However, the HSOPSC may not reflect everyone's individual understanding of safety culture and the use of this instrument may need to be changed as understanding of the concept develops. While this instrument has demonstrated reliability and validity, the language may be perceived differently by participants and researchers based on their own experiences.

According to Creswell (2009) post-positivism is reductionist, with the goal of condensing concepts into discrete, testable components. This author attempted to identify whether dimensions of safety culture identified by Sorra and Dyer (2010) can be detected in nursing students. Evidence of a positive view of safety culture dimensions in nursing students is an

indicator that student nurses are being enculturated into the values and practices that will enhance patient safety.

Problem Statement

Safety culture has been shown to be an important factor in HROs (Weick & Sutcliffe, 2001). The healthcare industry has not fully adopted the principles and values of HROs, thus patients are at significant risk for error and harm (Chassin & Loeb, 2013). The professional formation and enculturation of healthcare workers begins in their pre-licensure programs (Gregory et al., 2007; Leape et al., 2009; Leininger & McFarland, 2002). Little is known about the current state of patient safety culture in schools of nursing and no instruments have been identified to measure safety culture in schools of nursing.

Purpose

The purpose of this study is to modify an instrument to measure safety culture in schools of nursing and to examine the state of patient safety culture as perceived by students in pre-licensure nursing programs in the US using this instrument. This study provides a beginning understanding of patient safety culture in schools of nursing and norms this modified instrument for schools of nursing. This study also compares the state of safety culture in US schools of nursing with safety culture in hospitals.

Research Questions

The research questions are:

RQ1: Does this modified version of the HSOPSC, administered to pre-licensure nursing students in the US, maintain reliability and validity when compared to the psychometric properties of the HSOPSC as reported by Sorra and Dyer (2010)?

RQ2: What is the pre-licensure nursing student perception of patient safety culture in schools of nursing in the US as measured by the modified HSOPSC?

RQ3: How does aggregate national data on perceptions of patient safety culture in hospitals as measured by the HSOPSC and reported by the Agency for Healthcare Research and Quality (AHRQ, 2016a) compare to pre-licensure student perceptions of patient safety culture in schools of nursing in the US as measured by this modified version of the HSOPSC?

Definitions

For this study the following definitions will be used:

Clinical Environment: Any setting in which the nursing student engages in direct patient care activities as part of their program of study in a school of nursing. For this study care of simulated patients is not included.

Entry into Practice: The educational pathway by which a student is prepared to sit for the National Council Licensure Exam for Registered Nurses (NCLEX-RN). For this study those pathways will include associate degree, baccalaureate degree, and diploma level programs.

Errors: An occurrence in which a planned mental or physical activity fails to achieve the intended outcome. This can be a failure of execution or a deficiency or failure in the plan (Reason, 1990).

Near-Misses: An error that occurred, but was caught before reaching a patient, either by chance or by system design (Institute for Safe Medication Practices [ISMP], 2009).

Nursing Student: An individual admitted to and enrolled in a pre-licensure program approved as a professional school of nursing by a State Board of Nursing.

Patient Safety Culture: The values, beliefs, and norms about what is important in the clinical environment, how students and faculty are expected to behave, what attitudes and actions are

appropriate and inappropriate, and what processes and procedures are rewarded and punished with regard to patient safety as measured by the modified HSOPSC (adapted from Sorra & Dyer, 2010).

School of Nursing: An institution approved by a State Board of Nursing as a professional nursing school. This definition is substituted where *hospital* is used in the HSOPSC tool.

Student Level: The semester in nursing school in which the student is enrolled. Student level is measured as first, second, third, fourth, or fifth semester in a professional nursing program.

Summary

Healthcare associated harm is a significant problem in the US. Despite over a decade of efforts towards improving healthcare safety, the problem persists. A contributing factor to the matter of healthcare safety is the underlying culture of healthcare that is hierarchical and focused on individual performance (Leape, 2009). HROs are organizations that are complex and have a high potential for error, but function with a great deal of safety. The success of HROs is often attributed to the pervading culture of safety within these organizations (Leape, 2009; Weick & Sutcliffe, 2001). Enculturation is a process by which individuals take on the values, beliefs, and practices of a group (Leininger & McFarland, 2002). It is through this process that student nurses take on the values of nursing and learn to function as a professional nurse. It is essential that pre-licensure nursing programs be assessed for evidence of safety culture in order to ensure that nurses are being educated to function as a member of a safety culture. Without a culture of safety healthcare cannot achieve the safety success of HROs. This chapter has provided insight into the ways in which culture influences safety and the need for measurement of safety culture within schools of nursing.

CHAPTER 2

REVIEW OF THE LITERATURE

A systematic and thorough review of the literature was conducted to evaluate the current understanding of safety culture in pre-licensure nursing education. The databases used were Cumulative Index to Nursing and Allied Health Literature (CINAHL), PubMed, and Google Scholar. An initial search of "safety culture," "culture of safety," and "patient safety culture" returned 809, 470, and 339 results, respectively, with overlapping results for these terms. When the terms "education" or "student" were added as keywords, the results were reduced to between 110 and 17 articles, with overlapping results between terms and databases. Over 100 articles were reviewed for inclusion in this literature review. In addition, an ancestry search was conducted to discover any relevant articles that may not have been identified by the database search. The search was limited to articles available in English and articles published after 2005. The year 2005 was selected because the QSEN project was initiated that year. It was anticipated that QSEN would result in increased understanding of safety culture principles in nursing education.

Articles that related to continuing education for practicing nurses, rather than education of pre-licensure nursing students, were excluded. Interdisciplinary articles were included only if nursing students were part of the study sample. Interdisciplinary studies that did not include nurses were excluded from the literature review. Also excluded from the literature review were articles related to patient education, rather than nursing education. Articles that used the term *culture* to refer to the cultural background of students or patients instead of organizational culture, were also excluded.

A total of 46 empirical and theoretical articles were found that included components of safety culture in nursing or interdisciplinary education which included nurses. Nineteen theoretical or conceptual articles and 27 empirical studies were included. The 27 empirical studies included 15 qualitative, 10 quantitative, and two mixed-methods studies. Several of the published articles were actually based on secondary analysis of one study, or on multiple phases of the same study, though the researchers do not always indicate this. It is estimated that the 27 empirical articles included in this review include 22 separate research projects. Articles that described an educational intervention, but did not include data collection or analysis were included in the theoretical literature. The QSEN framework was used or discussed in 20 of the articles.

The findings from this literature search resulted in three areas of interest, each of which will be explored individually: the current culture in nursing education, evidence of safety culture principles in the nursing education curricula, and challenges to creating a safety culture in nursing education. A brief history of safety culture, including its use and measurement in healthcare, will also be provided.

History of Safety Culture

According to the International Atomic Energy Agency (IAEA, 1991), the term safety culture was first used in 1986 in relation to an investigation of the Chernobyl disaster. In 1991 the IAEI attempted to delineate the concept of safety culture to turn, "a convenient phrase into a concept of practical value" (p.21), proposing the following definition of safety culture in the nuclear industry, "Safety culture is that assembly of characteristics and attitudes in organizations and individuals which establishes that, as an overriding priority, nuclear plant safety issues receive the attention warranted by their significance" (IAEA, 1991, p. 1).

In healthcare the initial use of the term safety culture or culture of safety is attributed to the IOM's (2000) report, *To Err is Human*. In this report, the IOM (2000) identified safety culture as an organizational goal that should be regularly monitored and based on principles of safety science. Additionally, they recommended that training and education of health professionals emphasize the importance of safety (IOM, 2000). In this report *safety culture* and *culture of safety* were used interchangeably, as they are throughout safety science literature. The term, *patient safety culture* (IOM, 2003) has also been used to indicate safety culture in healthcare settings. Today, *safety culture*, *culture of safety,* and *patient safety culture* are often used interchangeably in the healthcare safety literature.

Measurement of Safety Culture in Healthcare

In 2009, the Joint Commission required that all accredited healthcare organizations create and maintain a culture of safety, spurring assessment of safety culture in hospitals nationwide (Chassin & Loeb, 2013). In addition, the AHRQ recommends yearly evaluation of safety culture for hospitals. Two measurement tools are recommended by the AHRQ (2017a) as reliable and valid for measuring safety culture, the AHRQ's Patient Safety Culture Surveys (including the HSOPSC) and the Safety Attitudes Questionnaire (SAQ). DiCuccio (2015) also recommended the HSOPSC or the SAQ as the most credible tools with the most comprehensive databases. Flin et al. (2006) found that the HSOPSC was the only tool that provided a through report of the development of the scale, and had more systematic testing of internal structure than other instruments. Pumar-Mendez et al. (2014) reviewed methodology in the assessment of safety culture and found that the HSOPSC and the Safety Organizing Scale (SOS) were the only tools to demonstrate strong validity and reliability. The AHRQ identified over 100 published research studies pertaining to the HSOPSC instrument (AHRQ, 2016c). Two studies have been

identified which use the HSOPSC to measure safety culture in healthcare students, but no studies have been identified that measure safety culture in nursing students using an established safety culture instrument.

Measurement of Safety Culture in Healthcare Students Using the HSOPSC

Ramoni et al. (2014) and Bowman et al. (2013) utilized versions of AHRQ Surveys on Patient Safety Culture to measure safety culture in dental students and medical students, respectively. Ramoini et al. (2014) administered the Medical Office Survey on Patient Safety Culture (MOSOPSC), an instrument derived from the HSOPSC, to faculty, staff, and students at three dental schools and found that these schools ranked lower in all dimensions of safety culture than composite safety culture scores for medical practices reported by the AHRQ. In a single-site study, Bowman et al. (2013) used a modified version of the HSOPSC to examine fourth year medical students' perception of patient safety culture in either their medicine or surgery clerkship. These researchers found that medical students had similar results to composite date reported by the AHRQ in some dimensions of the HSOPSC. For example, the dimensions of *Teamwork Within Units* and *Organizational Learning* were highly positive in both the student group and the AHRQ's composite results of the HSOPSC. However, some dimensions were different for the student population. *Communication Openness*, an area of less concern in composite results of hospitals, was poorly rated among medical students. Only 21% of students reported that they would speak up if they saw something that would negatively affect patient care and only 23% disagreed that they were afraid to ask questions when something did not seem right. This is compared to 76% and 63%, respectively for similar questions in the AHRQ's composite results for 2011 (Bowman et al., 2013). The authors concluded that assessing student

perceptions of patient safety culture could help identify areas for curricular improvement to promote patient safety culture in medical students (Bowman et al., 2013).

Quality and Safety Education for Nurses

The Quality and Safety Education for Nurses (QSEN) project began in 2005 with funding from the Robert Wood Johnson Foundation. QSEN was initiated to help educate future nurses with the knowledge, skills and attitudes (KSAs) to improve quality and safety in healthcare (Sherwood, 2011). Drawing on the work of the IOM's five competencies for health care professionals, QSEN's nursing education experts worked in conjunction with practice professionals to develop the six core competencies they felt were essential to nursing education: patient-centered care, teamwork and collaboration, evidence-based practice, quality improvement, safety, and informatics (Sherwood, 2011). Each of the competencies has an important role in quality and safety improvement. All of the competencies are also understood to be interrelated, rather than distinct (Sherwood, 2011). However, for the purposes of this discussion the competency of safety will be reviewed in independently in greater detail.

QSEN Safety Competency

The essential feature of safety, as defined by Cronenwett et al. (2007) is to, "minimize risk of harm to patients and providers through both system effectiveness and individual performance" (p.128). The understanding of systems is highlighted in the knowledge, skills, and attitudes (KSAs) that make up this competency including: safety-enhancing technologies, safety design principles, categories of error and hazards in care, culture of safety, and patient safety regulations and initiatives (Cronenwett et al., 2007). Students should be able to describe and discuss, demonstrate use, and value these topics in promoting patient safety. Cronenwett et al. (2007) recognize that patient safety has always been an integral, important part of nursing

education. What is different about the QSEN safety competency is the move from the individual focus to an understanding of systems (Cronenwett et al., 2007). Sherwood (2011) states that safety science and human factors theory informed the process of developing this competency. Using QSEN in nursing education will help prepare graduates who can transform healthcare into a high-reliability organization.

Safety Culture in Nursing Education

Current Culture in Nursing Education

Across the literature the current culture of nursing education was described as defensive (Attree et al., 2007), legalistic (Andrew & Mansour, 2014; Cresswell et al., 2013; Steven, Magnusson, Smith, & Pearson, 2014), punitive (Barnsteiner & Disch, 2012;), and individually focused (Attree et al., 2007; Bush, Hueckel, Robinson, Seelinger & Malloy, 2015; Chenot & Daniel, 2010; Mansour, 2012). This type of culture is detrimental to student learning (Tella et al., 2014). Students reported a culture of fear in nursing education, voicing concerns that reporting error would lead to course failure or dismissal from their program (Attree et al., 2007; Koohestani & Baghchegi, 2009; Reid-Searl et al., 2010a; Vaismoradi, Bondas, Jasper, & Turunen, 2014). The fear of retribution for error extends to faculty as well. Barnsteiner and Disch (2012) contend that faculty worry that they will be reprimanded for student error and that clinical agencies will withhold placement for schools whose students have been involved in incidents of error.

A culture that is legalistic and self-protective has also been described (Andrew & Mansour, 2014; Steven et al., 2014). Researchers report that patient safety is often taught as a way to protect one's license and practice (Andrew & Mansour, 2014; Attree et al., 2007; Cresswell et al., 2013). Students concur that faculty instruction on safety is often focused on

avoiding lawsuits and license protection (Attree et al., 2007; Cresswell et al., 2013). Steven et al. (2014) stated that faculty may see it as an ethical responsibility to teach students self-protection in a litigious healthcare environment.

Safety as a core value. Despite the evidence of defensiveness and fear of retribution that is pervasive in the nursing education literature, student and faculty commitment to patient safety is also apparent. Safety is frequently described as a core value of nursing according to nurse educators (Cronenwett et al., 2007; Cronenwett, Sherwood, & Gelmon, 2009; Madhavanpraphakaran, 2012; Sherwood, 2011; Tanicala, Scheffer, & Roberts, 2011; Vaismoradi, Salsali, & Marck, 2011). In fact, Cronenwett et al. (2009) stated that safety is arguably the most important concept for faculty, and that faculty are highly motivated to incorporate patient safety principles into their teaching. Sherwood (2011) describes teaching safety as a moral imperative and agreed that faculty are highly motivated to improve patient safety. Students report awareness of patient safety risks (Attree et al., 2007) and concern about the importance of safety (Cresswell et al., 2013). However, teaching and learning tends to focus on individual vigilance, rather than a systems approach (Cronenwett et al., 2007).

The fact that students place high value on safety, but have been taught only principles of individual vigilance as a method of insuring patient safety have caused students to internalize an impossible standard of perfection and to deny the possibility of error (Andrew & Mansour, 2014; Dyjur, Rankin, & Lane, 2011; Wolf et al., 2006;). This hinders development of a safety culture. A focus on individual perfection also has the potential to contribute to the danger of becoming a second victim of healthcare error as described by Wu (2000) and addressed in Chapter 1. Andrews and Mansour (2014) and Reid-Searl et al. (2010b) indicated that students who experience patient safety concerns may withdraw from learning. Reid-Searl et al. (2010a) found

that students who had an experience with error had strong emotional reactions to the experience. Barnsteiner (2011) contended that nursing faculty must assist students who have had a role in healthcare error and should understand the distress of students in this position.

The high value placed on safety combined with the punitive, defense, and closed culture may also result in a sense of dissonance in values for nursing students (Steven et al., 2014). Students expressed interest in learning more about how to advocate for patient safety, indicating that they want to do well in this role (Steven et al., 2014; Vaismoradi et al., 2014). Students have expressed dissatisfaction in the way safety principles are taught during their nursing education (Cresswell et al., 2013; Sherwood, 2011; Smith, Cronenwett & Sherwood, 2006; Vaismoradi et al., 2011). Students reported a desire to learn more about patient advocacy and safety (Vaismoradi et al., 2011), but lack knowledge of the concepts found in safety science (Sherwood, 2011). In a focus group of new graduates, Smith et al. (2007) found that new nurses felt that they had not been exposed to QSEN competencies in their programs and additionally did not feel that faculty were qualified to teach this content. A study by Duhn et al. (2012) found that student confidence in their knowledge of patient safety principles actually decreased as they progressed through their nursing program.

Evidence of Safety Culture Principles in the Nursing Education Curricula

The literature review found no authors who argued that a safety culture currently exists in nursing education. Safety culture principles, and safety in general, were not explicit in nursing curricula (Attree et al., 2007; Chenot & Daniel, 2010; Cresswell et al., 2013; Howard, 2010; Steven et al., 2014). Researchers also indicated that medical education is outpacing nursing education in formally addressing safety culture principles (Chenot & Daniel, 2010). Early enculturation of professionals may impact how they practice. In an interprofessional study, Cox,

Scott, Aud, Headrick, & Madsen (2009) found that nursing students were less likely to agree with principles of safety culture than medical students, and these differences persisted after educational interventions. They concluded that enculturation in their respective programs of study may play a role (Cox et al., 2009). Cresswell et al. (2013) stated that safety is taught in isolation by professionals of different disciplines, with little or no emphasis on how those disciplines interact and how systems impact safety.

Faculty and students both indicate that safety is implicit and threaded throughout the curriculum (Attree et al., 2007; Cresswell et al., 2013; Steven et al., 2014). Steven et al. (2014) found that faculty indicated that they prefer an implicit approach to safety, as safety is an overarching concept. The concern was voiced that treating safety as a separate concept de-contextualized and separated it from practice (Steven et al., 2014). However, when safety is not explicit, it is difficult to know how well safety culture principles are addressed or if they reflect current safety science (Howard, 2010).

Systems approach. Authors found a systems approach lacking in nursing education (Attree et al., 2007; Barnsteiner, 2011; Cresswell et al., 2013; Cronenwett et al., 2007; Dolansky & Moore, 2013; Dyjur et al., 2011; Mansour, 2012; Sherwood, 2011; Smith et al., 2007). Attree et al. (2007) and Mansour (2012) found that curricula focused only on individual student performance and readiness for practice, without the inclusion of the role that larger systems play in safety. An interprofessional study by Cox et al. (2009) revealed how a lack of a systems approach impacts educational culture. The researchers found that nursing students were significantly more likely than other healthcare students to state that competent providers do not make mistakes, and that an effective way to decrease error is for individuals to be more vigilant (Cox et al., 2009), missing the role that complex systems play as an underlying source of

healthcare error. Cresswell et al. (2013) agreed that systems approaches to safety were largely missing from the nursing curricula. However, it is clear that systems play a role in student error. Harding and Petrick (2008) found that systems factors contributed to the majority of student medication errors, demonstrating a need to address systems factors in nursing education.

The QSEN safety competency is seen as positive move from the individual, to a systems approach to safety in nursing education (Bargagliotti & Lancaster, 2007; Barnsteiner, 2011). Cronenwett et al. (2007) stated that the systems approach to safety as described in the QSEN competencies will produce nursing graduates who understand current safety science and are prepared for practice within a culture of safety. Sherwood (2011) agreed that changing from an individual to a systems approach to care is a necessary first step in preparing graduates for safe and effective practice. However, Dolansky and Moore (2013) argued that even when QSEN competencies were reportedly utilized by nurse educators, they often focus on the individual rather than systems approach.

Just culture. There is evidence that a just culture is aspired to (Barnsteiner & Disch, 2012; Tanicala et al., 2011; Wolf et al., 2006), though no author suggested that it currently exists in nursing education. Barnsteiner and Disch (2012) attributed the lack of just culture, in part, to nursing faculty. These authors stated that nursing faculty express that a just culture condones error and that admitting that error happens regularly is unacceptable (Barnsteiner & Disch, 2012). Even when faculty invite a just, open, reporting culture, students still express fear and concerns about retribution (Girdley, Johnsen, & Kwekkeboom, 2009; Pearson et al., 2010). Nursing students have also internalized views that are at odds with a just culture. In an interprofessional study by Cox et al. (2009) student nurses were significantly more likely than medical students to state that punishment should follow error. Student nurses voiced little

confidence that university policies and procedures would protect them (Reid-Searl et al., 2010c). Reid-Searl et al. (2010c) found that student nurses were unlikely to report poor supervision or unsafe practice among staff nurses in clinical for fear that the university would take action against the reporting student.

There is evidence that educational interventions can help to promote a just culture. In a study introducing the QSEN safety competency to nursing students, Jones (2013) found that students were more likely to support confidential, non-punitive error reporting after the educational intervention. Girdley et al. (2009) found that when faculty shared their experience with errors and near-misses they helped to create a safe, just environment for students to report. Faculty must be mentors and role models to promote a just culture. However, this is not always the case. Even nurse educators researching safety may attribute blame to nurses, when systems are clearly at fault. For example, Reid-Searl et al. (2010b) discussed the role poor physician handwriting played in student medication error and concluded that increased supervision of the nursing student by the registered nurse was needed, missing the opportunity to discuss the role that electronic medical records, physician order entry, teamwork, and communication could play in decreasing the root cause of error. Disch and Barnsteiner (2014) argued that nursing education has a long way to go to achieve a just culture. These authors state that nursing education has not made the philosophical change to a just culture that has been seen in healthcare (Disch & Barnsteiner, 2014).

Reporting culture. A reporting culture is also an aspiration identified by many authors (Barnsteiner & Disch, 2012; Currie et al., 2009; Wolf et al., 2006). Though Disch and Barnsteiner (2014) advised that most schools of nursing do not have tools or policies for reporting student errors and near-misses. When reporting is mandatory and standardized,

researchers can begin to understand the scope of error in schools of nursing. In one study, Currie et al. (2009), instituted a reporting system for hazards and near-misses. Students were required to submit reports to this system for their clinical experience, though they could indicate that no hazards or near-misses occurred. Over a three year period students made 21,276 reports that included 10,206 hazards or near-misses in the clinical setting (Currie et al., 2009). Currie et al. (2009) concluded that the process of reporting was beneficial to increasing safety culture among student nurses. Wolf et al. (2006) conducted a retrospective analysis of errors made by nursing students as reported in MEDMARX, a national medication error database. These researchers reported 1,305 student-involved errors over a five year period (Wolf et al., 2006). In a qualitative, single site study of 28 senior nursing students Reid-Searl et al. (2010a) found that nine participants stated they had a medication error or near miss in the clinical setting, though none reported this event to faculty. Harding and Petrick (2008) conduced a retrospective review of one school of nursing's incident report forms over a three year period and found 77 medication errors. In another retrospective study of incident reports, Gregory, Guse, Dick, Davis, and Russell (2009) found 37 students were involved in 154 patient safety events over a six-year period at one school of nursing. Luhanga, Yonge, and Myrick (2008) interviewed 22 nurse preceptors who reported medication error among 75% of the students they supervised. Clearly students are involved in safety incidents. Developing a reporting culture in nursing education is necessary to understanding the scope and circumstances of this issue to create a culture of safety. Efforts are currently underway by Disch and Barnsteiner (2014) to create a national occurrence reporting tool, an important first step to developing a reporting culture in schools of nursing.

Learning culture. A learning culture is the aspect of safety culture mentioned least frequently in the literature. This is not surprising, considering that a just and reporting culture are necessary antecedents to a learning culture (Reason & Hobbs, 2003), and those do not currently exist in nursing education. Though there is scant data on student error, studies indicate that there may be important lessons to learn that are different from what is known about practicing nurse error. Wolf et al. (2006), for example, found that students were more likely to have error related to misunderstanding of medication administration records (MAR), unfamiliarity with the use of 24 hour time, and wrong route events than practicing nurses. Harding and Petrick (2008) found a lack of understanding of the MAR and trouble reading medication labels were contributing factors in student medication error. Harding and Petrick (2008) analyzed the semester level of students involved in error and found that second and third semester students were more likely to have a medication safety event, perhaps indicating that these students were not ready for the tasks or the level of supervision they were experiencing in the clinical setting. Gregory et al. (2009) found that male students and international students were more highly represented in a study of safety incidents than one would expect, giving cause for concern about how diverse students are prepared and evaluated for safe practice. Knowledge of the students at risk for safety incidents, the types of incidents, and the root causes of incidents could help to target teaching interventions and create a learning culture.

An important part of a learning culture is also feedback. Attree et al. (2008), Koohestani and Baghchegi (2009), and Pearson et al. (2010) found that a lack of feedback on reported safety concerns contributed to an unwillingness to make future reports. Finally, reports of error cannot remain hidden in individual student files if learning from error is to occur. Following a study of nursing student medication error, one school of nursing changed their policy so that incident

reports were trended, shared with clinical agencies, and kept separately from documentation of individual student performance (Harding & Petrick, 2008), demonstrating the type of change required to learn from safety events.

Challenges to Creating a Safety Culture in Nursing Education

Overburdened curricula. An overburdened curriculum was often discussed as a challenge to implementing a safety culture in nursing education (Cronenwett et al., 2009; DeBourgh & Prion, 2012; MacPhee, Espezel, Clauson, & Gustavson, 2009; Sherwood, 2011). The challenge to add one more thing to an already full program of study can be a daunting task for educators. However, curricular review and reform is necessary to ensure that students are ready to practice in a safety culture. Bargagliotti and Lancaster (2007) and Sherwood (2011) indicated that incorporating QSEN competencies into nursing education will involve more than just curricular change, it will require a complete change in mindset for nursing faculty. Wolf et al. (2006) recommended reevaluation of the nursing curriculum related to safety. Active teaching strategies are needed to teach the principles of a culture of safety (Cronenwett et al., 2009), but these can be time-intensive and faculty may not have the requisite knowledge to teach safety concepts.

Teaching/learning practices. Researchers found a lack of understanding of principles of safety culture in nursing education (Barnsteiner, 2011; Cronenwett et al., 2007; Smith et al., 2007). According to Smith et al. (2007) nursing faculty overwhelmingly expressed that they were very comfortable teaching the concept of safety as described by QSEN. However, when focus groups were convened to discuss how the concept was covered, faculty reversed their assessment and concluded that safety was actually not covered in a way that met current QSEN competencies (Smith et al., 2007). Barnsteiner (2011) stated that faculty have trouble teaching

what they don't know. She advocated for nurse educators becoming more involved with clinical agencies in safety-related and quality improvement committees, and increased training in QSEN competencies in order to better prepare faculty to teach the principles that will contribute to a culture of safety (Barnsteiner, 2011).

A lack of understanding of safety culture principles may perpetuate ineffective teaching practices that are time-consuming and do not enhance safe student practice. Faculty may be missing opportunities to impact patient safety by teaching content in the way it has always been taught, without considering evidence or the current healthcare environment. An example is the current teaching-learning practices related to medication administration (Bush et al., 2015; Dyjur et al., 2011; Tanincala et al., 2011). Dosage calculation has traditionally been the primary focus of teaching safe medication administration, with a perfect score on a dosage calculation test often required for students to administer medications in the clinical setting (Dyjur, 2011; Wolf et al., 2006). Tanincala et al. (2011) agreed that competency in dosage calculation is often seen as synonymous with safe practice in nursing students. However, dosage calculation has rarely been found to play a role in student medication error. Reid-Searl et al. (2010b) expressed surprise in their findings when student nurses did not identify dosage calculation as an issue contributing to their medication error. Harding and Petrick (2008) found that none of the 77 nursing student medication errors they studied were a result of math calculation errors. Even when dosage calculation error is present in the literature, it may be misattributed. In Luhanga et al.'s (2008) study of preceptor-reported student error, a dosage near-miss was discussed in which a student tried to administer two tablets of a four milligram medication, when only four milligrams were ordered. The researchers attribute this as a dosage calculation error, but it is unlikely that this

simple calculation was due to a lack of understanding of mathematics. A deeper look at the cause of error may have revealed difficulty in understanding the MAR or reading packaging.

Dyjur et al. (2011) contends that the focus on dosage calculation as sufficient for safe medication administration misses the reality of current practice where infusion pumps, pharmacy dosed medications, barcode scanners, medication dispensing machines, and other technological advances have changed the nurses' role in medication administration. Bush et al. (2007) stated that medication administration is the step most commonly focused on in nursing education, however it is only the culmination of a bigger, complex process. They advocated for learning tools that emphasize role the system plays in medication safety. Wolf et al. (2006) recommended instruction on ordering processes, dispensing systems, and other systems involved in the medication administration process.

A variety of teaching-learning strategies are needed to successfully incorporate principles of safety culture in medication administration teaching (Harding & Petrick, 2008; Tella et al., 2014; Wolf et al., 2006). Wolf et al. (2006) recommended that activities such as simulation of medication administration should mirror actual clinical practice as much as possible. Harding and Petrick (2008) agreed that problem based learning, high fidelity simulation, and other contextual learning was important in teaching medication safety. Dolansky, Singh, and Neuhauser (2009) argued that quality and safety principles are difficult to teach in a traditional lecture environment, and that methods such as simulation and quality improvement projects are needed to reinforce safety science concepts. Dyjur et al. (2011) stated that contextualized learning should extend to student evaluation as well. These researchers recommended that dosage calculation be assessed in an environment that simulates practice, rather than solely by written examination.

Andrew and Mansour (2014) suggested that teaching assertiveness, in addition to traditional principles of medication administration is important to patient safety. Twigg and Attree (2014) agree that soft skills such as leadership, communication, and teamwork must be part of the patient safety curriculum. Girdley et al. (2009) and Vaismoradi et al. (2014) indicated that narratives of faculty and student experiences with error could help students develop an understanding of a systems perspective and comfort with error reporting

Root cause analysis of error has been touted by many as a way to improve just culture in schools of nursing and promote a culture of safety (Barnsteiner, 2011; Cresswell et al., 2013; Dolansky & Moore, 2013). Root cause analysis offers an opportunity to demonstrate just culture principles to students and faculty. While a root cause analysis in response to error is common in healthcare agencies, it is missing from education polices, the curricula, and teaching-learning practices (Cresswell et al., 2013). The current response to student error in education is to analyze the outcome, rather than root cause. Barnsteiner and Disch (2012) contended that root cause analysis is an important step to beginning a just culture in nursing education. While faculty and students may be wary of having error analyzed, learning strategies such as implementing root cause analysis and a just culture response to error into simulation, for example, may make students more comfortable with the concept and help to reinforce a just culture in practice (Cronenwett et al., 2009).

Education-practice gap. A major concern revealed in the review of the literature was the role that the education-practice gap plays in hindering safety culture. While the education-practice gap in nursing education has long been acknowledged, it takes a new significance when viewed through the lens of safety culture. Researchers report that student nurses are disconnected from the clinical environments in which they practice and are seen as outsiders in

healthcare systems (DeBourgh, 2012; Pearson et al., 2010; Steven et al., 2014; Wolf et al., 2006). Agencies often host a large number of clinical students from a variety of programs and rarely allow them full access to hospital computer systems, reporting tools, training, and other activities that promote safety (DeBourgh, 2012; Pearson et al., 2010). Tools intended to improve safety in the clinical sites, such as electronic medical records, may actual hinder safety for students who lack access (Pearson et al., 2010). When students attend clinical in multiple sites, this further decreases their involvement in the institutional culture and access to safety technology (Cronenwett et al., 2009). Madhavanpraphakaran (2012) advocated for extended clinical placements in units where students have full access to patient care information in order to bridge this gap and promote a culture of safety.

The fact that students lack independent licensure may also allow them to distance themselves from safety concerns and shift accountability to the nurse or nurse educator (Andrew & Mansour, 2014; Reid-Searl, Moxham, Walker & Happell, 2008), with some students indicating that they see safety events as outside of the scope of their responsibility. This is reinforced when students have no role in reporting safety events (DeBourgh, 2012; Disch & Barnsteiner, 2014; Pearson et al., 2010). Students described feeling unclear about their role in the clinical environment (Vaismoradi et al., 2014), further decreasing their connection and involvement in safety practices. Pearson et al. (2010) indicated that students may be unaware of and lack access to agency reporting systems.

Student nurses also experienced dissonance between what they were taught in the classroom and what they observed in clinical practice (Cresswell et al., 2013; Steven et al., 2014; Vaismoradi et al., 2014). The education-practice gap presents a unique challenge with regard to safety culture. Educators do not always acknowledge variations in practice, instead teaching

idealized practice standards, and giving students a lack of clarity about acceptable practice variations (Cresswell et al., 2013; Vaismoradi et al., 2014). If students are unable to differentiate between safe and unsafe derivations in practice, it is difficult for them to act as safety advocates. Staff nurses may engage in workarounds that may or may not be unsafe, but students lack the clinical judgment to evaluate this. DeBourgh et al. (2012) and Luhanga et al. (2008) also highlighted the tension between the need for student practice and the need for patient safety. Student nurses require experiential learning to practice safely, yet their lack of experience and clinical skill may impact the safety of patients. This is a difficult balance for nurse educators (DeBourgh et al., 2012; Luhanga et al., 2008). Students also report feeling undersupervised in clinical areas (Attree et al., 2007; Cresswell et al., 2013; Reid-Searl et al., 2010a; Wolf et al., 2006). Wolf et al. (2006) and Reid-Searl et al. (2010a) recommended that students should have uninterrupted access to faculty during at-risk times such as medication administration.

Varying levels of faculty expertise has also been implicated as a barrier to creating a safety culture in nursing education (DeBourgh et al., 2012; Sherwood, 2011). Attree et al. (2007) indicated that safety is usually assessed clinically, rather than theoretically, in schools of nursing. Unfortunately, students, educators, and clinical agencies are uncertain about the reliability of clinical nurses' assessments of students (Attree et al., 2007). Cresswell et al. (2013) indicated that the role of clinical learning was essential to safety education, but also found that the experiences of clinical placement were extremely variable. Tanicala et al. (2011) argued that evaluating students' safety in the clinical setting is highly contextual and requires careful assessment by qualified nurse educators. While these researchers would seem to support nurse educators instead of clinical nurses to teach and evaluate safety, Smith et al. (2007) indicated that faculty may be too removed from clinical practice to teach in a way that supports current safety

practices. Additionally, Smith et al. (2007) found that administrators of nursing programs were removed from both teaching and practice and may not reliably be able to evaluate how the program is teaching current principles of safety culture.

The responsibility for addressing the theory-practice gap does not only fall on the shoulders of educators. DeBourgh et al. (2012) indicated that health care agencies need to be involved in curricula development for nursing education. Cresswell et al. (2013), DeBourgh (2012), Dolansky et al. (2009), Madhavanpraphakaran (2012), Mundt, Clark, and Klemczak (2013), Reid-Searl et al. (2010b), and Wolf et al. (2006) agreed that practice-academic partnerships are key to educating students in a culture of safety. MacPhee et al. (2009) stated that loose, informal relationships with clinical facilities are not enough. Sustained, prolonged academic-practice partnerships that involve students in quality and safety improvements are necessary to building a culture of safety.

Power imbalances. The power imbalance between nursing students, faculty, and practicing nurses is also a barrier to safety culture in nursing education. Students reported feeling pressure to obey staff nurses direction, even when students felt that they may be unsafe (Andrew & Mansour, 2014; Cresswell et al., 2013; Reid-Searl, 2010c; Steven et al., 2014). Common themes include the feeling that students are holding nurses back from their work by not moving fast enough, or that students are adding to the work of busy nurses (Andrew & Mansour, 2014; Steven et al., 2014). Reid-Searl et al. (2010b; 2010c) reported that students were unlikely to express concerns they had about lack of supervision to staff nurses. Researchers also indicated that students have a desire to fit in or conform to the culture of their clinical environment (Andrew & Mansour, 2014; Reid-Searl et al., 2010c; Steven et al., 2014) which may make them less likely to challenge unsafe practice.

There is also concern regarding the dual responsibility of role model and evaluator given to clinical staff and nursing faculty. Students remain acutely aware of the role staff nurses and clinical educators play in evaluating their performance (Cresswell et al., 2013; Steven et al., 2014), making questions related to practice derivations or admission of mistakes difficult. The evaluator role of staff nurses extends beyond students' clinical placement as well. Reid-Searl et al. (2010c) revealed that students are concerned about pleasing their staff nurse as this could affect their future job prospects. Girdley et al. (2009) indicated that faculty must be mindful of the goal of promoting safety culture when evaluating students. Faculty should separate evaluation of students' individual performance from safety concerns that students reported, a change that required a cultural shift on the part of faculty (Girdley et al., 2009).

Accreditation and regulation. Finally, the role of accreditation and regulation has been discussed as a current challenge, but a potential asset, to a future culture of safety in nursing education. Authors called on accrediting bodies to hold schools of nursing accountable to safety culture principles (Barnsteiner, 2011; Gregory et al., 2007; Howard, 2010; Mundt et al., 2013; Reid-Searl et al., 2008; Sherwood, 2011). Regulatory and accrediting bodies should also be mindful of current best practices in safety (King & Anderson, 2012). An example of outdated regulatory oversight is given by Harding and Petrick (2008), who discussed one accrediting body requiring teaching of the rights method of medication administration, a technique which their study found might be too narrowly focused to contribute to a systems approach to safety.

The role of accrediting bodies in spurring nursing education towards a culture of safety is important. Cronenwett et al. (2009) identified seeking accreditation or re-accreditation as an impetus to curricular change. Sherwood (2011) reported that a systems approach and safety principles as found in QSEN are now incorporated into licensure examinations and nurse

residency programs. Researchers also suggested that nurse-sensitive indicators of quality, and other practice guidelines become a routine part of nursing education, and should be part of accreditation standards (Barnsteiner, 2011; DeBourgh, 2012; DeBourgh & Prion, 2012; Dolansky & Moore, 2013). DeBourgh (2012) found that students in their third semester of a nursing program had little awareness of national patient safety goals or nurse sensitive outcomes, though both of these guidelines are important measures of safe practice. Dolansky and Moore (2013) found that using established national quality and safety initiatives in a clinical setting, such as Catheter Associated Urinary Tract Infection (CAUTI) prevention, was key to improving students' systems thinking and supporting a culture of safety. Dolansky et al. (2009) also reported that for schools associated with medical centers, reimbursement concerns such as pay-for-performance systems may serve as an impetus to administrators to promote change in health professionals' education.

Regulatory agencies also need to be considered as both a barrier and a potential asset to the issue of error reporting schools of nursing. The lack of a reporting system for tracking, aggregating, and learning from student error has been implicated as an obstacle to creating a safety culture (Barnsteiner & Disch, 2012; Disch & Barnsteiner, 2014; Currie et al., 2009; Gregory et al., 2007), which regulatory and accrediting bodies have been urged to address. However, regulatory challenges were identified by Disch and Barnsteiner (2014) when attempting to institute a national error reporting system for schools of nursing. These authors found that data security and confidentiality regulations for both healthcare and education had to be considered, as well as costs and concerns regarding access (Disch & Barnsteiner, 2014). The issues surrounding error reporting systems are complex, but these systems are urgently needed if a reporting and learning culture are to exist in nursing education.

Summary

Little research has been conducted specifically addressing safety culture in schools of nursing. However, related concepts such as safety, error rates, reporting systems, and QSEN competencies have received attention in the nursing education literature. Most research in this area has been conducted in small, single site studies. No comprehensive measurement of the state of safety culture in nursing education has been found. Due to the implicit nature of safety in the curriculum, it is difficult to determine how safety culture principles are being addressed in nursing education. There is much work to be done to bring healthcare to the standards of HROs. Enculturation into a mindset of safety during health professionals' education may be a cornerstone to creating a safety culture in healthcare. The current culture in schools of nursing is not consistent with a culture of safety. Cresswell et al. (2013), Steven et al. (2014), and others have stated that additional research into safety culture in nursing education is urgently needed.

CHAPTER 3

METHODS

This chapter details the methods that were used in this research study. The study used a descriptive, comparative survey design, administered electronically to answer the study questions. As described in Chapter 1, the study questions are:

RQ1: Does this modified version of the HSOPSC, administered to pre-licensure nursing students in the US, maintain reliability and validity when compared to the psychometric properties of the HSOPSC as reported by Sorra and Dyer (2010)?

RQ2: What is the pre-licensure nursing student perception of patient safety culture in schools of nursing in the US as measured by the modified HSOPSC?

RQ3: How does aggregate national data on perceptions of patient safety culture in hospitals as measured by the HSOPSC and reported by the Agency for Healthcare Research and Quality (AHRQ, 2016a) compare to pre-licensure student perceptions of patient safety culture in schools of nursing in the US as measured by this modified version of the HSOPSC?

Design

The researcher conducted a survey of pre-licensure registered nursing students enrolled in professional schools of nursing in the US. According to Polit and Beck (2012), surveys are well suited to obtain information about prevalence and relationships of a concept and are appropriate to provide an initial, broad assessment of a phenomena. This study provides a beginning understanding of patient safety culture in schools of nursing and compares the perception of safety culture in a modified version of the HSOPSC to aggregate national data on hospital safety culture as measured by the HSOPSC (AHRQ, 2016). It also tests the validity of the modified HSOPSC in the pre-licensure student nurse population. Specific statistical analytic methods are

described in the data analysis section. This study also norms this modified version of the HSOPSC for schools of nursing.

Setting

The survey was conducted online using the survey platform Survey Monkey®. Students received an e-mail invitation from the National Student Nurses Association (NSNA) with a URL link to the study information and survey (Appendix A). The e-mail was sent to the address provided to the NSNA by the member. Neither the e-mail address nor any other participant information was provided to the researcher by the NSNA. Participants were given a 36 item questionnaire modified by this researcher for use in the student nurse population from the HSOPSC (Appendix B).

According to Sue and Ritter (2007), online surveys are appropriate for studies with large sample sizes that are geographically diverse. An online survey allows the researcher to reach a large, widespread population quickly and at a relatively low cost. Sue and Ritter (2007) also indicated that web-based surveys using a platform such as Survey Monkey® may be preferable to online surveys that require an e-mail response. According to the authors, using a web-based platform increases anonymity and may make participants more likely to answer sensitive questions honestly (Sue & Ritter, 2007). In addition, data collection may be enhanced as online surveys have fewer unanswered questions and more data provided in free-text boxes than paper and pencil surveys. Platforms such as Survey Monkey® are also accessible and easy for participants to navigate (Sue & Ritter, 2007).

Sample

A convenience sampling approach was used. Probability sampling is problematic with online surveys, according to Sue and Ritter (2007). There is little ability to randomize a sample

with the type of e-mail "blast" that was used for this study. However, convenience sampling is appropriate for an exploratory research study in which an organizational list from which to sample exists (Sue & Ritter, 2007). The sample was drawn from the population of pre-licensure, undergraduate registered nursing students in the United States. This population consists of approximately 57% associate degree and 40% baccalaureate degree students, with the remaining 3% in other entry into practice programs (Auerbach, Buerhaus, & Staiger, 2015). The American Association of Colleges of Nursing (AACN, 2015) reported that 189,729 students are enrolled in pre-licensure baccalaureate nursing programs in the US. Assuming that this number represents 40% of the total nursing student population, the total population size of pre-licensure nursing students is approximately 474,322.

A convenience sample of pre-licensure undergraduate nursing students was drawn from members of the NSNA. The NSNA is a non-profit organization with a membership of over 60,000 pre-licensure students from 50 states as well as the District of Columbia, Guam, Puerto Rico, and the US Virgin Islands (NSNA, n.d.). Membership is open to all pre-licensure nursing students, regardless of program type. It is also open to licensed registered nurses in baccalaureate degree completion programs. The NSNA (n.d.) reported that their convention attendance is approximately 52% baccalaureate and 41% associate degree nursing students with 7% from other program types. The geographic and program diversity of the NSNA membership, as well as the representation from various program types, made NSNA members an excellent sample for this population. Sue and Ritter (2007) indicated that convenience sampling from an organizational list is preferable to participant self-selection into a study, for example by placing an advertisement in a journal or website for the target audience, as it decreases validity concerns caused by participant self-selection.

Inclusion criteria included pre-licensure students over the age of 18 who are currently enrolled in an undergraduate (diploma, associate, or baccalaureate), pre-licensure, registered nursing program in the US. Participants were also able to use a computer and read and understand sufficient English to complete the survey. Exclusion criteria included students who are currently licensed as a registered nurse and students in a program of study other than undergraduate programs (masters or doctoral level pre-licensure programs).

Sample size and power analysis. Plichta and Kelvin (2013) indicated that the concept of power does not apply when calculating sample size for factor analysis. These researchers recommend that a minimum number of ten participants for each variable is considered desirable. Therefore, to answer RQ1, ten participants for each of the ten dimensions required a total of 100 participants. This is also consistent with Plichta and Kelvin's (2013) statement that a sample size of 100 is often recommended as adequate for factor analysis.

A power and sample size calculation, based on the one sample z-test for proportion for RQ3, was conducted. The following formula, recommended by Chow, Shao, and Wang (2008) was used to compute the minimum sample size required for a two-sided test with a level of significance α and power 1 – β:

$$n = \frac{(z_{\frac{\alpha}{2}} + z_{\beta})^2 p(1-p)}{\varepsilon^2}$$

where

- $z_{\frac{\alpha}{2}}$ is the standard normal critical value for a significance level of α. For a two-sided test with a significance level of α = 0.05, $z_{\frac{\alpha}{2}}$ = 1.96.

- z_β is the standard normal critical value for a power of 1-β. For a power of 80%, β = 0.2 and z_β = 0.84.
- p is the reference proportion.
- ε is the minimum detectable value of the proportion.

Note that the percent positive response for the 12 dimensions of the HSOPSC ranged from 44% to 81%. Thus, in this study, the reference proportion was set as the average of 0.44 and 0.81, which is calculated as 0.63. A minimum detectable value of the proportion of 0.15 was set, which corresponds to a medium effect size (Cohen, 1988).

The minimum sample size for this question is then equal to:

$$n = \frac{(1.96 + 0.84)^2 0.63(1 - 0.63)}{0.15^2} = 82$$

Thus, for this question, given a medium effect size and in order to achieve a power of 80% at the 0.05 level of significance the minimum sample size required was 82 (Y. Su, personal communication, November 3, 2015).

Instrument

Demographic questions

The placement of the demographic questions for the modified HSOPSC was modeled after the placement of the demographic questions on the original HSOPSC to maintain consistency between instruments. Therefore, one general demographic question was placed at the start of the survey and additional demographic questions were asked between the end of the survey questions and the free-text box. The initial question determined the type of nursing program in which the student was enrolled. This allowed the researcher to eliminate responses from participants in an associate to baccalaureate degree completion program or from participants in a graduate level program. Additional demographic data included:

- Semester level of the student in the program of nursing
- Race/ethnicity
- Gender
- Age
- Location of the school (northeast, midwest, south, west, or other)
- Size of the school [small (<5,000 students), medium (5,000 to 15,000 students), or large (>15,000 students)]
- School affiliation (public, private, for-profit, or religious-affiliated)

A frequency table for these variables is presented in Chapter 4.

Agency for Healthcare Research and Quality Hospital Survey on Patient Safety Culture

The AHRQ HSOPSC consists of 12 dimensions measured by 42 five-point Likert scale items (Sorra & Nieva, 2004). The 12 dimensions, the Cronbach's alpha of each dimension, and the associated items for each dimension of the HSOPSC are, respectively:

I. Teamwork within Units ($\alpha = .83$)
   A. People support one another in this unit.
   B. When a lot of work needs to be done quickly, we work together as a team to get the work done.
   C. In this unit, people treat each other with respect.
   D. When one area in this unit gets really busy, others help out.

II. Supervisor/Manager Expectations and Actions Promoting Patient Safety ($\alpha = .75$)
   A. My supervisor/manager says a good word when he/she sees a job done according to established patient safety procedures.

B. My supervisor/manager seriously considers staff suggestions for improving patient safety.

C. Whenever pressure builds up, my supervisor/manager wants us to work faster, even if it means taking shortcuts. (reverse worded)

D. My supervisor/manager overlooks patient safety problems that happen over and over. (reverse worded)

III. Organizational Learning-Continuous Improvement (α =.76)

A. We are actively doing things to improve patient safety.

B. Mistakes have led to positive changes here.

C. After we make changes to improve patient safety, we evaluate their effectiveness.

IV. Hospital Management Support for Patient Safety (α =.83)

A. Hospital management provides a work climate that promotes patient safety.

B. The actions of hospital management show that patient safety is a top priority.

C. Hospital management seems interested in patient safety only after an adverse event happens. (reverse worded)

V. Overall Perceptions of Patient Safety (α =.74)

A. Patient safety is never sacrificed to get more work done.

B. Our procedures and systems are good at preventing errors from happening.

C. It is just by chance that more serious mistakes don't happen around here. (reverse worded)

D. We have patient safety problems in this unit. (reverse worded)

VI. Feedback and Communication about Error (α =.78)

A. We are given feedback about changes put into place based on event reports.

B. We are informed about errors that happen in this unit.

C. In this unit, we discuss ways to prevent errors from happening again.

VII. Communication Openness (α = .72)

A. Staff will freely speak up if they see something that may negatively affect patient care.

B. Staff feel free to question the decisions or actions of those with more authority.

C. Staff are afraid to ask questions when something does not seem right. (reverse worded)

VIII. Frequency of Events Reported (α =.84)

A. When a mistake is made, but is caught and corrected before affecting the patient, how often is this reported?

B. When a mistake is made, but has no potential to harm the patient, how often is this reported?

C. When a mistake is made that could harm the patient, but does not, how often is this reported?

IX. Teamwork across Units (α =.80)

A. There is good cooperation among hospital units that need to work together.

B. Hospital units work well together to provide the best care for patients.

C. Hospital units do not coordinate well with each other. (reverse worded)

D. It is often unpleasant to work with staff from other hospital units. (reverse worded)

X. Staffing (α =.63)

A. We have enough staff to handle the workload.

B. Staff in this unit work longer hours than is best for patient care. (reverse worded)

C. We use more agency/temporary staff than is best for patient care. (reverse worded)

D. We work in "crisis mode," trying to do too much, too quickly. (reverse worded)

XI. Handoffs and Transitions (α =.80)

A. Things "fall between the cracks" when transferring patients from one unit to another. (reverse worded)

B. Important patient care information is often lost during shift changes. (reverse worded)

C. Problems often occur in the exchange of information across hospital units. (reverse worded)

D. Shift changes are problematic for patients in this hospital. (reverse worded)

XII. Nonpunitive response to Errors (α =.79)

A. Staff feel like their mistakes are held against them. (reverse worded)

B. When an event is reported, it feels like the person is being written up, not the problem. (reverse worded)

C. Staff worry that mistakes they make are kept in their personnel file. (reverse worded)

The responses for dimensions 1-5 and 9-12 are measured on a 5-point Likert scale with 1=Strongly Disagree, 2=Disagree, 3=Neither Agree nor Disagree, 4=Agree, and 5=Strongly Agree. The responses for dimensions 4-8 are measured on a 5-point Likert scale with 1=Never, 2=Rarely, 3=Sometimes, 4=Most of the Time, and 5=Always (Sorra & Nieva, 2004). In addition, the HSOPSC includes two additional outcome measures: an overall patient safety grade

with A=Excellent, B=Very Good, C=Acceptable, D=Poor, and E=Failing; and the number of events reported (AHRQ, 2016a). A comparative database report is currently published by the AHRQ every two years, with the most recent report published in 2016. This database allows researchers to compare their facility's safety culture with a national composite, provides data to facilitate targeted safety improvement projects, allows for identification of strengths and weaknesses, and identifies trends in safety culture (AHRQ, 2016a). The 2016 comparative data base for the HSOPSC included responses from 680 hospitals and 447,584 individual respondents, 36% of whom were nurses (AHRQ, 2016a). Findings from 2016 were consistent with those from recent years. Areas of strength in safety culture include teamwork within units, supervisor/manager expectations and actions promoting patient safety, and organizational learning (AHRQ, 2016a). The lowest scoring dimensions were nonpunitive response to error, handoffs and transitions, and staffing (AHRQ, 2016a).

The HSOPSC was initially pilot tested on 1,400 hospital employees from 21 hospitals in the United States (Sorra & Nieva, 2004). At the time of this study, the HSOPSC was a publically available instrument sponsored by the AHRQ. The instrument was available in a modifiable MS Word document at on the AHRQ website (www.ahrq.gov). Sorra and Nieva (2004) advised that terminology could be changed to reflect the terms used in a particular facility. Sorra and Nieva (2004) also recommended that, if items were deleted, all items associated with that dimension should be removed. A representative of Westat, the company that supports and manages the HSOPSC for the AHRQ, granted explicit permission to this researcher to modify the survey for my research purposes (N. Teixeira, personal communication, April 24, 2014). In August, 2017, after the conclusion of this study, the AHRQ (2017b) posted notification that they were seeking trademark status for the Surveys on Patient Safety Culture

(SOPS). While the surveys remain modifiable, surveys with substantive modifications are no longer able to use the SOPS designation. Furthermore, the AHRQ indicates that modifications make the surveys incomparable with other SOPS survey tools (AHRQ, 2017b). The researcher sought clarification from Westat. The company gave permission to use the modified HSOPSC as part of this study with the stipulation that the researcher indicate that it was adapted from the HSOPSC (T. Famolaro, personal communication, September 20, 2017).

The initial tool developed by the AHRQ to measure patient safety culture was written for hospital use (Sorra & Nieva, 2004). Since that time, the tool has been modified to reflect various settings including medical offices, nursing homes, community pharmacies, and ambulatory surgery centers. This study addresses a new setting for safety culture, schools of nursing. Therefore, it is necessary to revise terminology to reflect the educational setting. These changes include replacing the following wording:

- *Unit* changed to *clinical* or *clinical group*
- *Staff* changed to *students*
- *Supervisor/manager* changed to *faculty*
- *Hospita*l changed to *school of nursing*
- *Shift change* changed to *start or end of the clinical day*
- *Work climate* changed to *learning climate*

Examples of how these changes are reflected in the items include a change from the original item, "Staff are afraid to ask questions when something does not seem right" to "Students are afraid to ask questions when something does not seem right" or, the original, "Hospital management provides a work climate that promotes patient safety" to "School of nursing faculty provide a learning climate that promotes patient safety." These changes are consistent with those

made during other modifications of the instrument. Wording of the instrument was otherwise retained.

Dimensions nine and ten were removed from the survey for this study's purposes, as issues of staffing and teamwork across units were not considered relevant to the educational setting and are beyond the control of the nurse educator. Thus, for this study, the modified HSOPSC consists of a) 10 dimensions measured by 34 five-point Likert scale items; b) two questions not covered by the dimensions (patient safety grade and number of events reported); c) demographic questions; and d) one question with a free-text box. Though any statements in the free-text box will not be used for the purposes of this study, the original instrument does contain an option for free-text and that will be retained in the modified instrument. This information may provide data that could be useful in identifying areas for future study.

Procedures

Informed Consent

Institutional Review Board (IRB) approval was obtained from East Tennessee State University and the researcher's employer, Austin Peay State University. Signed documentation of informed consent was not obtained for this study. Polit and Beck (2012) indicated that documentation of informed consent may be waived when the study does not involve an intervention and data are collected anonymously. Informed consent information was provided to participants on the initial page of the survey platform; however, participants were not be asked to sign an informed consent document. Obtaining signed informed consent would hinder survey anonymity (Sue & Ritter, 2007). Instead, consent was obtained when the participant clicked into the survey after reading the consent document. Polit and Beck (2012) indicated that this is consistent with studies in which the data is collected by self-administered questionnaire.

Participants could exit the survey at any time prior to submitting their completed questionnaire and withdraw from the study without penalty.

Risk/Benefit

Participant risk was minimal. Polit and Beck (2012) stated that minimal risk involves risk no greater than the participant would encounter in daily life or in competing routine tests or procedures. A web-based questionnaire is consistent with this definition of minimal risk. Some survey questions regarding error may result in emotional distress or discomfort to the participant. The participant had the option to opt out of any question and had the option to not submit their responses at the end of the survey. Participants were able to exit the survey at any time before the survey was completed and submitted. When a participant exited the survey before submitting no data was retained on the Survey Monkey® platform and no data was transmitted to the PI. Participants who participated in the survey may have benefited by increasing their awareness of safety culture principles. Completion of the survey may also indirectly benefit the participant by improving safety culture in schools of nursing in the future. Creating a safety culture within schools of nursing may improve safety culture in hospitals as students who are enculturated into those principles during their education are more likely to carry that culture into their professional practice.

Confidentiality

Data transmission. Survey Monkey® allows for Secure Sockets Layer (SSL) encryption, which is a security protocol that creates a secure connection between the client and the server and encrypts sensitive information (Survey Monkey®, n.d.). In addition, the platform allows for the option to turn off Internet Protocol (IP) addresses to ensure anonymity of respondents. This survey was conducted anonymously. Electronically administered

questionnaires are particularly suited to maintaining participant anonymity (Polit & Beck, 2012). No participant names, birthdates, or identifying numbers were collected. The survey link was sent by the NSNA. The NSNA does not provide e-mail addresses and the researcher did not have access to any NSNA member data.

Data management. After all data was collected in the online platform, the data was transferred to the PI's personal, password protected computer. Data was transferred to Microsoft Excel spreadsheet software and Statistical Package for the Social Sciences (SPSS) software version 24 which was accessible only to the PI. Data backup is housed on a password protected flash drive stored in a locked file cabinet in the PI's office.

Data Collection

The researcher sent the survey URL link and an explanatory e-mail to a representative of the NSNA. The NSNA representative e-mailed this information via a "blast" e-mail message to all NSNA members. Participants were provided with information about the study and a URL link to the survey which was conducted via the platform Survey Monkey®. During data collection, the data was housed on the Survey Monkey® platform. Confidentiality of this platform is described above. Access to survey data is only available to the PI and is password protected. Data collection continued for a period of two weeks after the initial e-mail was sent. After the two week period the survey was closed and the data was transferred to the PI's personal, password protected computer as described above.

Data Analysis

Data was analyzed using SPSS version 24. Frequency tables were used to represent participant demographics. Frequency tables and descriptive statistics were used to present the survey data collected from the modified HSOPSC. Surveys that were submitted with no

responses and surveys that were submitted with all responses marked the same were omitted from analysis as advised by the AHRQ (2016b) HSOPSC user guide. The AHRQ (2016b) indicated that surveys that have all responses marked the same should be excluded from analysis since the reverse wording of some survey items would make this result unlikely in a legitimate survey response. The data for each research question were analyzed as described below.

Research question one. RQ1 is: Does this modified version of the HSOPSC, administered to pre-licensure nursing students in the US, maintain reliability and validity when compared to the psychometric properties of the HSOPSC as reported by Sorra and Dyer (2010)? The Cronbach's alpha for each of the ten dimensions of the modified HSOPSC was calculated. Individual-level factor analysis was conducted as used by Sorra and Dyer (2010). Sorra and Dyer (2010) analyzed the factor loadings for each item within a dimension and considered items with a factor loading of equal to or greater than .40 to have an adequate contribution to the dimension. Additionally, these researchers analyzed the percent of variance accounted for by each dimension and considered 50% of the variance accounted for by a dimension to validate the adequacy of the dimension (Sorra & Dyer, 2010). These methods and reference points were also used to answer RQ1 for this study

Research question two. RQ2 is: What is the pre-licensure nursing student perception of patient safety culture in schools of nursing in the US as measured by the modified HSOPSC? This question was answered using percentage of positive responses for each of the ten dimensions of the modified SOPSC. For each dimension composite scores were calculated by averaging the responses of each item in the dimension. Negatively worded items were reverse scored before computation of the composite score. A composite score greater than or equal to four indicated a positive response to the dimension. Thus, for each dimension a binary response

of either positive or not positive was calculated. With nominal level data, calculating percentage is one of the only available levels of analysis (Polit & Beck, 2012). This type of descriptive statistic is also appropriate for exploring and providing a beginning understanding a concept (Plichta & Kelvin, 2013).

Percentage of positive responses for each dimension were computed by dividing the number of respondents with positive responses by the total number of respondents. A higher percentage of positive responses indicates a more positive perception of the patient safety culture dimension. This calculation is recommended by AHRQ (2016b) to evaluate item and dimension scores for the original HSOPSC. Retaining the same method of calculation allowed for comparison between the modified HSOPSC and aggregate national data for the original HSOPSC as outlined in RQ3.

Research question three. RQ3 is: How does aggregate national data on perceptions of patient safety culture in hospitals as measured by the HSOPSC and reported by the AHRQ (2016a) compare to pre-licensure student perceptions of patient safety culture in schools of nursing in the US as measured by this modified version of the HSOPSC? A two-tailed, one sample z-test for proportions was employed to answer RQ3. In order to use this method, $np_0 \geq 10$ and $n(1 - p_0) \geq 10$ (Pennsylvania State University, 2017), where n is the sample size and p_0 is the percentage of positive responses for each dimension of the HSOPSC as reported by the AHRQ (2016a). For each dimension of the HSOPSC, the one sample z-test for proportions was used to compare the observed percentage of positive responses in pre-licensure nursing students to the percentage of positive responses for hospitals reported by the AHRQ (2016a). A p-value less than 0.05 indicates significance.

Limitations

There are limitations with regard to the setting and sample. Coverage error is often a concern with online surveys (Sue & Ritter, 2007). It may be argued that the sample in survey research conducted online is not representative of the general population as it is limited to those who have access to and use the internet. However, this concern is mitigated when populations such as college students, professionals, or others with ubiquitous internet use are being studied (Sue & Ritter, 2007). Due to the population of this study the concern of coverage error is minimal. The convenience sample of SNA members limits generalizability of findings; however, membership of the SNA is diverse and is representative of the student nurse population as a whole, both geographically and by program type, which decreases the threat to external validity.

Conclusions

The HSOPSC is a reliable and valid instrument developed for the AHRQ to measure safety culture in the hospital setting. It has been modified and adapted for use in other settings. This study modified the instrument for use in schools of nursing. The researcher distributed this study to members of the NSNA electronically using a survey platform. The reliability and validity of the modified HSOPSC for use with pre-licensure nursing students was evaluated. Descriptive statistics were used to determine the perception of safety culture among pre-licensure registered nursing students as measured by the modified HSOPSC. Finally, the study compared pre-licensure nursing student perception of safety culture in the modified HSOPSC to aggregate national data on hospital safety culture as measured by the HSOPSC (AHRQ, 2016a) using a one sample z-test for proportion. This study also normed the modified HSOPSC for schools of

nursing. This chapter has provided a detailed description of the design, instrument, and research methods used in this study.

CHAPTER 4

RESULTS

The purpose of this study was to examine the state of patient safety culture as perceived by students in pre-licensure nursing programs in the US using a modified version of the HSOPSC. This chapter presents the results of data analysis for this quantitative survey.

Demographics

An e-mail was sent by a NSNA representative to their member list on June 26, 2017. This e-mail briefly described the survey and contained a link to the survey platform. The survey was open from June 26, 2017 until July 9, 2017. The e-mail was sent to 62,562 NSNA members. The NSNA representative reported that 4,001 of those e-mails were returned as undeliverable, leaving 58,561 potential survey participants. Of those potential participants, 15,121 viewed the e-mail message (D. Mancino, personal communication, July 14, 2017). One thousand ninety-seven potential participants clicked on the URL link and entered the Survey Monkey platform. Nine hundred eighteen participants read the informed consent document and agreed to participate in the survey. The response rate for the survey was calculated by dividing the number of participants who consented to participate by the number of e-mails viewed (918/15,121). This calculation results in a 6% response rate.

Participants who consented to participate in the study were excluded from data analysis if they answered all survey questions with the same answer. Due to reverse-scoring of some items, the AHRQ (2016b) recommends excluding these participants. Participants who indicated that they were enrolled in a bachelor of science in nursing completion program for currently licensed RNs, or who indicated that they were enrolled in a graduate level program were also excluded from analysis. Finally, participants who were missing responses for any of the 34 survey

questions were excluded, though participants who were missing responses to demographic questions or other items that did not impact the survey dimensions were included. During data analysis an unanticipated group of participants emerged. Because of the timing of the survey, there were some participants (n = 33) that had just graduated from their program of study, but were not licensed RNs. These participants were included in the data analysis. It should be noted that many participants (n = 307) agreed to participate, but did not answer any survey questions after they consented. The final sample size for this study was 539 participants.

The most common type of program represented was Bachelors of Science in Nursing (67%). The participants were mostly female (91.6%), age 18-24 (40.8%), and identified their ethnicity as white or Caucasian (74.2%). Fourth semester students were the most frequently represented level (34.8%). The most common school location was the south (37.8%). Participants indicated that they attended medium sized (41.8%), public institutions (58.9%) most frequently. Table 1 illustrates the demographic data for the sample.

Table 1

Participant Demographics

Variable	Response	Frequency (%)
Type of program	Bachelors of science in nursing	361 (67.0)
	Associates degree in nursing	172 (31.9)
	Diploma	6 (1.1)
Student level	1st semester	28 (5.2)
	2nd semester	82 (15.4)
	3rd semester	128 (24.0)
	4th semester	186 (34.8)
	5th semester	77 (14.4)
	Recent graduate	33 (6.2)
Gender	Female	489 (91.6)
	Male	45 (8.4)
Age	18-24	220 (40.8)
	25-34	173 (32.1)

Variable	Response	Frequency (%)
	35-44	88 (16.3)
	45-54	45 (8.3)
	55-64	10 (1.9)
	65-74	2 (0.4)
	75 or order	1 (0.2)
Ethnicity	American Indian or Alaskan Native	5 (1.0)
	Asian/Pacific Islander	21 (4.0)
	Black or African American	37 (7.0)
	Hispanic	45 (8.5)
	White/Caucasian	392 (74.2)
	Multiple ethnicity/Other	28 (5.3)
School location	Northeast	125 (24.0)
	Midwest	109 (20.9)
	South	197 (37.8)
	West	90 (17.3)
School size	Small – less than 5000 students	192 (36.4)
	Medium – 5000to 15000 students	221 (41.8)
	Large – over 15000 students	115 (21.8)
School affiliation	Public	313 (58.9)
	Private	107 (20.2)
	For profit	11 (2.1)
	Religious	7 (1.3)
	Public/Religious	2 (0.4)
	Public/For Profit	4 (0.8)
	Private/Religious	66 (12.4)
	Private/For profit	16 (3.0)
	Other	5 (0.9)

Note. N = 539. Missing values for variables: student level (5), gender (5), ethnicity (11), school location (18), school size (11), school affiliation (8)

Survey Items

The survey was modified to reflect terminology related to the nursing student population. Two dimensions, staffing and teamwork across units, were removed from the survey as described in Chapter 3. In addition to the demographic questions provided above, the final modified HSOPSC consisted of 10 dimensions measured by 34 five-point Likert scale items, and two items not covered by the dimensions (patient safety grade and number of events reported).

The coding and location of items within the survey as described by Sorra and Dyer (2010) was retained to allow for more efficient comparison between the two surveys. The modified HSOPSC codes, items, and dimensions are illustrated in Table 2.

Table 2

Modified HSOPSC Codes, Items, and Dimensions

Code	Item	Dimension
a1	People support one another in my clinical	Teamwork within groups (units)
a3	When a lot of work needs to be done quickly, we work together as a team to get the work done	Teamwork within groups (units)
a4	In my clinical, people treat each other with respect	Teamwork within groups (units)
a6	We are actively doing things to improve patient safety	Organizational learning-continuous improvement
a8r	Students feel like their mistakes are held against them	Nonpunitive response to error
a9	Mistakes have led to positive changes	Organizational learning-continuous improvement
a10r	It is just by chance that more serious mistakes don't happen around here	Overall perceptions of patient safety
a11	When one person in the group gets really busy, others help out	Teamwork within groups (units)
a12r	When an event is reported, it feels like the student is being written up, not the problem	Nonpunitive response to error
a13	After changes are made to improve patient safety, the effectiveness of the change is evaluated	Organizational learning-continuous improvement
a15	Patient safety is never sacrificed to get more done	Overall perceptions of patient safety
a16r	Students worry that mistakes they make are kept in their file	Nonpunitive response to error

Code	Item	Dimension
a17r	We have patient safety problems in clinical	Overall perceptions of patient safety
a18	Our procedures and systems are good at preventing errors from happening	Overall perceptions of patient safety
b1	My faculty says a good word when he/she sees a job done according to established patient safety procedures	Faculty (manager) expectations and actions promoting patient safety
b2	My faculty seriously considers student suggestions for improving patient safety	Faculty (manager) expectations and actions promoting patient safety
b3r	Whenever pressure builds up, my faculty wants us to work faster, even if it means taking shortcuts	Faculty (manager) expectations and actions promoting patient safety
b4r	My faculty overlooks patient safety problems that happen over and over	Faculty (manager) expectations and actions promoting patient safety
c1	We are given feedback about changes put into place based on patient safety events	Feedback and communication about error
c2	Students will freely speak up if they see something that may negatively affect patient care	Communication openness
c3	We are informed about errors that happen in this clinical area	Feedback and communication about error
c4	Students feel free to question the decisions or actions of those with more authority	Communication openness
c5	In this clinical group, we discuss ways to prevent errors from happening again	Feedback and communication about error
c6r	Students are afraid to ask questions when something does not seem right	Communication openness

Code	Item	Dimension
d1	When a mistake is made, but is caught and corrected before affecting the patient, how often is this reported?	Frequency of events reported
d2	When a mistake is made, but has no potential to harm the patient, how often is this reported?	Frequency of events reported
d3	When a mistake is made that could harm the patient, but does not, how often is this reported?	Frequency of events reported
f1	School of nursing faculty provide a learning climate that promotes patient safety	Faculty (Management) support for patient safety
f3r	Things "fall between the cracks" when transferring patient care	Handoffs and transitions
f5r	Important patient care information is often lost during the start or end of the student's clinical day	Handoffs and transitions
f7r	Problems often occur in the exchange of information between students and clinical facility staff	Handoffs and transitions
f8	The actions of school of nursing faculty show that patient safety is a top priority	Faculty (Management) support for patient safety
f9r	School of nursing faculty seem interested in patient safety only after an adverse event happens	Faculty (Management) support for patient safety
f11r	The start or end of the student's clinical day is problematic for patients in the clinical environment	Handoffs and transitions

Note. Codes ending in r indicate a negatively worded item. Wording of the dimensions reflects the modified HSOPSC with the original wording of the HSOPSC indicated in parentheses.

The response options for the first 18 items (a1-b4r) and the last seven items (f1-f11r) were 1 = strongly disagree, 2 = disagree, 3 = neither, 4 = agree, and 5 = strongly agree. The responses for items c1-d3 were 1 = never, 2 = rarely, 3 = sometimes, 4 = most of the time, and 5 = always. The responses to these survey items are presented in Table 3.

Table 3

Summary of Participant Responses for Modified HSOPSC Items

	Frequency (%) of survey responses					
	1	2	3	4	5	Mean (SD)
a1	5 (0.9)	19 (3.5)	15 (2.8)	246 (45.6)	254 (47.1)	4.35 (0.78)
a3	5 (0.9)	31 (5.8)	41 (7.6)	255 (47.3)	207 (38.4)	4.17 (0.87)
a4	3 (0.6)	23 (4.3)	27 (5.0)	261 (48.4)	225 (41.7)	4.27 (0.79)
a6	6 (1.1)	14 (2.6)	54 (10.0)	275 (51.0)	190 (35.3)	4.17 (0.79)
a8r	49 (9.1)	203 (37.7)	111 (20.6)	125 (23.2)	51 (9.5)	2.86 (1.16)
a9	5 (0.9)	33 (6.1)	122 (22.6)	291 (54.0)	88 (16.3)	3.79 (0.82)
a10r	129 (23.9)	262 (48.6)	83 (15.4)	56 (10.4)	9 (1.7)	2.17 (0.97)
a11	8 (1.5)	49 (9.1)	46 (8.5)	304 (56.4)	132 (24.5)	3.93 (0.91)
a12r	51 (9.6)	159 (29.5)	180 (33.4)	114 (21.2)	35 (6.5)	2.86 (1.06)
a13	5 (0.9)	41 (7.6)	154 (28.6)	279 (51.8)	60 (11.1)	3.65 (0.81)
a15	19 (3.5)	66 (12.2)	52 (9.6)	202 (37.5)	200 (37.1)	3.92 (1.13)
a16r	45 (8.3)	151 (28.0)	69 (12.8)	186 (34.5)	88 (16.3)	3.22 (1.25)
a17r	120 (22.3)	253 (46.9)	72 (13.4)	80 (14.8)	14 (2.6)	2.29 (1.05)
a18	6 (1.1)	25 (4.6)	56 (10.4)	322 (59.7)	130 (24.1)	4.01 (0.80)
b1	5 (0.9)	46 (8.5)	24 (4.5)	246 (45.6)	218 (40.4)	4.16 (0.92)
b2	12 (2.2)	56 (10.4)	92 (17.1)	263 (48.8)	116 (21.5)	3.77 (0.98)
b3r	198 (36.7)	255 (47.3)	49 (9.1)	31 (5.8)	6 (1.1)	1.87 (0.88)
b4r	256 (47.5)	200 (37.1)	46 (8.5)	30 (5.6)	7 (1.3)	1.76 (0.92)
c1	13 (2.4)	61 (11.3)	135 (25.0)	177 (32.8)	153 (28.4)	3.73 (1.07)
c2	7 (1.3)	38 (7.1)	125 (23.2)	197 (36.5)	172 (31.9)	3.91 (0.97)

	Frequency (%) of survey responses					
	1	2	3	4	5	Mean (SD)
c3	22 (4.1)	62 (11.5)	147 (27.3)	178 (33.0)	130 (24.1)	3.62 (1.09)
c4	56 (10.4)	149 (27.6)	161 (29.9)	116 (21.5)	57 (10.6)	2.94 (1.15)
c5	9 (1.7)	34 (6.3)	92 (17.1)	160 (29.7)	244 (45.3)	4.11 (1.01)
c6r	97 (18.0)	164 (30.4)	202 (37.5)	57 (10.6)	19 (3.5)	2.51 (1.02)
d1	33 (6.1)	106 (19.7)	132 (24.5)	138 (25.6)	130 (24.1)	3.42 (1.22)
d2	35 (6.5)	100 (18.6)	133 (24.7)	129 (23.9)	142 (26.3)	3.45 (1.24)
d3	15 (2.8)	50 (9.3)	111 (20.6)	146 (27.1)	217 (40.3)	3.93 (1.11)
f1	2 (0.4)	5 (0.9)	24 (4.5)	225 (41.7)	283 (52.5)	4.45 (0.66)
f3r	96 (17.8)	253 (46.9)	110 (20.4)	71 (13.2)	9 (1.7)	2.34 (0.97)
f5r	136 (25.2)	267 (49.5)	63 (11.7)	64 (11.9)	9 (1.7)	2.15 (0.99)
f7r	98 (18.2)	263 (48.8)	84 (15.6)	81 (15.0)	13 (2.4)	2.35 (1.02)
f8	2 (0.4)	13 (2.4)	37 (6.9)	181 (33.6)	306 (56.8)	4.44 (0.76)
f9r	226 (41.9)	214 (39.7)	42 (7.8)	39 (7.2)	18 (3.3)	1.90 (1.04)
f11r	164 (30.4)	231 (42.9)	105 (19.5)	27 (5.0)	12 (2.2)	2.06 (0.95)

Note. N = 539. SD = standard deviation

The survey contained two items that are not included in the 10 dimensions, patient safety grade and number of events reported. Over 86% of participants gave their clinical a patient safety grade of excellent (37.3%) or very good (48.8%). Most participants indicated that they had no reported errors or near-misses in the past 12 months. The responses to these two items are illustrated in Table 4.

Table 4

Summary of Participant Responses to Items not Affiliated with Dimensions

Item	Response	Frequency (%)
Patient safety grade	Excellent	201 (37.3)
	Very good	263 (48.8)
	Acceptable	64 (11.9)
	Poor	10 (1.9)
	Failing	1 (0.2)
Number of events reported	No event reports	479 (88.9)
	1 to 2 event reports	53 (9.8)
	3 to 5 event reports	6 (1.1)
	6 event reports	1 (0.2)

Note. N = 539. The item *patient safety grade* = Please give your clinical an overall grade on patient safety. The item *number of events reported* = In the past 12 months, how many event reports (reports of errors or near-misses) have you filled out and submitted (or have faculty/hospital staff submitted on your behalf?

Research Question Results

This section describes the process and results of data analysis for each of the three research questions.

Research Question One

RQ1 is: Does this modified version of the HSOPSC, administered to pre-licensure nursing students in the US, maintain reliability and validity when compared to the psychometric properties of the HSOPSC as reported by Sorra and Dyer (2010)? The Cronbach's alpha for each of the ten dimensions of the modified HSOPSC was calculated. Individual-level factor analysis was also conducted. The methods and reference points described by Sorra and Dyer (2010) were also used to answer RQ1 for this study.

Reliability. The Cronbach's alpha coefficients for the 10 dimensions of the modified HSOPSC ranged from 0.632 to 0.848. Values of $\alpha \geq 0.70$ are generally considered acceptable.

However, Nunnally (1967) stated that values of $\alpha \geq 0.50$ are sufficient at the early stages of research. Additionally, Cronbach's alpha values are affected by the number of items, with fewer items potentially decreasing alpha values, even when reliability is acceptable (Field, 2009). The alpha values for all dimensions except organizational learning-continuous improvement ($\alpha = 0.632$) and overall perceptions of patient safety ($\alpha = 0.669$) were greater than 0.70, indicating acceptable reliability for the modified HSOPSC. Table 5 lists the Cronbach's alpha for each of the 10 dimensions of the modified HSOPSC.

Table 5

Cronbach's Alpha for Modified HSOPSC Dimensions

Dimension	Contributing Items	α
Teamwork within groups	a1, a3, a4, a11	0.843
Faculty expectations and actions promoting patient safety	b1, b2, b3r, b4r	0.732
Organizational learning - continuous improvement	a6, a9, a13	0.632
Faculty support for patient safety	f1, f8, f9r	0.751
Feedback and communication about error	c1, c3, c5	0.759
Frequency of events reported	d1, d2, d3	0.848
Overall perceptions of patient safety	a10r, a15, a17r, a18	0.669
Communication openness	c2, c4, c6r	0.730
Handoffs and transitions	f3r, f5r, f7r, f11r	0.818
Nonpunitive response to error	a8r, a12r, a16r	0.729

Validity. Individual-level factor analysis was conducted as described by Sorra and Dyer (2010). The results of the confirmatory factor analysis are presented in Tables 6 and 7. The absolute values of factor loadings for each item within a dimension were all greater than 0.40

(Table 6), indicating the item's adequate contribution to the dimension (Sorra & Dyer, 2010). The percent of variance accounted for by each dimension was greater than 50% (Table 7) indicating that it is justifiable to combine the items within the dimension into a single composite score (Sorra & Dyer, 2010). Thus, the modified HSOPSC, administered to pre-licensure nursing students, maintained its validity.

Table 6

Factor Loading for Modified HSOPSC

	Factors									
Item	1	2	3	4	5	6	7	8	9	10
a1	0.841									
a3	0.839									
a4	0.718									
a11	0.653									
b1		0.669								
b2		0.613								
b3r		-0.696								
b4r		-0.579								
a6			0.613							
a9			0.547							
a13			0.653							
f1				0.811						
f8				0.837						
f9r				-0.583						
c1					0.743					
c3					0.722					
c5					0.682					
d1						0.724				
d2						0.963				
d3						0.745				
a10r							-0.537			
a15							0.509			
a17r							-0.641			
a18							0.682			

	Factors									
Item	1	2	3	4	5	6	7	8	9	10
c2								0.678		
c4								0.717		
c6r								-0.676		
f3r									0.705	
f5r									0.821	
f7r									0.738	
f11r									0.650	
a8r										0.719
a12r										0.727
a16r										0.630

Note. Factor 1 = Teamwork within groups, factor 2 = Faculty expectations and actions promoting patient safety, factor 3 = Organizational learning - continuous improvement, factor 4 = Faculty support for patient safety, factor 5 = Feedback and communication about error, factor 6 = Frequency of events reported, factor 7 = Overall perceptions of patient safety, factor 8 = Communication openness, factor 9 = Handoffs and transitions, factor 10 = Nonpunitive response to error.

Table 7

Percent of Variance by Dimension of the Modified HSOPSC

Dimension	Percent of variance
Teamwork within groups	68.644
Faculty expectations and actions promoting patient safety	55.658
Organizational learning - continuous improvement	57.622
Faculty support for patient safety	69.978
Feedback and communication about error	67.487
Frequency of events reported	76.853
Overall perceptions of patient safety	51.300
Communication openness	65.110
Handoffs and transitions	64.798
Nonpunitive response to error	65.231

Exploratory factor analysis. While the modified instrument demonstrated adequate reliability and validity, due to the borderline reliability and validity of two dimensions, an exploratory factor analysis was undertaken following the initial data analysis to determine if the items and dimensions could be reconfigured for this population and setting. This factor analysis (Appendix C) indicated seven potential dimensions for the SON-COSS. Three of the original dimensions corresponded exactly with the dimensions used for this study: *Teamwork Within Groups*, *Frequency of Events Reported*, and *Nonpunitive Response to Error*. Four of the original dimensions combined into two new dimensions along common themes. *Faculty Expectations and Actions Promoting Patient Safety* and *Faculty Support for Patient Safety* combined into one new dimension that was re-named *Faculty Commitment to Patient Safety*. *Feedback and Communication about Error* and *Communication Openness* were combined into one new dimension that was renamed *Communication.* Two of the dimensions that demonstrated borderline validity in the confirmatory factor analysis, *Overall Perceptions of Patient Safety* and *Organizational Learning- Continuous Improvement* had items distributed along the two additional unnamed dimensions. The dimension of *Handoffs and Transitions* was also subsumed into one of these two dimensions. The items in these two new dimensions did not clearly fit into any identifiable category. The Cronbach's alpha for each of the seven new dimensions was also calculated (Table D2). The Cronbach's alpha demonstrated adequate reliability for six of the seven dimensions with one dimension, *Communication*, showing borderline reliability (α= 0.595).

Results. Based on calculation of the Cronbach's alpha and individual-level confirmatory factor analysis the modified HSOPSC, administered to pre-licensure nursing students in the US, maintained reliability and validity when compared to the psychometric properties of the

HSOPSC as reported by Sorra and Dyer (2010). While the exploratory factor analysis also demonstrated acceptable reliability and validity, it did not demonstrate overall improved reliability and validity from the initial confirmatory factor analysis.

Research Question Two

RQ2 is: What is the pre-licensure nursing student perception of patient safety culture in schools of nursing in the US as measured by the modified HSOPSC? This question was answered using the percentage of positive responses for each of the ten dimensions of the modified SOPSC. The percentage of positive responses to each of the ten dimensions of the modified HSOPSC is summarized in Table 8 and Figure 1. The percentage of positive responses ranged from 81.6% to 23.1%. Participants ranked faculty support for patient safety (81.6%), teamwork within groups (78.3%), and faculty expectations and actions promoting patient safety (68.6%) highest. The lowest percentage of positive responses were given for the dimensions of frequency of events reported (47.3%), communication openness (34%) and nonpunitive response to error (23%).

Table 8

Percent of Positive Responses by Dimension for the Modified HSOPSC

Patient safety culture composite	Percentage of positive responses
Teamwork within groups	78.3
Faculty expectations and actions promoting patient safety	68.6
Organizational learning - continuous improvement	58.4
Faculty support for patient safety	81.6
Feedback and communication about error	54.9
Frequency of events reported	47.3
Overall perceptions of patient safety	54.4
Communication openness	34.0
Handoffs and transitions	50.8
Nonpunitive response to error	23.0

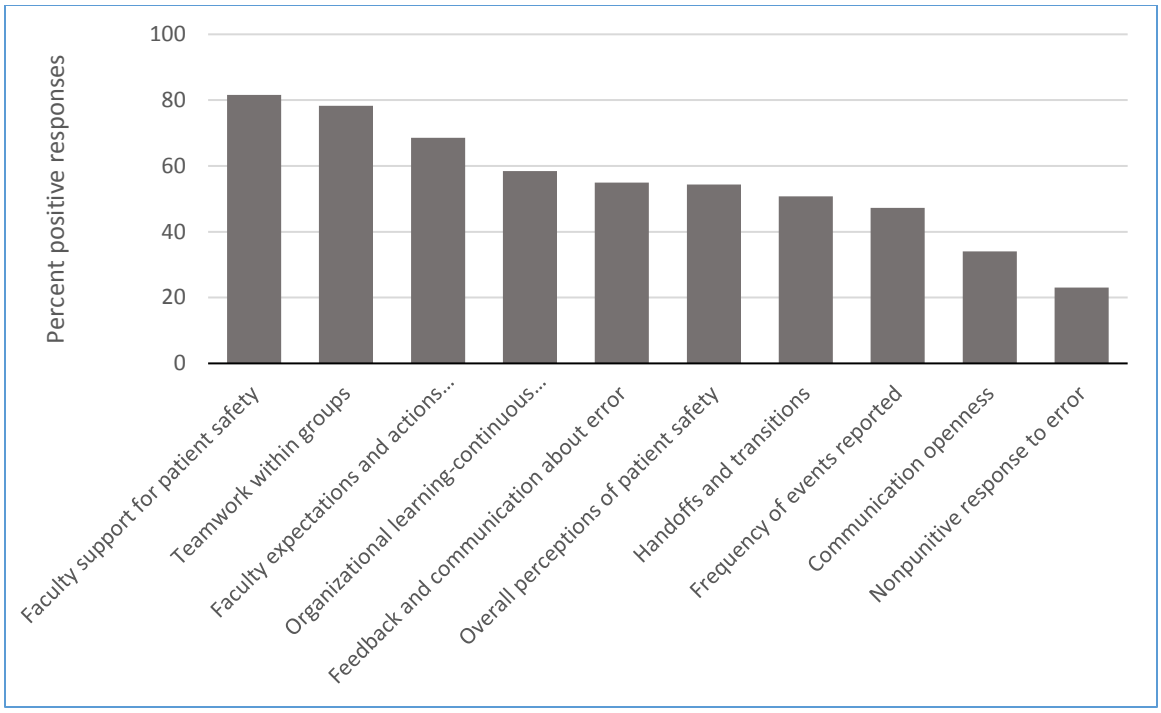

Figure 1. Percent positive responses for dimensions of the modified HSOPSC

Research Question Three

RQ3 is: How does aggregate national data on perceptions of patient safety culture in hospitals as measured by the HSOPSC and reported by the Agency for Healthcare Research and Quality (AHRQ, 2016a) compare to pre-licensure student perceptions of patient safety culture in schools of nursing in the US as measured by this modified version of the HSOPSC?

A two-tailed, one sample z-test for proportions was employed to answer RQ3. For each dimension of the HSOPSC, the one sample z-test for proportions was used to compare the observed percentage of positive responses in pre-licensure nursing students to the percentage of positive responses for hospitals reported by the AHRQ (2016a). A p-value less than 0.05 indicates significance. The results of this analysis are presented in Table 9 and Figure 3.

The results of this analysis indicate that for eight of the ten dimensions the percentage of positive results for pre-licensure nursing student perceptions of safety culture as measured by the

modified HSOPSC were significantly lower than aggregate national data on perceptions of patient safety culture in hospitals as measured by the HSOPSC and reported by the AHRQ (2016a). However, for one dimension of the modified HSOPSC (faculty support for patient safety = 81.6%) the responses were significantly higher for pre-licensure nursing students than the corresponding dimension of the HSOPSC (management support for patient safety = 72%). There was no statistically significant difference in one dimension (handoffs and transitions) of the modified HSOPSC when compared to national aggregate data for the HSOPSC.

Table 9

Comparison of Percentage of Positive Responses for Dimensions of the Modified HSOPSC and the Original HSOPSC as Reported by the AHRQ (2016)

Dimension	Percentage of positive responses, this study	Percentage of positive responses AHRQ (2016)	z-statistic	p-value
Teamwork within groups (units)	78.3	82	2.24	0.0254*
Faculty (manager) expectations and actions promoting patient safety	68.6	78	5.27	< 0.0001*
Organizational learning - continuous improvement	58.4	73	7.63	< 0.0001*
Faculty (management) support for patient safety	81.6	72	4.96	< 0.0001*
Feedback and communication about error	54.9	68	6.52	< 0.0001*
Frequency of events reported	47.3	67	9.73	< 0.0001*

Dimension	Percentage of positive responses, this study	Percentage of positive responses AHRQ (2016)	z-statistic	p-value
Overall perceptions of patient safety	54.4	66	5.69	< 0.0001*
Communication openness	34.0	64	14.51	< 0.0001*
Handoffs and transitions	50.8	48	1.30	0.1932
Nonpunitive response to error	23.0	45	10.27	< 0.0001*

Note. * indicates significance at the 0.05 level

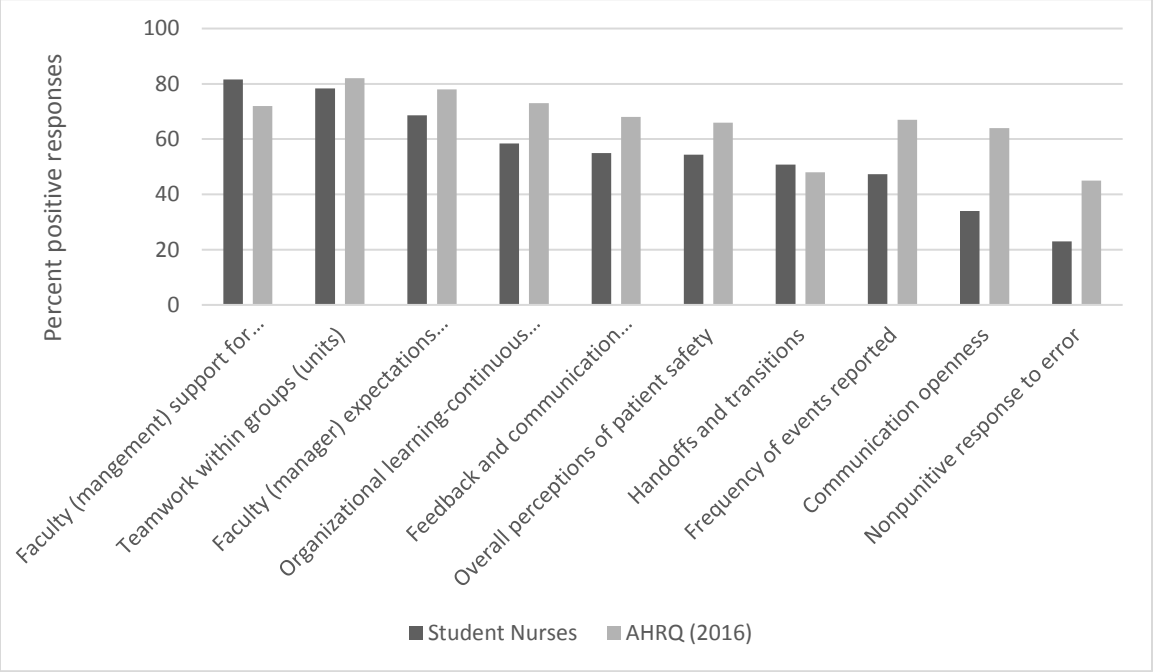

Figure 2. Percent positive responses for dimensions of the modified HSOPSC in student nurses compared to percent positive responses for dimensions of the HSOPSC as reported by the AHRQ (2016).

Summary

This chapter provides the results of data analysis for a modified version of the HSOPSC, administered electronically to pre-licensure nursing students in the US (N = 539). The modified HSOPSC was found to have maintained its reliability and validity with this population and with modifications to the instrument for use in this population. The perception of patient safety culture among pre-licensure nursing students ranged from 81.6% positive to 23% positive for the 10 dimensions of the modified HSOPSC. Participants ranked faculty support for patient safety (81.6%), teamwork within groups (78.3%), and faculty expectations and actions promoting patient safety (68.6%) highest. The lowest percentage of positive responses were given for frequency of events reported (47.3%), communication openness (34%), and nonpunitive response to error (23%). Pre-licensure nursing students perceived patient safety culture significantly lower for 8 out of 10 dimensions of the modified HSOPSC compared to aggregate national data on hospitals reported by the AHRQ (2016a). Pre-licensure nursing students perceived patient safety culture higher in the dimension of faculty (management) support for patient safety. One dimension of the HSOPSC, handoffs and transitions, was not significantly different between pre-licensure nursing students and aggregate national data for hospitals as reported by the AHRQ (2016a).

These findings, including implications and recommendations for future study, will be discussed in Chapter 5.

CHAPTER 5

DISCUSSION AND RECOMMENDATIONS

A positive safety culture has been demonstrated to be an important factor in high-reliability organizations (HROs), industries that function under complex and difficult conditions while maintaining high levels of safety (Weick & Sutcliffe, 2001). For almost 20 years, a culture of safety has been a goal in healthcare (IOM, 2000). However, Chassin and Loeb (2013) argued that no hospitals in the US have attained a safety culture as found in HROs. A lack of safety culture contributes to healthcare-associated error and adverse events, and may result in nurses leaving the profession due to burnout and the stress of becoming a second victim of error (Seays et al., 2013; Wu, 2000).

Since 2009 the Joint Commission has required that hospital systems evaluate safety culture. One of the most commonly used instruments to measure safety culture is the HSOPSC, a reliable and valid instrument for which aggregate national data is publically available. While the HSOPSC has been adapted for use in nursing homes, medical offices, pharmacies, and ambulatory surgery centers (AHRQ, 2016c), no safety culture instrument was found that has been adapted for use in the pre-licensure nursing student population. Evaluation of culture is important during students' professional formation. According to Leininger and McFarland (2002) enculturation is the process of learning to live by a culture, including its values, beliefs, and practices. Enculturation into the principles of safety culture is necessary in order for future nurses to contribute to a healthcare safety culture. However, there is a lack of information about the current state of safety culture in schools of nursing. This study provides benchmark data on the state of patient safety culture in schools of nursing and modifies an instrument to measure

safety culture for schools of nursing. This chapter provides a discussion of the findings from this study, nursing and theoretical implications, and suggestions for future research.

Summary of Findings

This study demonstrated that this instrument based on the HSOPSC, modified for use in and administered to pre-licensure nursing students in the US (N = 539), maintained its reliability and validity ($\alpha = 0.632$ to 0.848). Student nurses rated the dimension *Faculty Support for Patient Safety* (81.6%) significantly higher than the corresponding dimension in the HSOPSC, *Management Support for Patient Safety* (72%; p-value < 0.0001). Eight of the 10 dimensions of the modified version of the HSOPSC were rated significantly lower in the student nurse population than the corresponding dimension in the HSOPSC as reported by the AHRQ (p-values 0.0254 to <0.0001). One dimension, *Handoffs and Transitions*, showed no significant difference between the two surveys and groups (p-value = 0.1932). The lowest ranked dimension among participants in this study was *Nonpunitive Response to Error*, which had a positive response of 23% (p-value < 0.0001) among student nurses compared to 45% positive in HSOPSC aggregate national data (AHRQ, 2016a).

Discussion

Research Question One

To recall, RQ1 was: Does the modified version of the HSOPSC, administered to pre-licensure nursing students in the US, maintain reliability and validity when compared to the psychometric properties of the HSOPSC as reported by Sorra and Dyer (2010)? The psychometric properties of the modified survey are provided in Chapter 4. The modified HSOPSC demonstrated adequate reliability and validity when adapted for use in and administered to nursing students. The Cronbach's alpha ranged from 0.632 to 0.848 for each of

the 10 dimensions. Two dimensions, *Organizational Learning-Continuous Improvement* (α = 0.632) and *Overall Perceptions of Patient Safety* (α = 0.669) were below the commonly accepted Cronbach's alpha level of 0.70 for reliability, though they were above the level of 0.50 set by Nunally (1967) for early-stage research. These two dimensions also had borderline values for validity, with just over 50% of variance accounted for in individual level factor analysis. Reliability and validity were not improved overall by modifying the dimensions through exploratory factor analysis. Additional modifications to the wording of these two dimensions may enhance the reliability and validity of the modified instrument.

It should be noted that these two dimensions and the items they contain reflect the final subcomponent of safety culture as described by Reason and Hobbs (2003), a learning culture. The AHRQ (2016a) defined the dimension *Organizational Learning-Continuous Improvement* as, "the extent to which mistakes have led to positive changes and changes are evaluated for effectiveness" and the dimension of *Overall Perceptions of Patient Safety* as, "the extent to which procedures and systems are good at preventing errors and there is a lack of patient safety problems" (AHRQ, 2016a, p. 3). In order for a learning culture to exist, a culture of trust and a reporting culture are essential prerequisites (Reason & Hobbs, 2003). It is logical, therefore, that student nurses would have trouble accurately responding to items such as: *We are actively doing things to improve patient safety* (a6); *After changes are made to improve patient safety the effectiveness of the change is evaluated* (a13); or *Our procedures and systems are good at preventing errors from happening* (a18). Student nurses may not yet have the exposure to the prerequisite elements of safety culture that would allow them to recognize the presence or absence of elements of a learning culture in their clinical environment. As described in Chapter 2, a learning culture is the aspect of safety culture least represented in the nursing education

literature. Without data from a reporting culture, a learning culture cannot exist, and would not be recognizable to nursing students.

The modified HSOPSC used in this study is the first known safety culture instrument specifically for use in the student nurse population. Bowman et al. (2013) and Ramoni et al. (2014) used versions of the AHRQ Patient Safety Culture Surveys to measure safety culture in medical and dental students, respectively. However, no psychometric data on instrument modification or use in the student population was provided by these authors. Ramoni et al. (2014) stated that the researchers changed the wording of the Medical Office Survey on Patient Safety Culture (MOSOPS) to reflect the dental clinic environment, but with regard to reliability and validity, the authors reported that, "we felt confident relying upon the existing pilot testing of the MOSOPS" (Ramoni et al., 2014, p. 747). Bowman et al. (2013) used items from the HSOPSC, combined with the UCSF Department of Medicine Survey, as well as adding an additional dimension. While Bowman et al. (2013) reported that they, "conducted survey beta-testing for language and ease of completion" (p. 803), no data regarding the modified instrument's reliability or validity were provided.

The findings from RQ1 may contribute to current knowledge of patient safety culture by demonstrating the reliability and validity of a modified instrument to measure safety culture in a previously untested population. Based on the results of the confirmatory and exploratory factor analysis, it is suggested that the dimensions of *Overall Perceptions of Patient Safety* and *Organizational Learning- Continuous Improvement* be omitted from future studies of nursing students. It is recommended that other dimensions be retained, resulting in an instrument with 27 items, measuring eight dimensions.

Research Question Two

RQ2 was: What is the pre-licensure nursing student perception of patient safety culture in schools of nursing in the US as measured by the modified HSOPSC? The percent positive responses for each of the 10 dimensions of the modified HSOPSC ranged from 81.6% to 23%. Student nurses rated *Faculty Support for Patient Safety* (81.6%), *Teamwork Within Groups* (78.3%), and *Faculty Expectations and Actions Promoting Patient Safety* (68.6%) highest in this study. *Frequency of Events Reported* (47.3%), C*ommunication Openness* (34%), and *Nonpunitive Response to Error* (23%) were the lowest rated dimensions for this study. The highest percent positive and negative dimensions will be discussed in relation to the literature and the theoretical framework for this study.

Positively rated dimensions. The highest rated dimensions for this study were *Faculty Support for Patient Safety* (81.6%), *Teamwork Within Groups* (78.3%), and *Faculty Expectations and Actions Promoting Patient Safety* (68.6%). Two of these dimensions directly relate to the role of faculty in safety culture, and are the only dimensions in the modified survey that specifically address faculty. The dimension of *Faculty Support for Patient Safety* measures the, "extent to which faculty provide a learning climate that promotes patient safety and show that patient safety is a top priority" and the dimension of *Faculty Expectations and Actions Promoting Patient Safety* measures the, "extent to which faculty consider student suggestions for improving patient safety, praise students for following patient safety procedures, and do not overlook patient safety problems" (modified from AHRQ, 2016a, p. 3-4). The other dimension, *Teamwork Within Groups*, measures how clinical groups, "support each other, treat each other with respect, and work together as a team" (modified from AHRQ, 2016a, p. 3). The results of this study suggest that students perceive their faculty's commitment to patient safety and feel

supported in their clinical groups. This finding reinforces the assertion, found throughout the nursing education literature, that safety is one of the core value of nurse educators (Cronenwett et al., 2007; Cronenwett et al., 2009; Madhavanpraphakaran, 2012; Sherwood, 2011; Tanicala et al., 2011; Vaismoradi et al., 2011).

These higher-rated dimensions are also supportive of the first stage of safety culture, a just culture. A just culture, according to Reason and Hobbs (2003) is based on trust and is an essential prerequisite for a reporting culture and learning culture. Students' positive perceptions of support from their clinical groups and faculty indicate that there is a foundation for a just culture in schools of nursing. In addition to the positive dimensions, one of the non-dimensional items of the modified HSOPSC also showed a positive perception of safety culture. Over 86% of participants gave their clinical a patient safety grade of excellent (37.3%) or very good (48.8%). These findings are encouraging as they indicate that students see the commitment their faculty have to safety, the value that is placed on patient safety within their clinical groups and schools of nursing, and feel generally positive about patient safety in their clinical experiences.

Negatively rated dimensions. The lowest rated dimensions for this study were *Frequency of Events Reported* (47.3%), *Communication Openness* (34%) *and Nonpunitive Response to Error* (23%). While there was some evidence for just culture found in the positively rated dimensions for this study, these negatively rated dimensions indicate that students do not fully perceive a just culture in their schools of nursing. *Communication Openness* and *Nonpunitive Response to Error* measure the extent to which students feel free to speak up if they see the potential for patient harm and the extent to which they feel mistakes and event reports will not be held against them, respectively (adapted from AHRQ, 2016a). These two dimensions directly reflect a just culture. Reason and Hobbs (2003) advised that in a just culture, HROs

welcome and reward reports of errors and near-misses and that blameless errors are not treated punitively. This study's findings suggest that student nurses do not see these attributes of just culture in their schools of nursing, even though they do feel generally positive about the support of their faculty and clinical groups.

The literature reveals some evidence of why student nurses may feel that faculty value safety, yet still perceive a punitive culture. Safety is typically addressed individually in nursing education (Attree et al., 2007; Bush et al., 2015; Chenot & Daniel, 2010; Mansour, 2012). As discussed in Chapter 2, vigilance, adherence to safety rules, and individual competence are the focus of teaching on patient safety, with little emphasis on the role systems play in keeping patients safe (Andrew & Mansour, 2014; Dolansky & Moore, 2013; Dyjur et al., 2011; Wolf et al., 2006). Disch and Barnsteiner (2014) stated that nursing education has not embraced the concept of just culture. Instead the culture is legalistic (Andrew & Mansour, 2014; Cresswell et al., 2013; Steven et al., 2014) and punitive (Barnsteiner & Disch, 2012), which is inconsistent with the approach advocated by safety science and found in HROs. Therefore, while students perceive the value faculty place on safety, they also perceive that safety is an individual responsibility. This may represent a missed opportunity to enculturate students into the role they play in patient safety as part of the larger healthcare system.

Frequency of Events Reported was also poorly rated in this study. This dimension measures the extent to which mistakes that did not result in patient harm were reported (AHRQ, 2016a). This measure is an important part of a reporting culture, because it allows for individuals and systems to learn from near-misses. In addition, almost 90% of participants in this study stated that they had no event reports of errors or near-misses in the previous year. For this study, the question was re-worded from the original HSOPSC to include both event reports

submitted by the student and those submitted by faculty or hospital staff on behalf of the student. Because students may not have access to event reporting systems this wording was chosen to capture all reported student events, even if the student did not have the means to report it themselves.

It has been demonstrated that student errors and near-misses occur in the clinical setting (Currie et al., 2009; Gregory et al., 2009; Harding & Petrick, 2008; Reid-Searl et al., 2010a; Wolf et al., 2006). Therefore, the lack of errors reported by participants in this study may indicate a lack of reporting, rather than an actual absence of events. This is not surprising given the mixed findings on a just culture in this study. Without the trust that is engendered by a just culture, a reporting culture cannot be realized (Reason & Hobbs, 2003). Barnsteiner and Disch (2012), Currie et al. (2009), and Wolf et al. (2006) have called for a reporting culture to be developed in schools of nursing. In fact, Disch and Barnsteiner (2014) have made progress toward creating a national occurrence reporting tool for schools of nursing. Reporting is a crucial component of a safety culture. However, according to Reason and Hobbs' (2003) model of safety culture, in order for reporting to be effective a just culture must first be achieved. The results of this study suggest that schools of nursing do not have the prerequisite just culture that would allow for a robust reporting culture.

The findings from RQ2 provide baseline data on the state of safety culture in the pre-licensure nursing student population in the US. This will allow schools of nursing, or other entities that wish to examine safety culture in pre-licensure nursing students, a reference point for their own results. The AHRQ (2016a) provides composite data for hospitals to compare to their safety culture findings. This study offers an initial glimpse into the state of safety culture in the pre-licensure registered nurse student population in the US.

Research Question Three

RQ3 is: How does aggregate national data on perceptions of patient safety culture in hospitals as measured by the HSOPSC and reported by the Agency for Healthcare Research and Quality (AHRQ, 2016a) compare to pre-licensure student perceptions of patient safety culture in schools of nursing in the US as measured by this modified version of the HSOPSC? Student nurses in this study perceived almost all dimensions of the modified HSOPSC less positively than the corresponding dimension of the HSOPSC as reported by the AHRQ (2016a). The modified HSOPSC was significantly less positive in eight of the 10 dimensions measured (p-values 0.0254 to <0.0001). One dimension, *Faculty (Management) Support for Patient Safety*, was more positive in this study (81.6%) than in AHRQ's (2016) reported composite findings for hospitals (72%; p-value <0.0001). One dimension, *Handoffs and Transitions*, was not statistically different in this study (50.8%) compared to AHRQ (2016a) composite data (48%; p-value 0.1932).

It should be encouraging to nurse educators that students perceived *Faculty Support for Patient Safety* (81.6%) significantly higher than the corresponding dimension for hospitals (*Management Support for Patient Safety* = 72%). This indicates that students recognize the value nurse educators place on patient safety and supports the idea of safety as a core value of nursing education as described in the discussion of RQ2. The dimension *of Management Support for Patient Safety* may be less highly rated for hospitals due to issues of staffing, budget constraints, and other competing priorities and challenges, though it is still one of the higher-ranked dimensions as reported by the AHRQ (2016a).

Most dimensions of the modified HSOPSC were significantly lower among student nurses than aggregate hospital data reported by the AHRQ (2016a). This suggests that safety

culture overall is perceived less positively among students in schools of nursing than healthcare workers in the hospital setting. One possible contributing factor to this may be the issue of engagement. As discussed in Chapter 2, disconnection from the clinical environment has been identified as a problem in schools of nursing (DeBourgh, 2012; Pearson et al., 2010; Steven et al., 2104; Wolf et al., 2006). Students often indicated feeling like outsiders in the clinical setting (Steven et al., 2014). Engagement has also been identified as a factor in improving safety and safety culture in healthcare workers (Collier & Fitzpatrick, 2016). The lack of connection to the clinical environment, including lack of access to reporting systems, orientation sessions, and hospital computer systems may contribute to the less positive perception of safety culture in student nurses. Researchers reported that academic-practice partnerships and prolonged clinical placements may improve student engagement and patient safety (MacPhee et al., 2009; Mundt et al., 2013).

The hierarchical healthcare culture (Leape et al., 2009) may also disproportionately impact nursing students. As described in Chapter 2, student nurses have reported feeling pressure to comply with the direction of practicing nurses, even when they felt that it might negatively impact patient safety (Andrew & Mansour, 2014; Cresswell et al., 2013; Steven et al., 2014). While a strict hierarchy in healthcare culture may negatively impact everyone, student nurses are particularly vulnerable because they have no licensure or formal role in healthcare agencies and because their evaluation often depends on the input of clinical nurses (Cresswell et al., 2013; Steven et al., 2014).

The two lowest ranked dimensions for this study, *Communication Openness* (34%) and *Nonpunitive Response to Error* (23%), which both directly reflect a just culture, are significantly lower than the corresponding dimensions of the HSOPSC (64% and 45%, respectively; p-values

< 0.0001). As discussed in RQ2 and reported by Barnsteiner and Disch (2012) faculty may feel that a just culture condones error and tend to have a more individual approach to safety. Understanding the difference between how schools of nursing and hospital systems view error and just culture may provide insight to understanding why student nurses rate these two dimensions lower than composite hospital data. While hospitals have not yet realized a just culture, healthcare workers do rate just culture attributes significantly higher than student participants in this study. This may be due, in part, to the emphasis placed on just culture from agencies such as the Centers for Medicare and Medicaid Services (CMS). For example, in order to receive reimbursement from CMS, hospitals must take part in Quality Assessment Performance Improvement (QAPI). This requires that hospitals collect, aggregate, and analyze data regarding patient safety events and near misses. The QAPI elements of assessment include such items as, "Is there evidence that the hospital has adopted policies supporting a non-punitive approach to staff reporting of adverse patient events, medical errors, near misses/close calls, etc., and situations they consider unsafe?" (CMS, n.d., p. 8). While much work remains to be done for hospitals to achieve a just culture, the expectations of agencies such as CMS are clear. These type of expectations may partially explain the discrepancy between results on just culture dimensions for participants in this study and AHRQ (2016a) aggregate data. In schools of nursing, expectations of a nonpunitive culture do not exist. Data on student error is typically kept individually in student files, is used punitively, and is not shared, aggregated, or evaluated for program improvement. The way in which error is addressed may impact nursing students' perceptions of safety culture. The findings from this study are similar those reported by Bowman et al. (2014) for medical students. Though Bowman et al. (2013) did not retain all questions for the dimensions of *Communication Openness* and *Nonpunitive Response to Error*,

the authors did report the percent positive response to those dimensions among medical students as 32% and 22%, respectively. This indicates that other healthcare professional students have a similar perception of just culture within their program of study.

It should be noted that the four highest-ranked areas among participants in this study are also the top four dimensions in AHRQ (2016a) composite data. The lowest ranked dimension, *Nonpunitive Response to Error*, was also the lowest for both surveys and populations. There is some consistency, therefore, in how students and healthcare workers view patient safety culture. It is reasonable to hypothesize that if safety culture can be increased in the student population the increase may be transferred to the hospital setting as students enter the workforce.

The findings from RQ3 give insight into how perceptions of patient safety culture differ from the education to practice settings. If students are able to enter practice enculturated into a positive approach to patient safety, they may be able to transfer those attributes to the hospital setting.

Theoretical Implications

Madeleine Leininger's Theory of Culture Care is critical to future understanding of safety culture in schools of nursing. While this study offers baseline data to begin to examine safety culture, Leininger's theory may provide a more holistic lens through which to view the culture of nursing education. The Theory of Culture Care takes into account the influence of not only values and beliefs, but also technological factors, political and legal factors, economic factors, and educational factors that impact culture (Leininger & McFarland, 2002). As described in Chapter 2, these influences may have significant implications for safety culture in schools of nursing. This study indicates that there are both positive and negative perceptions of safety culture among nursing students. The Theory of Culture Care will allow the researcher to

evaluate aspects of culture that should be maintained, adapted, or restructured (Leininger & McFarland, 2002). Clearly, there are many cultural practices in nursing education that are positive and beneficial to safety culture. However, other practices may need to be adapted or restructured to create and maintain a culture of safety. This theory would provide researchers a framework to comprehensively evaluate influences, practices, and opportunities for improved safety culture.

Nursing Implications

Implementing the QSEN competencies is essential for future improvements to safety culture. The competency of safety outlined by QSEN is an excellent resource for nurse educators to begin to address the poorly rated areas of safety culture. As described in Chapter 2, the QSEN safety competency seeks to, "minimize the risk of harm to patients and providers through both system effectiveness and individual performance" (Cronenwett et al., 2007, p. 128). Currently nurse educators are focused primarily on the individual aspects of safety, omitting a critical piece of safety culture. Researchers have reported faculty misunderstanding of the safety competency as described by QSEN (Barnsteiner, 2011; Dolansky & Moore, 2013; Smith et al., 2007). This argument is supported by the findings of this study which indicate that, though faculty value safety, they approach it from an individual perspective. Education of faculty in safety science principles and findings from HROs is necessary in order to create and maintain a culture of safety. Nurse educators must begin to create a just and safe culture, while maintaining high standards of performance expected of nursing students. Disch & Barnsteiner (2014) have indicated that a philosophical change is needed in nursing education. Leape et al. (2009) has also called for a similar reformation in medical education. This is no easy undertaking, but the

professional identity formation that occurs in pre-licensure education may be the best opportunity to create a safety culture in healthcare.

One way to begin to implement safety science principles in schools of nursing is to use errors and near misses as opportunities to learn and improve. Accrediting bodies for schools of nursing might consider adopting requirements that mandate reporting, tracking, and learning from student errors and near misses. Accrediting bodies for schools of nursing should look to hospital accreditors' efforts to improve patient safety as an example. If a systematic and comprehensive mechanism to report, track, and learn from student error is a feature accreditors look for in schools of nursing, faculty and administrators will be motivated to move student error out of individual files and into a format that allows a learning culture to develop.

The findings from this study indicate that student nurses perceive safety culture less positively than healthcare workers. This has implications for both healthcare agencies and schools of nursing with regard to student engagement. Student nurses may be disconnected from the clinical facilities in which they are trained (DeBourgh, 2012; Pearson et al., 2010; Steven et al., 2014). A lack of understanding of safety policies and procedures, incomplete access to computer systems or technology, and uncertainty in their role may have negative consequences for student perceptions of safety culture. Cronenwett et al. (2009), Madhavanpraphkaran (2012), and others have advocated for more in-depth relationships with clinical facilities in order to promote safety culture. Healthcare agencies and schools of nursing should work to include students more fully in the organizational culture of the healthcare system.

Finally, faculty should look beyond teaching practices such as the "rights" of medication administration to ensure patient safety. Participants in this study indicated that they did not feel comfortable acting as safety advocates in the clinical environment. Communication skills and

assertiveness training should be part of teaching practices to promote patient safety (Andrew & Mansour, 2014; Twigg & Attree, 2014). These skills may be taught and practiced using techniques such as simulation, but they should also be encouraged in the patient care setting. Faculty and clinical agency staff should recognize and reward students for feedback on patient safety concerns and promote open communication at all levels.

Strengths and Limitations

The sample (N = 539) for this study was overwhelmingly female (91.6%), identified their ethnicity as white or Caucasian (74.2%), and listed their age as 34 or younger (72.9%). The lack of diversity in this sample is noteworthy, but is consistent with the overall population of professional nursing students with regard to gender, age and ethnicity (AACN, 2017: NLN, 2016). The sample showed good distribution of geographic location, school size, and school affiliation (NLN, 2014).

The sample was not representative of the population in terms of program type. Auerbach et al. (2015) reported that, in the US, 57% of undergraduate nursing students were enrolled in an associate degree, 40% in a baccalaureate degree, and three percent in other types of programs. In this sample, 67% of students listed their program type as a bachelor's of science in nursing. Associate degree student nurses represented 31.9% of the sample, and diploma nursing students were 1.1%. Baccalaureate degree nursing students are therefore overly represented and associate degree nursing students are underrepresented in this sample compared to the general population of undergraduate nursing students. This may limit the generalizability of the findings to student nurses in general. Drawing the sample from membership in the NSNA may also limit generalizability. As described in Chapter 2, however, previous studies of patient safety in schools of nursing have primarily been single-site studies with small sample sizes. This study is

one of the few known to look at safety in schools of nursing on a national level using a large sample.

The low response rate is a concern for this study. While e-mails were sent to over 62,000 addresses by the NSNA representative, only 15,121 of those e-mails were viewed. This may be due to the timing of the study. Students who used their school e-mail addresses for NSNA purposes may be unlikely to check those accounts during the summer. Of the 15,121 e-mails viewed, 1,097 people clicked on the URL link to enter the survey platform. Of those, 918 agreed to participate in the survey. Three-hundred seven people did not answer any survey questions after agreeing to participate and entering the survey. The final sample, after excluding ineligible participants, was 539. While determining response rate seems like a straightforward calculation, there are actually many ways this can be done. Plewes and Tourangeau (2013) provided six recognized methods of calculating response rate for online surveys. These authors further advised that there is little standardization in how response rates for online surveys are calculated and reported. Vicente and Ries (2010) discussed calculating response rates for online surveys by using the number of potential participants entering the survey platform as the denominator. For this study, that calculation would have resulted in a response rate of 83.7%. This calculation may be helpful when it is not possible to determine the number of e-mails sent to valid addresses. However, because the NSNA was able to provide data on the number of e-mails viewed, the more conservative calculation of 6% was used.

A poor response rate is cause for concern related to response bias. For this study it may be that there were differences between those who chose to respond and those who did not respond. As reported, 307 individuals entered the survey but did not answer any questions. It is possible that those who answered questions had stronger feelings regarding patient safety culture

or experiences with healthcare error. One method, advised by Creswell (2009) to determine response bias, is to directly contact non-respondents to determine if there is a significant difference between their responses and those who initially participated in the survey. Due to the anonymous nature of this survey, this extra safeguard is not possible and the impact of response bias is unknown for this study.

There are limitations related to the use of a survey to study culture. Culture is most appropriately studied holistically and in context using techniques such as ethnography (Leininger & McFarland, 2002). Surveys are reductionist and cannot fully reveal something as complex as culture. This study allowed for measurement of some dimensions of safety culture as identified by Sorra and Nieva (2004). However, Denzin and Lincoln (2011) advised that ethnomethodology is particularly well suited to developing understanding of how culture is actually created and practiced. This study provides a beginning understanding of some dimensions of safety culture and allows for quantitative measurement that can be compared. However, in order to achieve a more holistic understanding of patient safety culture qualitative methods must also be employed.

Finally, this study has limitations related to the borderline reliability and validity in two areas. The Cronbach's alpha coefficients for the dimensions of Organizational Learning-Continuous Improvement ($\alpha = 0.632$) and Overall Perceptions of Patient Safety ($\alpha = 0.669$) were just below generally acceptable levels for reliability. In addition, these two areas had borderline results for validity as calculated by individual-level factor analysis. Because these two dimensions reflect a learning culture, the component of safety culture that requires the presence of a just and reporting culture to exist (Reason & Hobbs, 2003), it may be that these dimensions are not recognizable by student nurses. It also may be necessary for the wording of these two

dimensions to be re-evaluated and tested to develop better reliability and validity for these dimensions in the modified survey.

Recommendations for Future Research

Based on the results of this study and review of the literature surrounding patient safety in schools of nursing the researcher makes the following recommendations for future research.

Routine evaluation of safety culture in schools of nursing should be undertaken. This study demonstrates the reliability and validity of an instrument to measure safety culture in schools of nursing and provides baseline data to which schools may compare their results. After completion of this study, the AHRQ (2017b) indicated that the use of the term Survey on Patient Safety Culture (SOPS) should be limited to studies that use AHRQ surveys in their entirety without substantive modifications (AHRQ, 2017b). They do, however, allow the surveys to be modified with the understanding that the original survey will be credited and the SOPS name will not be used (AHRQ, 2017b). Therefore, the name School of Nursing Culture of Safety Survey (SON-COSS) is proposed for this modified survey based on the HSOPSC. Schools of nursing may evaluate their percent positive results using the SON-COSS and compare those to baseline national data as reported in this study. This will allow schools of nursing to understand the strengths and areas for improvement in their own safety culture and to measure the effectiveness of interventions to improve patient safety culture within their schools.

As efforts continue by researchers such as Disch and Barnsteiner (2014) to develop a national occurrence reporting tool for use in schools of nursing, schools of nursing should also be encouraged to report their SON-COSS results so that this data may be aggregated and used to compare individual schools with comprehensive national data. Interventions to improve safety culture should be targeted in those dimensions with low percent positive findings. For this study,

those areas include *Frequency of Events Reported*, *Communication Openness*, and *Nonpunitive Response to Error*. Understanding and teaching the QSEN safety competency is an excellent first step to improvement in this area. Faculty and administration may need additional training to implement safety science principles, a systems approach to safety, and develop a just culture. Techniques such as the use of root-cause analysis as advocated by Barnsteiner (2011), Cresswell et al. (2013), and Dolansky and Moore (2013) are encouraged to develop a just culture. The SON-COSS may be used to evaluate the effectiveness of these interventions.

Finally, schools of nursing should be evaluated more comprehensively for elements of safety culture using methods such as ethnography. Schools with positive SON-COSS results should be evaluated for the teaching-learning practices, policies, and procedures that contribute to a culture of safety. Student handbooks, clinical evaluation tools, and other documents may reveal important features of schools with positive patient safety culture that would benefit other schools of nursing.

Conclusion

It is clear from the literature, and reinforced by the results of this study, that patient safety is one of the core values of nurse educators. Enculturation of students into a profession is an important role of educators. However, nursing faculty may be missing opportunities to develop and contribute to a culture of safety. A culture of safety includes a just culture, a reporting culture, and a learning culture. Currently, nursing education tends to be punitive, legalistic, and individually-focused regarding student error and patient safety. This study contributes to nursing education and patient safety knowledge by providing a beginning understanding of the current state of safety culture in schools of nursing in the US and norming an instrument for use in this

population. Future research into the characteristics of schools with positive safety culture and interventions targeted to improve safety culture are needed.

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APPENDICES

Appendix A

E-Mail to NSNA Members

Dear National Student Nurses Association Member,

My name is Kristen Hershey and I am a graduate student at East Tennessee State University. I am working on my PhD in nursing. In order to finish my studies, I need to complete a research project. The name of my research study is Pre-Licensure Nursing Students' Perceptions of Safety Culture in Schools of Nursing.

The purpose of this study is to examine the state of patient safety culture as perceived by students in pre-licensure nursing programs in the United States. I would like to give a brief survey questionnaire to nursing students enrolled in registered nursing programs. It should only take about 10 to 15 minutes to complete.

Please consider taking a few moments to read the informed consent document by clicking the link to the online survey platform, Survey Monkey, below. If you chose to participate, you may click "I agree" after reading the consent form and you will be brought to the survey page.

Thank you for your time. Your participation is greatly appreciated.

Sincerely,

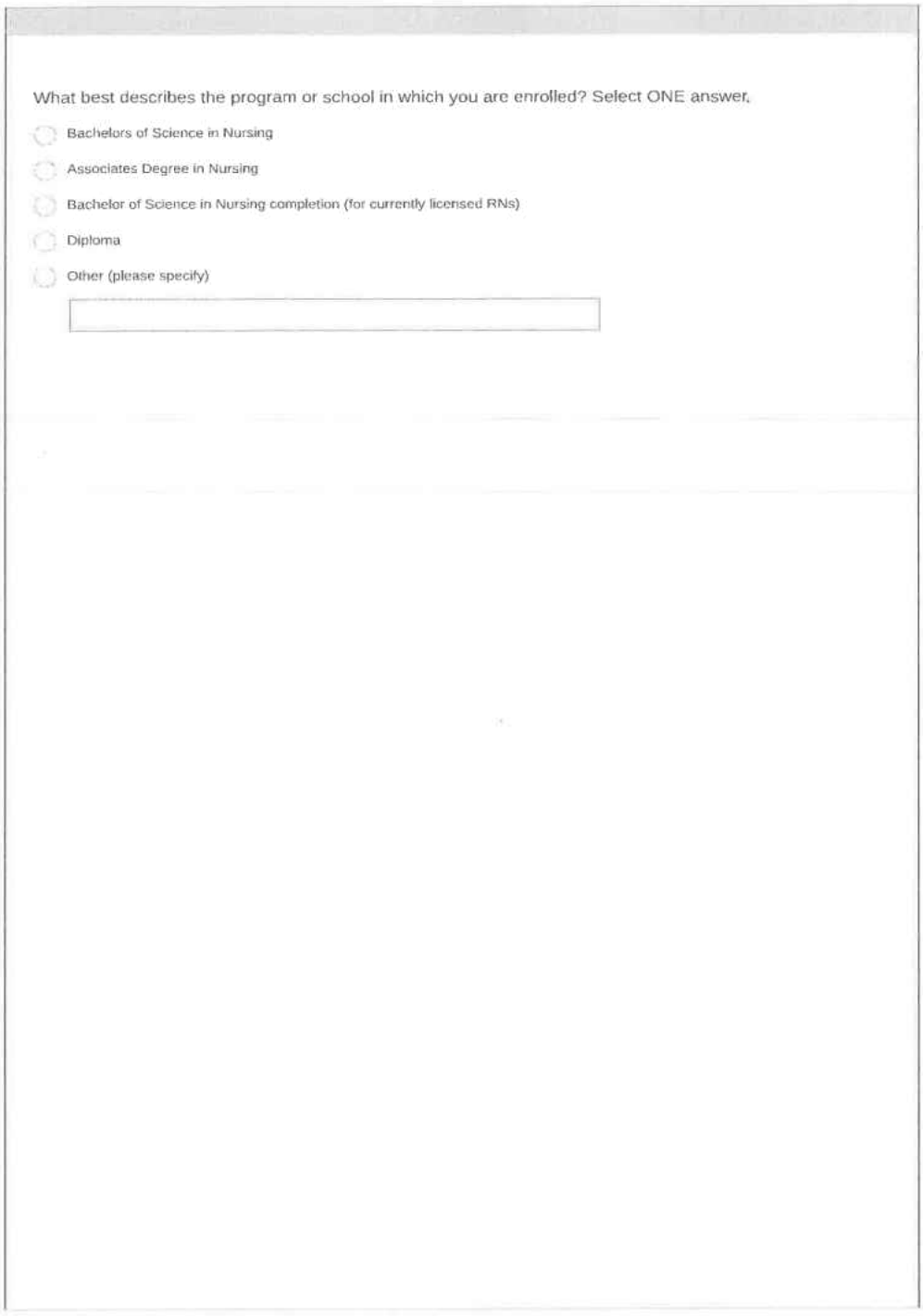
Kristen Hershey

https://www.surveymonkey.com/r/CSL76NV

If you are unable to access the survey using the hyperlink, please cut and paste into your web browser.

Appendix B

Modified HSOPSC



What best describes the program or school in which you are enrolled? Select ONE answer.

- Bachelors of Science in Nursing
- Associates Degree in Nursing
- Bachelor of Science in Nursing completion (for currently licensed RNs)
- Diploma
- Other (please specify)

Please indicate your agreement or disagreement with the following statements about your clinical groups.

Think about your clinical groups....

	Strongly Disagree	Disagree	Neither	Agree	Strongly Agree
People support one another in my clinical	○	○	○	○	○
When a lot of work needs to be done quickly, we work together as a team to get the work done	○	○	○	○	○
In my clinical, people treat each other with respect	○	○	○	○	○
We are actively doing things to improve patient safety	○	○	○	○	○
Students feel like their mistakes are held against them	○	○	○	○	○
Mistakes have led to positive changes	○	○	○	○	○
It is just by chance that more serious mistakes don't happen around here	○	○	○	○	○
When one person in the group gets really busy, others help out	○	○	○	○	○
When an event is reported, it feels like the student is being written up, not the problem	○	○	○	○	○
After changes are made to improve patient safety, the effectiveness of the change is evaluated	○	○	○	○	○
Patient safety is never sacrificed to get more done	○	○	○	○	○
Students worry that mistakes they make are kept in their file	○	○	○	○	○
We have patient safety problems in clinical	○	○	○	○	○
Our procedures and systems are good at preventing errors from happening	○	○	○	○	○

Please indicate your agreement or disagreement with the following statements about your immediate faculty or person to whom you directly report in clinical.

	Strongly Disagree	Disagree	Neither	Agree	Strongly Agree
My faculty says a good word when he/she sees a job done according to established patient safety procedures	○	○	○	○	○
My faculty seriously considers student suggestions for improving patient safety	○	○	○	○	○
Whenever pressure builds up, my faculty wants us to work faster, even if it means taking shortcuts	○	○	○	○	○
My faculty overlooks patient safety problems that happen over and over	○	○	○	○	○

How often do the following things happen in your clinical groups?

Think about your clinical groups...

	Never	Rarely	Sometimes	Most of the time	Always
We are given feedback about changes put into place based on patient safety events	○	○	○	○	○
Students will freely speak up if they see something that may negatively affect patient care	○	○	○	○	○
We are informed about errors that happen in this clinical area	○	○	○	○	○
Students feel free to question the decisions or actions of those with more authority	○	○	○	○	○
In this clinical group, we discuss ways to prevent errors from happening again	○	○	○	○	○
Students are afraid to ask questions when something does not seem right	○	○	○	○	○

In your clinical group, when the following mistakes happen, how often are they reported?

	Never	Rarely	Sometimes	Most of the time	Always
When a mistake is made, but is caught and corrected before affecting the patient, how often is this reported?	○	○	○	○	○
When a mistake is made, but has no potential to harm the patient, how often is this reported?	○	○	○	○	○
When a mistake is made that could harm the patient, but does not, how often is this reported?	○	○	○	○	○

Patient Safety Grade

Please give your clinical an overall grade on patient safety.

- ○ A- Excellent
- ○ B- Very Good
- ○ C- Acceptable
- ○ D- Poor
- ○ E- Failing

Please indicate your agreement or disagreement with the following statements about your school of nursing.

Think about your school of nursing...

	Strongly Disagree	Disagree	Neither	Agree	Strongly Agree
School of nursing faculty provide a learning climate that promotes patient safety	○	○	○	○	○
Things "fall between the cracks" when transferring patient care	○	○	○	○	○
Important patient care information is often lost during the start or end of the student's clinical day	○	○	○	○	○
Problems often occur in the exchange of information between students and clinical facility staff	○	○	○	○	○
The actions of school of nursing faculty show that patient safety is a top priority	○	○	○	○	○
School of nursing faculty seem interested in patient safety only after an adverse event happens	○	○	○	○	○
The start or end of the student's clinical day is problematic for patients in the clinical environment	○	○	○	○	○

Number of Events Reported

In the past 12 months, how many event reports (reports of errors or near-misses) have you filled out and submitted (or have faculty/hospital staff submitted on your behalf)?

- ○ No event reports
- ○ 1 to 2 event reports
- ○ 3 to 5 event reports
- ○ 6 event reports or more

Which best describes your level in your program of nursing (not how many overall credits you have, but where you are in your nursing classes)?

- ◯ 1st semester (sophomore)
- ◯ 2nd semester (junior)
- ◯ 3rd semester (junior)
- ◯ 4th semester (senior)
- ◯ 5th semester (senior)
- ◯ Other (please specify)

Which race/ethnicity best describes you?

- ☐ American Indian or Alaskan Native
- ☐ Asian / Pacific Islander
- ☐ Black or African American
- ☐ Hispanic
- ☐ White / Caucasian

Multiple ethnicity / Other

What is your gender?

- ◯ Female
- ◯ Male

What is your age?

- ◯ 18 to 24
- ◯ 25 to 34
- ◯ 35 to 44
- ◯ 45 to 54
- ◯ 55 to 64
- ◯ 65 to 74
- ◯ 75 or older

Which best describes the location of your school?

- ◯ Northeast
- ◯ Midwest
- ◯ South
- ◯ West
- ◯ Other (please specify)

Which best describes the size of your school? (the school population as a whole, not only nursing)

- ◯ Small- less than 5,000 students
- ◯ Medium- 5,000 to 15,000 students
- ◯ Large- over 15,000 students
- ◯ Other (please specify)

Which best describes your school's affiliation? (select all that apply)

- Public
- Private
- For-profit
- Religious-affiliated
- ☐ Other (please specify)

Your Comments

Please feel free to write any comments about patient safety, error, or event reporting in your school of nursing.

Appendix C

Exploratory Factor Analysis

Table C1

Factor Loading for Exploratory Factor Analysis

	Factors						
Item	1	2	3	4	5	6	7
a1	0.825						
a3	0.813						
a4	0.739						
a11	0.678						
b1		0.432					
b2		0.462					
b3r		-0.602					
b4r		-0.716					
f1		0.600					
f8		0.654					
f9r		-0.526					
c1			0.489				
c2			0.643				
c3			0.672				
c4			0.719				
c5			0.558				
c6r			-0.463				
d1				0.798			
d2				0.879			
d3				0.813			
a8r					0.750		
a12r					0.741		
a16r					0.725		
a10r						0.447	
a17r						0.550	
f3r						0.683	
f5r						0.752	
f7r						0.673	
f11r						0.664	

	Factors						
Item	1	2	3	4	5	6	7
a6							0.477
a9							0.447
a13							0.755
a15							0.478
a18							0.441

Note. Factor 1 = Teamwork within groups, factor 2 = Faculty commitment to safety (Faculty expectations and actions promoting patient safety & Faculty support for patient safety), factor 3 = Communication (Feedback and communication about error & Communication openness), factor 4 = Frequency of events reported, factor 5 = Nonpunitive response to error, factor 6 = Unspecified (Overall perceptions of patient safety & Handoffs and transitions), factor 7 = Unspecified (Organizational learning- continuous improvement & Overall perceptions of patient safety). Where original dimensions were combined those dimensions are indicated in parentheses.

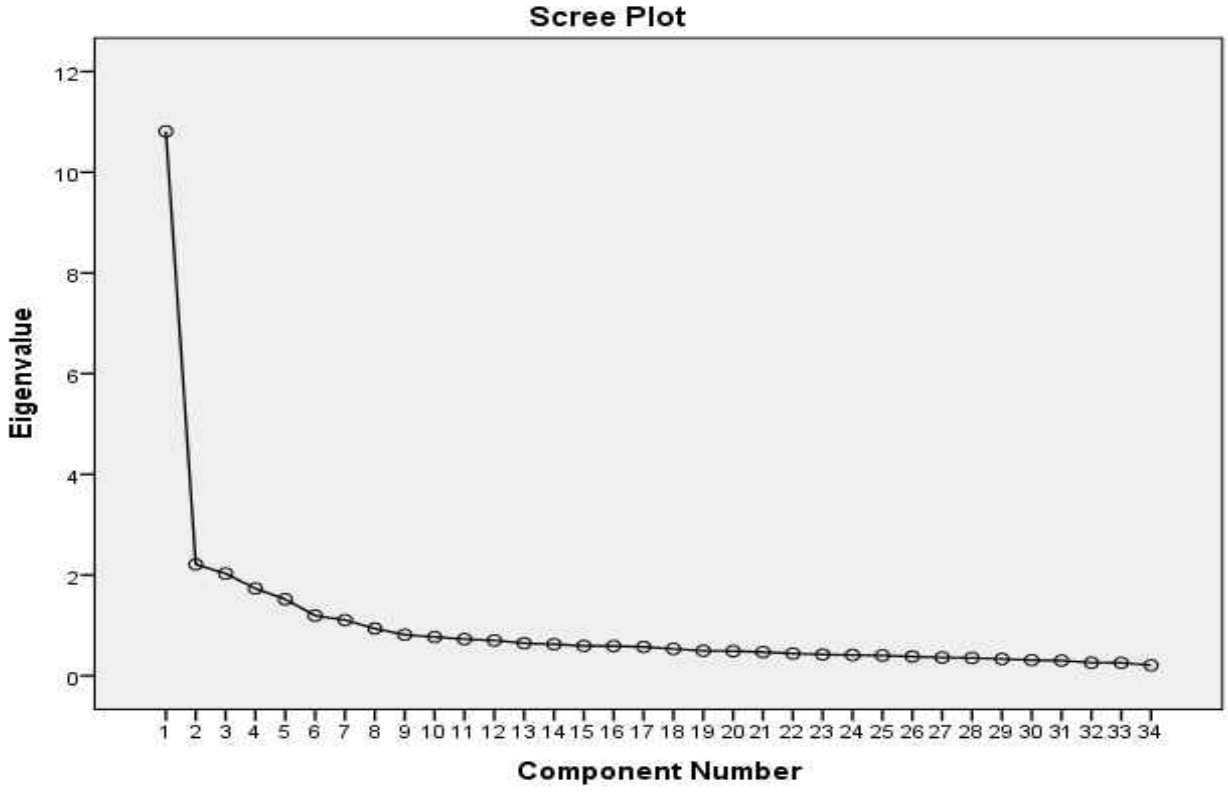


Figure C1. Scree plot for exploratory factor analysis

Table C2

Cronbach's Alpha for Dimensions Identified from Exploratory Factor Analysis

Dimension	Contributing Items	α
Teamwork within groups	a1, a3, a4, a11	0.843
Faculty commitment to patient safety	b1, b2, b3r, b4r, f1, f8, f9r	0.760
Communication	c2, c4, c6r, c1, c3, c5	0.595
Frequency of events reported	d1, d2, d3	0.848
Nonpunitive response to error	a8r, a12r, a16r	0.729
Unspecified (Dimension 6)	a10r, a17r, f3r, f5r, f7r, f11r	0.819
Unspecified (Dimension 7)	a6, a9, a13, a15, a18	0.725

VITA

KRISTEN HERSHEY

Education:	Associate in Applied Science/Associate Degree Nursing, Fayetteville Technical Community College, Fayetteville, North Carolina 2000
	Bachelor of Science in Nursing, East Carolina University, Greenville, North Carolina 2003
	PhD in Nursing, East Tennessee State University, Johnson City, Tennessee 2017
Professional Experience:	Associate Professor, Austin Peay State University; Clarksville, Tennessee, 2010-present
	Instructor, Hopkinsville Community College; Hopkinsville, Kentucky, 2009-2010
Publications:	Hershey, K. (2015, March). Culture of safety. *Nursing Clinics of North America: Transformational Tool Kit for Front Line Nurses, 50*(1).
	Hershey, K. (2013, June). Fracture complications. *Critical Care Nursing Clinics of North America, 25*(2).
Honors and Awards:	Socrates Award for Excellence in Teaching, Austin Peay State University, 2015