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Assessing Patient Safety Culture In United States' Hospitals

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ASSESSING PATIENT SAFETY CULTURE IN UNITED STATES' HOSPITALS

by

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ABSTRACT

Patient safety is founded on continuous learning because there is an urgent need to report and learn from errors, accidents, near misses, and adverse events. The traditional approach to patient safety, based on forming mortality committees and investigating accidents, will no longer be effective. Frameworks, surveys, and assessment tools have been developed over the last decade to assist organizations in measuring and understanding their culture. This a retrospective cross-sectional study included 67,010 respondents from Agency for Health care Research and Quality (AHRQ) 2018 comparative database was analyzed using partial least squares structural equation modeling (PLS-SEM). This research explored whether the dominant patient safety culture would impact the frequency of reported events and overall perceptions of patient safety. Furthermore, the study amid to examine whether respondents and hospital characteristics influence the perception of patient safety culture and the impact on healthcare staff. The results in this study showed that the perception of PSC positively influenced the overall perception of patient safety and frequency of event reporting. Moreover, the results revealed that hospital and respondents' characteristics (Staff Position, Teaching Status and Geographic Region) had varying influence on patient safety culture, overall perception of patient safety and frequency of event reporting.

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Adverse Events (AEs)

Agency for Health care Research and Quality (AHRQ)

Average variance extracted (AVE)

Communication openness (COMMUN)

Confirmatory Factor Analysis (CFA)

Department of Health (DOH)

Exploratory Factor Analysis (EFA)

Feedback and communication about error (FEED)

Frequency of events reported (ERFREQ)

Handoffs and transitions (HANDOFF)

Health and Safety Commission (HSC)

Heterotrait-monotrait ratio (HTMT)

High-Reliability Organizations (HRO)

High-Reliability Organization Theory (HROT)

Hospital Survey on Patient Safety Culture (HSPSC)

Human Factors and Ergonomics (HFE)

Institute for Health Care Improvement (IHI)

International Nuclear Safety Advisory Group's (INSAG)

Intra-Class Correlations (ICCs)

Joint Commission International (JCI)

Licensed independent practitioners (LIP)

Management support for patient safety (MGMT)

Medical Errors (MEs)

Medical Errors Workgroup of the Quality Interagency Coordination Task Force (QuIC)

Modified Stanford Instrument-2006 (MSI-2006)

National Health Service's (NHS)

National Patient Safety Foundation (NPSF)

Nonpunitive response to error (NONPUN)

Organizational learning—Continuous improvement (ORGLRN)

Overall perceptions of patient safety (OVERALL)

partial least squares structural equation modeling (PLS-SEM)

participatory action research (PAR)

Path Coefficient (β)

Patient Safety (PS)

Patient Safety Climate in Health Care Organizations (PSCHO)

Patient Safety Culture (PSC)

Safety Attitudes Questionnaire (SAQ)

Scottish Hospital Safety Questionnaire (SHSQ)

Staffing (STAFF)

Standardized root mean square error (SRMR)

Stone-Geisser (Q^2)

Supervisor/manager expectations and actions promoting patient safety (SUPV)

Systems Engineering Initiative for Patient Safety (SEIPS)

Team Strategies and Tools to Enhance Performance and Patient Safety (TeamSTEPPS®)

Teamwork across units (TEAMAC)

Teamwork within units (TEAMIN)

The Institute of Medicine (IOM)

The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA)

United Kingdom (UK)

United States (U.S.)

World Health Organization (WHO)

CHAPTER 1: INTRODUCTION

1.1 Background

In the United States (U.S.), the field of health care has always been referred to as one hazardous area due to its unhealthy, erroneous environment, with high mortality rates and unnecessary loss of valuable lives and valuable assets (Zeidel, 2011). The inconsistency between the very advanced technology and the very retarded medical practices results in the U. S. leads to much disappointment among those who expect to receive high-quality health services. They realize how frequently the patients have been vulnerable to medical errors or susceptible to adverse events (AEs) (Zeidel, 2011). Being not associated with certain diseases, AEs are simply unfavorable results of faulty diagnoses or irrelevant treatments, rather than medical errors, carelessness or low level of care (Berwick et al., 2015).

Studies have proven that the level of safety in health care institutions in the U. S. lacks many renovations to eliminate the prevalent risks (Sorra & Dyer, 2010; James, 2013; Berwick et al., 2015; Hopkins, 2016; Nanji et al., 2016). The Institute of Medicine's (IOM) announcement of the report "To Err Is Human: Building a Safer Health System." has brought patients' safety into international focus and awareness. By stressing the actual amount of harm, IOM encourages health care institutions to realize the importance of improving the quality of their health care practices which, in turn, lead to more patient safety. Creating awareness of safety will develop into a culture that ensures the patients encounter fewer risks while receiving health care (Institute

of Medicine, 1999). The attention worldwide has shifted to spreading safety culture in health care systems as a cornerstone in any effective health care policy.

Patient safety has frequently been defined as “Freedom from accidental or preventable injuries produced by medical care” (Hines et al., 2008). With this being the notion, increasing attention has been directed to evaluating the safety level in each health care organization. (Colla et al., 2005, Singer et al., 2009; Haynes et al., 2011). The increase in safety culture awareness has added positively to the level of health care services provided and improved the favorable outcomes. However, studies and reviews (Brennan et al.,1991; Wilson et al.,1995; Thomas et al., 2000; Vincent et al., 2001; Davis et al., 2002; Baker et al., 2004) show that considerable numbers of patients around the world are still vulnerable to avoidable risks as well as being subject to less than average level of health care (Dixon-Woods et al., 2011). The rate of adverse events occurrence is between 3% and 17%. For example, a report by Sir Robert Francis about the health care services of Mid Staffordshire NHS Foundation Trust shows several points of weaknesses in patient care safety (Francis, 2013). There is ample evidence worldwide that countless errors and failures (Tingle, 2011).

Consequently, there are considerable losses in health care assets finances (US$ 19 billion a year) as a result of overstay in hospital, unnecessary stay off work, and involvement in legal actions (World Health Organization, 2014). So, it is needless to say that any improvement in patient safety is an investment in the field of health care provision. Policymakers could be assured that the gains far surpass the losses if they calculated the expenses of patient safety (Jha et al., 2013).

For any health care organization to establish a long-term safety culture, the foundation stone should be a careful estimation of how successful its current safety culture has been (Hellings et al., 2010). The most popular and holistic definition of safety culture is that it is the "product of individual and group values, attitudes, perceptions, competencies and patterns of behavior that determine the commitment to and the style of proficiency of an organization's health and safety management" (Health and Safety Commission, 1993; Berwick et al., 2015). The safety climate and safety conditions are obvious criteria to foresee the future safety culture in any health care organization (Colla et al., 2005). In other words, the current safety culture in an organization can be considered a mirror of the safety culture in the collective mind, effort, and practice of the manpower of that organization at any point in time (Mearns and Flin, 1999). Throughout this study, the terms safety culture and safety climate are used as having the same sense and concept. Furthermore, the implemented tools of study use the term safety culture in its name; Hospital Survey on Patient Safety Culture (HSPSC).

As one of the most common evaluation methods, safety culture questionnaires are used to assess workforce awareness of the safety culture in the health care institution (Singer et al., 2007). These safety culture questionnaires are recognized and extensively utilized as they are effective and time-saving (Wreathall, 1995; Guldenmund, 2000). The survey results can create a better understanding of the safety climate in health care organizations and, thus, highlight the aspects of strengths to be enforced and the others of weaknesses to be dealt with adequately. This will help health care policy makers recognize the obstacles that hinder optimizing the patients' safety culture in their organizations (Smits et al., 2009). The findings of the survey can be

utilized to comparatively standardize similar results of surveys in the area of assessing and developing safety culture efficiency, both nationally and internationally (Blegen et al., 2009).

The questionnaire tools used for evaluating the safety culture in hospital settings are diverse, and therefore, may not be equally and scientifically sound (Colla et al., 2005, Flin et al., 2006, Singla et al., 2006). Consequently, the validity and reliability of survey scores obtained in safety climate questionnaires may be challenging to be confirmed. Proper validation may be required before the full adoption and implementation of these questionnaires in other health care settings (Manser et al., 2016). It is equally vital and pragmatic to assess the health care professionals' perception of patient safety culture as they are the core of the whole process of turning the health care area into a risk-free environment.

1.2 Statement of the Problem

All health care organizations have patient safety as their top priority, and big budgets are allocated by governments to achieve this goal, even though it is a developed or developing country (Bodur & Filiz, 2010). Safe health care practices and procedures are being viewed as fundamental. Moreover, safety care culture is the source of concern for patient safety due to the Institute of Medicine (IOM, 2000) recommendations that all health care organizations should develop, improve, and strictly adhere to a sound patient safety culture.

In response to the report by the Institute of Medicine, the U. S. Congress instructed the Agency for Health care Research and Quality (AHRQ) to supervise the process of establishing patient health care to minimize the occurrence of medical errors (MEs). A target can be achieved

through research and joint efforts exerted by healthcare organizations around the country (Kohn et al., 1999; Erickson et al., 2003; Berwick et al., 2015; Larrison et al., 2017). An ME is "an act of commission (doing something wrong) or omission (not doing the right thing) that leads to an undesirable outcome or potential for such an outcome" (Berwick et al., 2015). Although the problem has been underestimated statistics show that about 98,000 (3.7%) death cases occurred due to poor patient safety regarding medical therapy in the New York cohort (Kohn et al., 1999; Berwick et al., 2015).

James (2013) reviewed literature published from 2008 to 2011 about AEs in hospitals. The revision revealed that more than 440,000 cases of preventable AEs occurred and led to the death of the patients (James, 2013). In the U. S, research findings indicate that MEs come third in ranking death causes (Hopkins, 2016). The AHRQ (2015) estimated that about 10% of patients were prone to some kind of dangerous AE that can lead to health complications such as adverse drug effects, bed ulcers, or infections that require additional health care or further medication procedures which could be avoidable (Berwick et al., 2015; AHRQ, 2015). Despite the exerted efforts to improve hospital conditions, the U.S. lags behind many developed countries regarding matters like efficiency and quality assurance related to patient care procedures and practices (Davis et al., 2014; Sutcliffe et al., 2017).

Compared with several countries covered by studies, health care in the U. S. is still far from being as safe as it should be (Zeidel, 2011; Berwick et al., 2015; Schneider et al., 2017). The exact data are lacking, but inpatients and outpatients departments are hazardous and have very high risks. Revering the prevailing negative safety culture could reduce the low-quality

levels of practices and, in turn, increase the positive results of patient care (Mardon et al., 2010; Sorra & Dyer, 2010; Hansen et al., 2011; Sorra et al., 2012; DiCuccio, 2015).

Full awareness of safety culture among all health care practitioners in a hospital can enhance their safety performance and avail high levels of safety. The outcomes would be low disease and death cases due to poor hospitalization and health care.

1.3 Research Objectives

This study highlights the possibilities of establishing organizational health care where patient safety is a topmost priority. In such safe and well-established health care systems, any defects or drawbacks would be detected and dealt with in real-time. Continuous upgrading and improvement of safe health care services would ensure successful patient safety advancements (Smits et al., 2009). The study findings can assist in standardizing medical safety practices that would yield effective and efficient health care systems (Blegen et al., 2009).

The study's primary objective is to conduct a patient safety culture evaluation by probing the 12 areas assessed by the SOPS Hospital Survey. The research would depend on a specially developed model to relate the effects of hospital settings to those of the predominant respondent. The health care workers' perception of patient safety culture and the impact of such awareness would thoroughly be evaluated.

1.4 Research Contributions

Measuring patient safety culture has been a concern throughout some latest studies. According to this research, the level of patient safety can be predicted and diagnosed using

investigation outcomes in the area of patient safety culture. In addition to the available level, many literature reviews have been done. One of the main concerns has been probing the issues related to human and organizational concepts and tendencies in envisaging the safety of health care and the conceivable ways to achieve the desired goals of preventing medical errors.

This research aims at analyzing and measuring the relationships between both unit and hospital dimensions on the one hand and the characteristics of hospitals and workers on the other in the context of reported events concerning patient safety in health care. The role of organizational administration in spreading patient safety culture among staff has been highlighted. The more commitment from the side of management, the better effective safety attitudes have been ensured (Fogarty & Shaw, 2010).

The participating bodies in this research include health care workers from different positions, different hospitals areas, and different geographical regions of the United States. One main purpose of the study is to evaluate the present level of patient safety culture among workers who are in direct and indirect contact with the patients in U. S. health organizations. Another study's main purpose is to examine the factors and perceptions influencing the patient safety culture and their role in the frequency of reported events. The study aims to present patient safety culture as the key factor to interpret and consequently eliminate plenty of medical errors and adverse events in health care.

The study intends to offer health care organizations scopes to better understanding and advice to more effective improvements of patient safety culture. Managers will benefit from the

research findings, and health care workers will be provided with insights that will improve the quality of medical procedures. Therefore, erroneous practices can ultimately be diminished.

CHAPTER 2: CONCEPTUAL AND THEORETICAL FRAMEWORKS LITERATURE REVIEW

2.1 Introduction

Common beliefs and values in health care shape specific behaviors among health organizations and health care practitioners, which add up to form patient safety culture (Cooper, 2000; Nieva & Sorra, 2003; Xuanyue et al., 2013). By considering patient safety culture as a priority in all health care practices and procedures, the environment of health care organizations will become much more medical error-free. The safety culture will become the gear behind all innocuous behaviors of health care professionals. This leads to viewing how health care safety culture has been defined. After that, the following areas will be examined in the chapter: 1) Safety in health care organizations and patient safety .2) Organizational safety culture and climate.3) History and analysis of safety culture concept and climate; the theoretical basis of the concept; its relevant dimensions; assessing safety culture and its outcomes.

Relevant literature on patient safety culture will be reviewed in the second half of the chapter. Special highlighting will be directed to initiatives and research in patient safety culture in hospitals and other health care organizations' settings. Careful assessment and thorough analysis will be made regarding the factors underlying the patient safety culture in these hospitals and health care organizations' settings. The problems associated with poor safety culture have been identified and the concept of patient safety is discussed concerning safety culture in

general. Future research thoughts have been discussed, highlighting future opportunities for the researchers interested in safety culture.

2.2 Safety in Organizations

From giant industrial plants to small businesses, the issue of safety has become a significant concern. Sometimes minor errors cause death and even more catastrophic effects (Feng et al., 2008, Weick and Sutcliffe, 2011). The ultimate goal of safety procedures in any organization should simply be the prevention of accidents and any form of injury, not only to the customers but also to the employees and practitioners (Grote, 2000). As a result of the critical need, numerous studies on safety culture and climate in various industrial and service settings have been conducted. Some researchers may argue that the field of health care has its unique characteristics, and therefore it is quite different from those organizations where the idea of safety culture has initially been introduced (Pizzi et al., 2001; Colla et al., 2005). One significant difference is that in health care, “accidents” often happen one person at a time, unlike in other industries where accidents happen as “sweeping disasters” (Pizzi et al., 2001).

At present times, there is an international move to view single human determinations as to the basis of substantial potential impacts on the environment. The same can be said about the human role in safety if it can be turned into error preventing factor instead of risk causing factor. The North Sea Piper Alpha oil platform explosion can be an obvious example to prove this hypothesis (Flin et al., 2006). The same conclusion has been reached by Hutchinson (2014). When it comes to preventing error and avoiding adverse events, rather than being the cause, in a

working environment context, the individual role of the worker is vital (Hutchinson, 2014). Various theoretical approaches in the area support such a concept. The concept of "Normal Accident" (Hopkins, 1999), the approach of "Organizational Accidents" (Reason, 1997), and the attitude of "High-Reliability Organizations" (Weick, 2001) are just three examples.

Reason (2000) introduces the "person approach" and the "system approach" as two main pathways to deal with human errors and human-based accidents. Dealing with these potential risk causes should be through an appropriate management philosophy. The "person approach" segregates the individual's erroneous practices from those related to the system. These erroneous practices can be in the form of inattention, carelessness, forgetfulness, poor managerial skills, or low motivation. The approach throws the error responsibility upon the health care practitioners' shoulders, whether consultants, surgeons, physicians, anesthetists, or nurses. In this model, errors are tackled through sets of corrective actions and litigations, while in the "system approach" these errors are related to the contexts and circumstances in which the individuals work. The errors are considered as consequences to the system's causational settings. Human workers are seen as normally susceptible to error, and they naturally need to safeguard, protect, and fortify against this natural susceptibility (Reason, 2000).

The mainstream of 95 researches reviewed to detect the causal factors in hospital patient safety revealed that personal factors are dominant(Lawton et al., 2012). Thus, it has been highlighted that human behaviors need to be given more focus, without justification, by referring to the reasons and causal factors underlying these erroneous behaviors (Lawton et al.,2012). Although still widely used, the person approach has been accused of hindering the effort of

establishing institutionalized safer health care (Reason, 2000). On the other hand, High-Reliability Organizations (HRO) have been named to represent the system's approach to learn more about the systematic attitude in dealing with failures and errors (Ruchlin et al., 2004). Consequently, the system's approach started to be used more in the medical field (Currie, 2012). In medicine, a prevailing argument is that hospital systems assume workers' performances are free from mistake (Leape et al., 1998). Whereas, in industry, it is assumed that human errors are inevitable (Flin, 2007). These two opposing directions lead to some perplexes in patient safety health care.

Reason (1997) introduced the "Swiss Cheese Model" to represent the manifestations of system failures. The model was originally intended to be applied in industrial sceneries. Later, the model was redesigned to identify medical errors in health care organizations (Vincent et al., 1998). The model identifies several mechanisms that can be followed for keeping the victims safe from hazards. According to the World Health Organization, a hazard is "any threat to safety, e.g., unsafe practices, conduct, equipment" (World Health Organization, 2009). However, in any protective mechanism, there are areas of weaknesses that harbor factors leading to errors and failures (Reason, 1997) or, in other words, actions and situations whose combined results give rise to adverse events (World Health Organization, 2009). Collectively, areas of weaknesses cause the hazards to turn into actual harm to the patients (Reason, 2000).

Actual health care failures are those "the unsafe acts committed by people who are in direct contact with the patient or system" which directly and negatively affect efforts to keep the patient safe (Reason, 2000, p.769). Such failure can be in the form of inappropriate handling,

lack of relevant knowledge, negligence of safety precautions, and mistaken interventions (Vincent et al., 1998). In contrast to latent safety, conditions are the hidden unfavorable conditions that function as "resident pathogens" inside the system (Reason, 1997). These conditions wait silently until some operational failures take place. Then, an accident emerges from under the long-time residing adversities (Reason, 2000).

The latent safety failures are most often the result of poor plans and administrative assessments made by not properly educated personnel in the field of health care safety (Vincent et al., 1998; Reason, 2000). Hazardous performances most often result from accumulations of failure and unfavorable conditions such as ignorance, inexperience, poor preparations, overwork, stress, miscommunication, poor administration and many more adverse situations (Vincent et al., 1998). In most cases, adverse events occur due to an individual's failures associated with the system's drawbacks (Reason, 1997; Reason, 2000).

Based on Reason's model of organizational accidents (Reason, 1997, Reason, 2000), Vincent and colleagues (Vincent et al., 1998) introduced what is called the "Organizational Accident Model". This model considers safety failures and adverse events inevitable outcomes of operational failures caused by unfavorable administrative conditions. These conditions include wrong decisions and other organizational factors that lead to accidents and adverse events (Carayon, 2010). These organizational factors, according to Vincent's model, are (1) institutional context, (2) organizational and managerial, (3) work environment, (4) team factors, (5) individual (staff) factors, (6) task factors, and (7) patient characteristics. These factors are closely

related to one another and more related to the organizational level than the individual level (Carayon, 2010).

In the nuclear power and aviation industries, safety procedures concentrated on organizational factors instead of the workers' accidents and injuries. Such sift of attention permits overall observation of the holistic organization's safety culture (Reason, 1995, Reason, 1997, Weick et al., 2008). Three main examples of such a holistic organization's safety culture are establishing a safe environment, risk recognition and safe behavior monitoring (Cooper and Phillips, 2004).

Health care errors and adverse events are two prominent issues in health care. These two proactive and leading indicators have affected almost all the approaches to assess safety performance (Lawton et al., 2012; Choudhery et al., 2014). The reactive approach tends to use indicators before events to avoid future errors. The approach utilizes incident reporting systems, analysis of serious accidents causation, and incident reviews. On the other hand, the proactive approach tends to rely more on detecting potential organizational latent conditions to tackle them before accidents happen (Lawton et al., 2012). An excellent example of the proactive approach is safety climate assessment, in which the focus is on the system's successes rather than its failures (Flin et al., 2000; Cooper and Phillips, 2004). A successful combination of the two approaches can serve health care organizations to monitor their safety activities and see their actual effects (Cooper and Phillips, 2004).

2.3 Patient Safety

The growing costs of healthcare, due to the use of expensive technology and opting to provide competitive health care services. Other additional expenses rise from establishing, furnishing, and staffing costly health care premises and administrations. Obviously, amid all of this scenario, the safety of health care services would acquire relevant considerations formally and informally. Health care organizations started to borrow, adapt, and apply many ideas and techniques from other industries to meet the rising challenges posed by safety lacking procedures in the field (Institute of Medicine, 1999). The occurrence of too many errors and adverse events has necessitated efficient error management systems and administrations (McFadden et al., 2004). To understand how dire the situation has been, consider that in the U.S., despite all advancements in the field, between 44,000 and 98,000 lives are lost each year, with a total cost of approximately US$29 billion as a result of AEs (Kohn et al., 1999).

Another study in the U.S. claimed that annually between 210,000 and 400,000 deaths that could be prevented occur in US hospitals (James, 2013). Worldwide, it has been estimated in a study that about 9% of the total number of patients has been exposed to avoidable adverse events while being admitted to hospital (de Vries et al., 2008). Hudson suggests that safety culture authorities in health care are usually reactive (Hudson, 2003). As these authorities are not safety well-oriented, they do not take adequate initiatives towards their (systematic knowledge and approaches about the operation of the system and the management of risks (Hudson 2003)). Thus, they become serious and take safety actions after accidents occur, but not before.

2.3.1 Evolution of Patient Safety

The subject of patient safety in health care settings has become a general issue of concern for health organizations worldwide. The Institute of Medicine made some outstanding reports under the titles: “To Err Is Human: Building a Safer Health System” and “Crossing the Quality Chasm: A New Health System for the 21st Century” (Institute of Medicine, 1999). The IOM published these reports in 1999 and 2001 to highlight the estimated vast numbers of deaths as direct results of preventable errors in health care (Institute of Medicine, 1999). The IOM also tried to encourage each organization concerned with health care to have its system of “a culture of safety” with a specific focus on improving the safety of patient care (Institute of Medicine, 1999). Additionally, the IOM advised health care organizations to implement “the experiences of other industries” as these make available some “valuable insight about how to begin the process of improving the safety of health care by learning how to prevent, detect, recover and learn from accidents” (Institute of Medicine, 1999).

Similar outstanding improvements of patient health care safety in the United Kingdom (UK) followed the publication of the inspirational report, “An organization with a memory”, by the Department of Health (DOH, 2001). The influential report highlighted that “Safety cultures can have a positive and quantifiable impact on the performance of organizations” (DOH, 2001, p.46). The direct outcome was that patient safety culture became a principle element on the National Health Service’s (NHS) program for change for the better (Scott et al., 2003). These reports lead to worldwide considerations toward the role of organizational safety culture in the occurrence of adverse events in health care (Nieva and Sorra, 2003). The highlights of the

reports were also proved by the findings of studies on health care errors in countries Australia (Wilson et al., 1995), UK (Vincent et al., 2001), New Zealand (Davis et al., 2002, Canada (Baker et al., 2004), Scotland (Williams et al., 2008) and Palestine (Najjar et al., 2013). These studies, in turn, highlighted the reported rates (3–17% of admissions) of the could be prevented adverse events and the unnecessary death cases and financial loss (Brennan et al., 1991; Leape et al., 1991; Andrews et al., 1997).

Due to these reports, the shortages in the safety of patient care and the poor quality of services were all made visible to health care practitioners and the public and caught the attention of politicians (Pronovost et al., 2006). In 2004, due to the reports mentioned above, the WHO made the world alliance for patient safety in collaboration with numerous world organizations. The common cause was to highlight the need for worldwide cooperation to improve patient safety (WHO, 2009). Moreover, the issues of patient safety and safety culture have been popped up to the top of the health care agenda by such worrying failures in health care as the most prominent recent case of Mid Staffordshire NHS trust in England (Francis, 2013).

2.3.2 The Concept of Patient Safety

Patient safety has been defined as "the avoidance, prevention and amelioration of adverse outcomes or injuries stemming from the process of health care" (Vincent, 2006). In effect to this notion, it has become the most important worldwide and became a significant factor of high-quality health care service. The IOM considered patient safety as "freedom from accidental injury; ensuring patient safety involves establishing operational systems and processes that minimize the likelihood of errors and maximize the likelihood of intercepting them when they

occur" (IOM, 1999). Researchers agree that patient safety culture is subsequent to general organizational culture and that it is related to the individuals' values and beliefs about patient safety (Feng et al., 2008). This concept is precisely replicated in Mustard's (2002) definition of patient safety as: "…a product of social learning; ways of thinking and behaving that are shared and that work to meet the primary objective of patient safety." Still, the concept tends to remain not fully and satisfactorily defined (Feng et al., 2008).

In order to improve and build safer health care systems, some countries like the UK, Canada, Australia and the U.S. have started their safety initiatives of establishing patient safety actions, activating adverse event reporting and defining performance indicators related to safety. However, the outcomes of such efforts are vague and uncertain (Arah and Klazinga, 2004). According to Vincent et al. (2008), safer patient care is still an unreached goal. In addition to the significant challenges of improving efficient health care systems and processes of safe health care (Leape and Berwick, 2005), Reasons would add the shortages in patient safety information at both the organizational and the national levels. Furthermore, the task of involving the concerned staff in these patient safety improvement initiatives poses another hurdle (Vincent et al., 2008).

For example, in the Netherlands, a longitudinal retrospective review of patient records found adverse events rates among inpatients to have risen from 4.1% in 2004 to 6.2% in 2008. In North Carolina, USA, a random sample of 10 hospitals has been subject to another retrospective study on patient safety activities. The study showed only a little evidence of improvement (Landrigan et al., 2010). Again, a second U.S. study showed that about 33% of patients at three

tertiary care hospitals suffered from their medical care, despite these three hospitals being recognized for their efforts in improving patient safety (Classen et al., 2011). All these findings indicate that more efforts are still needed. So far, there has been a total failure in reducing the rates of risky, and in many cases harmful, medical care (Shojania and Thomas, 2013).

Several organizational factors have been designated as contributors to unsafe care throughout patient safety literature. These factors include apparent inefficiency of teamwork, communication, leadership, planning and decision making (Flin and Yule, 2005, Yule et al., 2006). Johnson and Hudson (2004) earlier listed poor communication, loose supervision, excessive workload, negligence of safety procedures and understaffing as patient safety threatening factors. Most of these organizational factors emerge from improper safety culture (Singer et al., 2003). McFadden et al. (2006) researched that further necessitated a comprehensive system approach to safety in which all hospital partners participate in establishing a common safety culture. In conclusion, it has been emphasized that a safety culture is a basis for any improvement in the quality and safety of patient care (Alonazi, 2011).

2.4 Organizational Culture and Climate

Organizational culture and climate have been studied as early as the 1970s and 1980s, with health care organizations being the core of concern (Harrison et al., 1992, Mackenzie, 1995, Sureshchandar et al., 2001). The concept of "organizational climate" appeared about a decade before the concept of "organizational culture" (Reichers and Schneider, 1990). The 1970s witnessed much research on organizational climate. Later in the 1980s, the term "culture" started to be replaced by the term "climate" in most research works (Guldenmund, 2000). The result was

an overlap in the definition and conceptualization of both terms. This overlap, in turn, led to long debates and discussions and of course, differences over the two concepts (Olsen, 2009). Different authors have introduced varying definitions of organizational behavior in the field (Verbeke et al., 1998).

Organizational culture is defined as a set "of commonly held beliefs and values about work life" that are shared between colleagues in an organization (Gaucher et al., 1993) while according to Schein (1992), organizational culture is defined as follows:

> "A pattern of shared basic assumptions that the group has learned as it solved its problems of external adaptation and internal integration; that has worked well enough to be considered valid and, therefore, to be taught to new members as the correct way to perceive, think, and feel in relation to those problems" (p. 12).

Cultural researchers have also described organizational culture as a three-level model. It starts from the lowest level of primary assumptions based on the unconscious beliefs that form the individual behavior and ends at the highest and most physical and behavioral reflections of culture (Davies et al., 2000, Glendon and Stanton, 2000). Schein (1992) positions basic assumptions at the most profound and least accessible level. The beliefs and embraced values are positioned at the intermediate level. The behaviors are at the highest and most consciously perceived level. Schein (1992) assumes that the variation between the levels of organizational culture is essential in health care as the more visible elements of culture are easier to control while the deep-rooted beliefs and values show more resistance to external influence. Figure 1 below shows three interrelated aspects of an organization's safety culture: psychological,

behavioral, and situational aspects. The arrows show how the three sub-concepts are interrelated so that nothing stands on its own (Cooper, 2000; Health and Safety Executive, 2005). The psychological, behavioral and situational aspects of safety culture are discussed to show what each category represents in the health care environment.

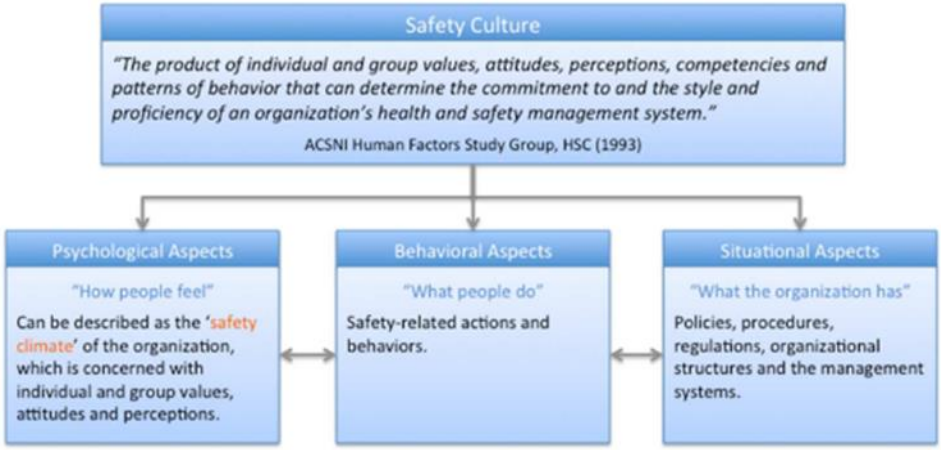

Figure 1 Safety Culture Abstraction (Developed by the United Kingdom's Health and Safety Executive, 2005)

The block of psychological aspects represents "the way people feel" about the safety environment and management systems. These aspects include people's beliefs, attitudes, values and perceptions at different organizational levels. This sub-concept is referred to as the organization's safety climate (Health and Safety Commission, 1993; Cooper, 2000; Health and Safety Executive, 2005).

A safety climate reflects how individuals identify their social environment within the organization. This perception influences their individual psychological well-being (James &

James, 1989). An organizational climate comes into existence when members of an organization share the same perceptions of an event or an environment. These perceptions are the actual characterization of how all employees in the organization see their roles as individuals, relate to one another as members of a group, and the feeling of objectivity within this organization (Glisson et al., 2008). The developments of positive safety cultures tend to be much impeded in such organizational climates where there are high role conflicts and low perception of role objectivity and clarity (Jordan et al., 2009).

Behavioral aspects of the safety culture reflect "what people do" within the organization (Health and Safety Commission, 1993; Cooper, 2000; Health and Safety Executive, 2005). This sub-concept includes all the actions, behaviors, and activities related to safety. Numerous staff activities directly affect the organizational overall safety culture. For example, certain behavioral aspects in a hospital environment can be related to handwashing as safety procedures before and after patient care. The correct documentation of when medications are administered to the patient can be another example of a safety-related activity.

The third block in an organization's culture consists of situational aspects. These sub-concepts include the organizational structures, policies, procedures, management communication and workflow that are prevalent and related to the patient care system in the health organization (Health and Safety Commission, 1993; Cooper, 2000; Health and Safety Executive, 2005). These aspects are sometimes known as corporate factors. Adhering to these corporate factors in a manner that ensures they are current, accessible and followed by all the health care teams would eventually prevent errors in all health care domains of management, a hospital's policies,

operating procedures, management communication and workflow systems. An outdated policy on medication administration can be taken as an example of a situational aspect. In this case, if a nurse followed the outdated policy, the current medication administration process would be inaccurate and could cause harm to the patient. The reporting hierarchy for a critical lab value can be another example. In most hospitals, the policies of a critical lab value delivery mandate that lab results are to be reported to licensed independent practitioners (LIP) who are physicians or nurse practitioners permitted by laws and regulations in their organizations to provide care to patients without direction or supervision (The Joint Commission, 2008). If these delivery policies are not followed, information could be passed to unauthorized employees, resulting in serious violations, treatment delays and harm to the patients.

Each author visualizes organizational climate from his or her perspective. Campbell et al. (1970) define organizational climate as "a set of attributes specific to a particular organization that may be induced from the way the organization deals with its members and its environment" (p.390). Schein (1992) considers climate "a reflection and manifestation of cultural assumptions" (p. 230). Glendon and Stanton (2000) describe organizational climate as "the perceived quality of an organization's internal environment" (p.198). The author goes further to define climate as culture in being constructed.

Organizational climate, unlike organizational culture, has been described as a broader concept that reflects the status of an organization at present (Glendon and Stanton, 2000). Ekvall (1983) sets an apparent differentiation between the two concepts. The author considers organizational climate and organizational culture reflecting different components of the social

system governing an organization. Culture is based on shared beliefs and values, whereas climate is a reflection of set behaviors. While organizational climate is concerned with individuals' attitudes and perceptions of specific aspects of an organization, culture, on the other hand, concentrates on pan-organization shared beliefs (Reichers and Schneider, 1990). Organizational climate has been described by Furnham and Gunter (2015) as an index of organizational health. Moran and Volkwein (1992) believe that climate incorporates "behaviors and artifacts" and "beliefs and values" and these are the cultural elements in the two outer layers of organizational culture.

Generally speaking, organizational climate is viewed as being less stable and as a result, is thought to be more subject to change (Denison, 1996). Whereas organizational culture is considered by Guldenmund (2000) as "relatively stable, multidimensional, and holistic in nature". Despite these attempts of distinction, Glick (1985) and Reichers and Schneider (1990) consider climate and culture as simply two interchangeable terms.

Hofstede et al. (2005) considered the distinction between organizational climate and organizational culture is only due to the level of concern. While climate is considered the concern of lower and middle-level management, culture is considered the concern of top-level management (Hofstede et al., 2005). Moreover, Glick (1985) explains that the two concepts are devised from two different disciplines. Organizational climate research is based mainly on social psychological disciplines, whereas organizational culture is mainly on anthropology. Consequently, the two terms reflect different research hypotheses and the distinction between them is in terms of the methodology applied.

Often, quantitative approaches are followed by organizational climate studies, while in the case of organizational culture, qualitative approaches are applied to study the research objectives. Organizational culture is evaluated qualitatively through observation and interviews (Wreathall, 1995). Glendon and Stanton (2000) explain that organizational climate tools, like climate survey questionnaires, may measure attitudes, beliefs, and perceptions when the measurement is undertaken with a slight touch on specific aspects of organizational culture. However, the results of climate surveys may not be ready to infer without further confirmation. Zohar and Hofmann (2012) advocate that culture and climate are multi-level paradigms upon which staff build perceptions of the organizational level climate and perceptions of the group level climate. According to Zohar and Luria (2005), whether consistent or discrepant, staff perceptions contain significant interpretations of safety behaviors.

2.5 Safety Culture and Climate

Safety culture and safety climate are derived from organizational culture and climate (Cooper, 2000, Guldenmund, 2000). The concept of safety culture is suggested to be studied in organizational culture (Guldenmund, 2000; Frazier et al., 2013). According to Neal et al. (2000), "Safety climate is a specific form of organizational climate which describes individual perceptions of the value of safety in the work environment" (p.100). Olsen (2008) asserts that the same perspectives used in understanding organizational culture can be utilized to understand organizations' safety culture. Naturally, safety culture studies focus on safety-related issues on organizational culture research. Again, and as explained earlier, there is a dire need for consistent definitions and conceptualizations of the terms organizational culture and organizational climate.

Otherwise, the lack of clarity in safety culture and climate concepts shall remain prevalent (Flin, 2007).

2.5.1 History of Safety Culture

The concept of safety culture was first introduced in the International Nuclear Safety Advisory Group's (INSAG) investigation report following the Chernobyl disaster in 1986 (WHO, 1986). The concept has since been discussed in various public inquiry reports about other high-profile incidents such as the nuclear accidents at Three Mile Island, the Piper Alpha oil rig, the King's Cross station fire, and the Clapham Junction train crash. Poor safety culture has been identified as a significant factor contributing to those accidents in such investigations (Cox and Flin, 1998; Fleming and Lardner, 1999; Reason, 2002; Perrow, 2004). As a result, safety culture has become a fundamental and top priority requirement in many high-risk industries like aviation, nuclear power, and chemical engineering (Pronovost et al., 2006).

Following the release of the IOM's reports in 1999 and 2001, there was a lot of interest in patient safety culture in the healthcare field (IOM, 1999, IOM, 2001). Creating a positive safety culture has become a key component of healthcare organizations' efforts to improve patient safety (Hughes and Lapane, 2006). According to Zhan and Miller (2003), creating a positive safety culture is critical to reducing the number of preventable medical errors and their costs to patients and society.

Recent advances in the health care field have indicated the advantages of adopting recognized organizational models and error management methodologies from other industries to minimize medical errors and protect patients from harm (Institute of Medicine, 1999). The main

concern is whether it is relevant to develop a safety culture in health care settings by transferring it from high-risk industries. The following section explores theoretical approaches and definitions across the published literature.

2.5.2 The Concept of Safety Culture

Since the Chernobyl accident in 1986, an increasing amount of literature has been issued to examine the safety culture concept. Several definitions for safety culture have been proposed, but most of them are general and not explicit enough (Carroll, 1998; Cox and Flin, 1998; Pidgeon, 1998; Cooper, 2000; Boughaba et al., 2014). The Health and Safety Commission has developed one of the most widely cited definitions of safety culture, and it states that:

> "The safety culture of an organization is the product of individual and group values, attitudes, perceptions, competencies to, and the style and proficiency of, an organization's 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 the efficacy of preventive measures" (HSC, 1993, p.23).

The above definition states that organizations with a positive safety culture are characterized by high levels of trust and shared views about the importance of safety. These organizations are built on the efficiency of safety management systems (HSC, 1993). Leape et al. (2009) stress that positive structures of safety culture include leadership, communication and preventive safety measures. Choudhry et al. (2007) state that a positive safety culture includes five fundamental components: commitment and support of management to safety; management

concerns for the staff; shared trust between management and employees; empowerment of staff; and continuous monitoring and improvements.

According to Cooper (2000), individual performance and organizational aspects that influence health and safety are reflected in safety culture. Zohar (2010) states that safety culture reflects one aspect of an organization's overall culture. Edwards and Armstrong (2013) portray safety culture as "the assembly of underlying assumptions, beliefs, values and attitudes shared by members of an organization, which interact with an organization's structures and systems and the broader contextual setting to result in those external, readily-visible, practices that influence safety" (p. 77).

Pidgeon (1998) has criticized earlier research in the field for being "unsystematic, fragmented and in particular, underspecified in theoretical terms." Guldenmund (2000) sees that safety culture as a concept is still poorly defined. Therefore, It is more logical to believe that developing a universal model or definition of safety culture has not yet been completed (Cooper, 2000). In contrast, a group of researchers such as Wilpert and Itoigawa (2001) argue that such a complex concept as safety culture requires theoretical and practical clarification. Another group of researchers such as Ginsburg et al. (2013) argue for the lack of clarity in defining the construct of safety culture and safety climate and the construct of patient safety culture. Nevertheless, a consensus of most researchers indicates that organizational and contextual factors are essential to define safety culture.

Most safety culture definitions from various industries share common elements, such as focusing on workers' attitudes and behaviors regarding health and safety practices (Cooper,

2000). These shared elements also indicate the importance of the psychological feature of safety culture, which is closely bound to the concept of safety climate (Choudhry et al., 2007). Cooper (2000) points out the situational and the behavioral constituents as two other essential elements of safety culture.

Sammer et al. (2010) carried out a comprehensive review of the culture of safety literature in the U.S. hospital settings. They documented the following seven patient safety sub-cultures: (a) leadership, (b) teamwork, (c) evidence-based patient care practices, (d) communication, (e) learning, (f) just culture, and (g) patient-centered care. According to Collins and Gadd (2002), sub-cultures of safety tend to develop when workers in the same organization experience different working conditions. Glendon and Stanton (2000) state that identifying safety sub-cultures as a basis to improve our understanding of the construct under study could be significant progress. Reason and Hobbs (2017) suggest considering safety culture based on three essential constituents: (1) a just culture, (2) a reporting culture and (3) a learning culture.

Theoretically speaking, any basic assumptions of organizational cultures tend to be influenced by national cultures. For example, the importance of rules and the acceptance of hierarchy may vary from one national culture to another (Hofstede, 1991). Some clear cases indicate that safety culture varies according to national cultures' differences (Cheyne et al., 2003). Lardner (2003) argues that a robust local safety culture created on a solid basis can over-ride the influence of national culture. However, this proposition needs some more research in its support.

2.5.3 The Concept of Safety Climate

Zohar (1980) appears to be the first researcher to use the term "safety climate" in a study on safety perceptions among industry workers. The author (1980, p.96) defined safety climate as a “summary of molar perceptions that employees share about their work environment” thus providing a “snapshot” of the perceptions that health care workers could hold about the visible features of safety culture during a particular time (Mearns and Flin, 1999, 5). Flin et al. (2000, p.178) defined safety climate “as the surface features of the underlying safety culture.” It “assesses workforce perceptions of procedures and behaviors in their work environment that indicate the priority given to safety relative to other organizational goals” (Flin et al., 2006, p.109).

Safety climate is made up of attitudes and perceptions instead of safety culture. It excludes values, competencies, and behaviors (Lardner, 2003). Safety climate differs from safety culture because it is specific to a single point in time and a single location. Reichers and Schneider (1990, 23) traced the progression of the two concepts, who concluded that "culture exists at a higher level of abstraction than climate, and climate is a manifestation of culture." Alternatively, safety culture is a broader organizational feature, whereas safety climate is a subset of it. Alternatively, safety culture is a broader organizational feature, whereas safety climate is a subset of it. As the actual disposition of the organization, Cox and Flin (1998) define safety culture as the relative stability of systems, procedures, and behaviors.

On the other hand, safety climate was described as a transitory mood that changes according to external events and factors. Guldenmund (2000) states that safety climate can be

regarded as another safety performance indicator. The Health Foundation held a discussion event in February 2013 to decide what is meant by 'safety culture' and how it can be assessed and monitored. The meeting concluded that culture, on the one hand, is described as more informational and concerns "the values, beliefs and assumptions that staff infer through story, myth and socialization, and the behaviors they observe that promote success" while, on the other hand, climate "emerges through a social process, where staff attach meaning to the policy and practice they experience and the behaviors they observe" (The Health Foundation, 2013, p.3).

To identify common features in the definitions of the concepts of safety culture and safety climate, Kaczur (2017) conducted a conceptual analysis and comparison of these concepts at the level of theoretical and operational definitions and concluded that both concepts appear to be distinct constructs, in which safety climate is a sub-component of safety culture. The definitions of both terms significantly vary in the published research. The evident lack of unified definitions for both constructs leads to the prevailing lack of conceptual clarity. Kaczur (2017) concludes that safety culture may lose its potential as a crucial feature in organizational activities without a clear understanding of its nature.

On the other hand, Denison (1996) draws attention to the distinctive differences between research studies that have measured safety culture and those that have measured safety climate. Guldenmund (2000) adds that according to the Schein (1992) model, safety culture is of three levels labeled as basic assumptions, espoused values, and artifacts. The level of basic assumptions is the core layer of culture. The other two levels of espoused values and artifacts formulate a safety climate. Basic assumptions cover beliefs, unconscious thoughts and feelings

considered true and are more readily accessible by qualitative methods. The innermost, sub-conscious basic assumptions can only be inferred rather than assessed (Schein, 1990). Meanwhile, the two outer aspects of culture are the more visible and conscious values, attitudes and perceptions that can be quantitatively measured using questionnaires. Schein (1990) suggests ethnographic methods to assess basic assumptions held by the members of an organization as an indication of safety culture.

Safety climate questionnaires are commonly used to assess safety climate because they measure employees' attitudes and perceptions of safety in their work environments (Collins and Gadd, 2002; Choudhery et al., 2014). According to Denison (1996), questionnaire surveys are useful in reflecting employee perceptions of the current state of safety in their specific organization location at a specific time. On the other hand, these questionnaire surveys cannot accurately reflect the underlying safety culture.

To conclude, the definitions of safety culture and safety climate are equally numerous and different. Denison (1996) states that the two terms may represent different approaches to the same incident. Nonetheless, despite their distinctive differences, the two terms are often used interchangeably in literature (Cox and Flin, 1998).

2.5.3.1 Zohar and Luria's multilevel model of safety climate

Both Zohar and Luria suggest a multi-level model of safety climate at the levels of organization, sub-unit, or group (Zohar, 2000; Zohar and Luria, 2005). The most significant assumption of the multi-level model is that staff perceptions related to the safety priority which are determined by the perceived managerial commitments at different levels of the organization. These staff perceptions are represented in the organization's policies, procedures, and practices.

Zohar and Luria (2005) point out that the effect of an organization climate on staff's safety behavior is greatly facilitated by group climate level, which indicates that organization-level and group-level climates are "globally aligned" (p. 625). The authors add that perceptions of managerial commitment at the unit level, as in the form of supervisors, have been considered a more "proximal measure and powerful antecedent" of safety performance. The organization level, represented in the top management, lies as the "distal antecedent" (p. 618). The authors also reveal that, in some cases, group-level variation can be related to the preference of supervisors to apply formal procedures. Zohar and Luria's (2005) multi-level safety climate model appears to be the most overt framework to demonstrate the effects of staff perceptions on safety results at different levels of the organization (Saraç, 2011).

In agreement with Zohar's theoretical suggestions, Colla et al. (2005) report that management commitment has been evaluated with safety results in patient safety climate studies. The influence of top management on the level of priority given to safety at the unit level has been found to reduce adverse consequences, including treatment errors (Naveh et al., 2006). This can be achieved mainly by establishing well-written safety procedures and policies. However, specifically in health care, the effect of hospital safety climate on both patient and worker safety is often not entirely clear (Flin, 2007).

2.5.4 Theoretical basis

Theoretically speaking, both safety culture and safety climate provide a basis to guide the workers' safety behavior to acquire perceptions and expectations regarding safety behavior outcomes (Zohar, 1980). Despite the significant practical improvement of safety culture and

climate, that progression has not been reflected in theoretical improvement (Clarke, 2000, Guldenmund, 2000, Zohar, 2010). Groves et al. (2011) add that there is an undisputable lack of a reliable definition of safety culture and a proper reinforcement of theoretical basis for this concept. Also, there is an absence of a safety culture theory that describes the process of protecting patients and, at the same time, includes the interaction between the organizational structures and the individual activities (Groves et al., 2011).

Clarke (2000) points out the "theoretical roots" of safety culture and argues that no one has built an independent framework or attempted to make safety culture operate based on theoretical roots. Guldenmund (2000) carried out a literature review of research on safety culture and climate and concluded that "All in all, the models of safety culture are unsatisfactory to the extent that they do not embody a causal chain but rather specify some broad categories of interest and tentative relationships between those" (p. 243). Likewise, Groves et al. (2011) argue that it is not unusual for a concept gathered from various disciplines, as in the case of safety culture, to lack a solid theoretical basis in a profoundly different health care environment.

It is believed that research on patient safety culture has borrowed its theoretical roots from high-risk industries (Ausserhofer, 2012). According to Halligan and Zecevic (2011), the five most commonly cited models in health care research include (1) High-Reliability Organization Theory (HROT) (Ruchlin et al., 2004), (2) Donabedian's Quality of Care Model (Donabedian, 2002) and its adaptations including the Systems Engineering Initiative for Patient Safety (SEIPS) model (Carayon, 2006) and Quality Health Outcomes Model (Mitchell et al., 1998), (3) The Cultural Maturity Model (Westrum, 2004), (4) Organizational Theory (Ruchlin et

al., 2004) and (5) System Theory (Nieva and Sorra, 2003). According to Guldenmund (2000), no single safety culture theory or model has been unanimously recognized as clearly representing the construct of safety culture and safety climate. Also, no single theory or model can be applied in all organizations. The most common theories and models adopted in health care research are HROT, Donabedian's Quality of Care Model, including its SEIPS variations, and Hospital Survey on Patient Safety Culture Conceptual Model. A brief overview of these is provided below.

2.5.4.1 High-reliability organization theory

The early literature on safety was founded on the premise that individual workers more often caused errors than how safety was administered (Cox and Flin, 1998, Reason, 2002). However, according to the Institute of Medicine (1999), organizational errors are primarily caused by poorly planned systems. The systems approach to error, which is gaining popularity in health care, was first widely employed in various industrial settings (Currie, 2012). HROT, for example, is based on research into high-reliability companies. These high-reliability firms operate risky and intricate technology in hazardous environments where the consequences of errors may be severe, but the likelihood of errors is low (Roberts, 1990). Nuclear aircraft carriers, navy, and commercial aviation are examples of high-reliability companies (Baker et al., 2006). The premise underpinning organizational safety in these is that they can work in dangerous conditions because their components have various functions and complexities. They also link time-sensitive procedures and highly specialized staff (Roberts, 1990; Perrow, 1999).

Furthermore, it is considered that accidents occur because those in charge of managing and operating complicated systems cannot anticipate and predict the difficulties that the system

will produce (Perrow, 1999, Ruchlin et al., 2004, Singer et al., 2007). To handle complicated tasks, prevent accidents, and improve reliability, such complex yet successful operations require efficient human organization, relevant processing, and appropriate technology (Ruchlin et al., 2004).

Only lately has a study indicated that a sense of "collective mindfulness" is a critical part of HROs' safety culture, allowing them to maintain good performance (Weick and Sutcliffe, 2011). This important feature is built on front-line staff sharing a common goal of detecting and correcting errors before they cause negative consequences. As simple as it may appear, this shared motivation is made up of five interconnected behavioral principles: fear of failure, unwillingness to simplify interpretations, sensitivity to operations, dedication to resilience, and deference to expertise (Vogus & Sutcliffe, 2007). According to Weick and Sutcliffe (2011), these five principles help front-line workers stay mindful and function safely even in dangerous situations.

Another critical component in the success of HROs is the ability of the organization's employees and teams to communicate consistently and effectively. Despite operating under high stress in complex circumstances, long-term synergistic behaviors and staff constancy supplement these (Wilson et al., 1995). Contrary to popular belief, the health care sector has its own set of complications that distinguish it from tightly managed industrial HRO environments (Dekker et al., 2010). HROT was used to develop several patient safety climate measures, including the patient safety climate in healthcare organizations and the safety organizing scale.

2.5.4.2 Donabedian's quality of care model and SEIPS model

Donabedian (2002) proposed a framework for understanding the structures, processes, and outcomes that influence the quality of healthcare services. According to Donabedian (2002), structure refers to the conditions under which care is provided. This structure considers all of the physical and organizational characteristics of healthcare facilities. All of the activities involved in providing care are included in the process. In terms of all relevant collective structures, process components, and impacts, the outcomes are the final results or induced changes related to the provision of care. Bonner et al. (2009) asserted that each component in Donabedian's framework is not only active but transactional and liable to influence the safety outcomes. However, the model has some limitations in identifying the scope of interactions and the extent of relationships among the system's constituents (Carayon, 2006).

Human Factors and Ergonomics (HFE) came to existence as a scientific discipline promoted as being useful for redesigning health care systems and processes, as well as improving the quality of patient safety and care (Pronovost and Goeschel, 2011; Pronovost and Weisfeldt, 2012; Carayon et al., 2014). Following the IOM's report "To Err is Human: Building a Safer Health System" in 1999 (Institute of Medicine, 1999), the HFE approach to research, design, and policy making became fundamental for patient safety in various health care settings. Nevertheless, Carayon et al. (2014) argue that HFE systems approaches should incorporate all the comprehensive organizational concerns and external impacts to have a significant and sustainable influence on patient safety and health care quality.

Donabedian's Structure-Process Outcome model of health care quality is incorporated into the SEIPS model (Donabedian, 1978; Donabedian, 1988; Carayon, 2006). Furthermore, the work system replaces the "Structure" component to create a more systematic approach to analyzing and improving patient safety and health care quality (Carayon et al., 2014). In terms of incidents, errors, adverse events, satisfaction, and experience, the SEIPS model describes the system components and their relationships and their impacts on patients. It also explains the components, their relationships, and how they affect employee outcomes such as incidents, stress, burnout, joy, satisfaction, and organizational outcomes such as productivity, efficiency, and staff injuries. It improves on Donabedian's model by including a more detailed description of organizational structure in a working system. Furthermore, the SEIPS model details the interacting components, whether persons, tasks, tools and technologies, physical environments, or organizations. Likewise, it incorporates employee/organizational outcomes with all possible mutual relationships between patient outcomes and employee/organizational outcomes.

2.5.4.3 Hospital Survey on Patient Safety Culture Conceptual Model

The AHRQ created a survey to pinpoint the underlying conditions that lead to AEs in patient care, which led to the AHRQ HSPSC conceptual model. Appendix A contains a sample of this survey. The literature review, tool development, and psychometric analyses components of the AHRQ are discussed later in this chapter. The HSPSC conceptual model is based on individual hospital employees' perceptions of safety culture. Figure 2 shows the same thing (Sorra & Nieva, 2004; Blegen et al., 2009; Sorra & Dyer, 2010). Using factor analysis, the researchers grouped individual employees' perceptions of safety culture into four main categories: (1) "Your Work Area," (2) "Supervisor/Manager," (3) "Communication" and (4) "Your Hospital." There were ten

dimensions within these four structures to describe the employees' perception of safety culture. There were also two more dimensions representing outcome measures: "Frequency of Event Reporting" and "Overall Perceptions of Safety" (Sorra & Nieva, 2004) (Appendix B). The tool consists of 42 items that help operate each dimension. Detailed descriptions and examples of dimensions will follow.

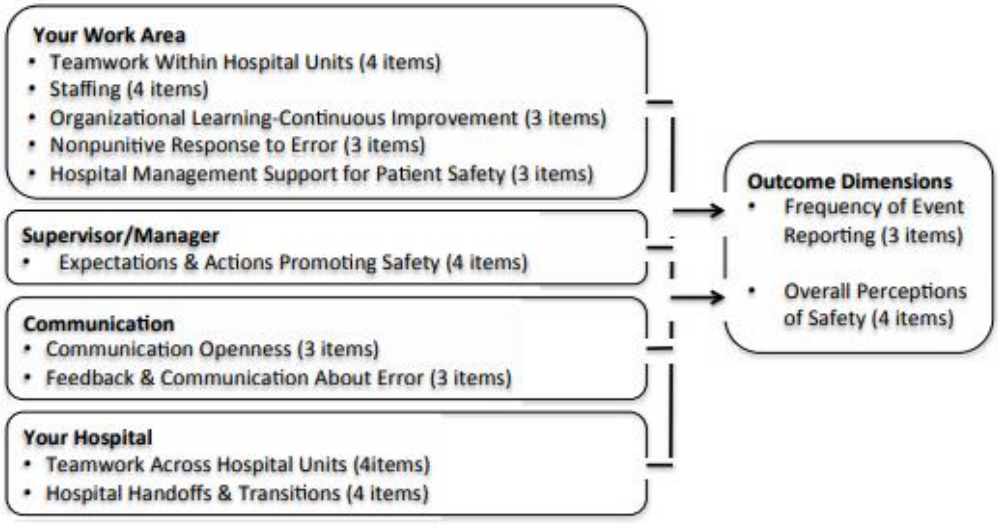

Figure 2 HSPSC Conceptual Model

Through factor analyses, researchers identified the dimensions that measure an employee's perceptions of safety culture on the work area (Sorra & Nieva, 2004; Blegen et al., 2009; Sorra & Dyer, 2010). Work areas are defined as units of the organization that provide specialized patient care, although they are not considered departments. Examples include the intensive care unit, the surgical unit, and the neonatal intensive care unit. The dimensions' definitions and examples of hospital scenarios are provided below to clarify the functioning perceptions.

1. Teamwork within Hospital Units

Within this dimension, all levels of staff in specific units respect and support one another, and they all work together as one team (Sorra & Nieva, 2004; Blegen et al., 2009; Sorra & Dyer, 2010). When caring for a neonate, for example, the nursing staff may develop clear care goals in line with treatment options, and these objectives would need to be communicated to other staff shifts to maintain safe care. In such situations, the nursing staff must respect and support one another and work as a cohesive unit to ensure the neonate's safety.

2. Staffing

This dimension looks into the institution's staffing practices to see if enough staff can handle the workload. This dimension's items also test whether people believe their unit's work hours are appropriate and support high-quality patient care (Sorra & Nieva, 2004; Blegen et al., 2009; Sorra & Dyer, 2010). Furthermore, the staffing dimension determines whether the working teams are made up entirely of temporary employees and, if so, whether such ad hoc staffing is best for patient care. When nurse-to-patient ratios are reasonable, care is proven to be safer (Siarkowski-Amer, 2013). When nursing staff realizes that the organization's management understands the importance of adequate staffing to address the safety needs involved in providing quality patient care, a safe work environment prevails (Siarkowski-Amer, 2013).

3. Organizational Learning-Continuous Improvement

In this dimension, researchers tried to find out if hospital employees believed their organization learns from the occurrence of error and if it is likely that such errors lead to improvements that can elevate the efficiency of safe care provision (Sorra & Nieva, 2004; Blegen et al., 2009; Sorra & Dyer, 2010). Medication administration could be an example of

Organizational Learning-Continuous Improvement. A root cause analysis of the event could detect the source of the error if a medication was delivered to the wrong patient. Then consequently, relevant modifications could be introduced to improve the process and avoid such error occurrence. While learning from mistakes helps to avoid mistakes in the future, it can only happen in environments that value and promote safe patient care.

4. Non-punitive Response to Error

This dimension investigates the extent to which employees believe they will not be punished for unintentional errors. In other words, their mistakes would not be held against them and would not be recorded in their performance files (Sorra & Nieva, 2004; Blegen et al., 2009; Sorra & Dyer, 2010). As in medication errors, employees would report their errors if they felt secure from punitive actions. The assumption is that there might be a flaw in the system for such an error to have occurred. To get keenly involved in improving a flawed system, employees need to feel secure and believe there will be no negative consequences if they report work deficiencies (Reason, 2000). Such transparency in the work environment tremendously enhances patient safety culture.

5. Hospital Management Support for Patient Safety

This dimension assesses whether hospital management maintains a work environment that promotes patient safety. The dimension also confirms that the hospital's management prioritizes patient safety (Sorra & Nieva, 2004; Blegen et al., 2009; Sorra & Dyer, 2010). An organization's climate is a specific component concerned with how hospital employees identify the social setting in the organization, as mentioned earlier in this chapter (, 1996; Jordan et al.,

2009). The ideal environment for a safety culture is when the hospital management's actions and activities demonstrate to the staff that safety is a top priority. These safety-enhancing actions may be visible if management actively supports appropriate nurse-to-staff ratios or implements a fair pay scale to all employees.

6. Supervisor/Manager category of safety culture

Through the use of factor analyses, researchers acknowledged this category as having a single dimension to evaluate employees' perceptions of their supervisors' or managers' expectations, actions and willingness to promote patient safety and safe health care (Blegen et al., 2009; Sorra & Nieva, 2004). This category was defined through the perceptions of hospital supervisors and managers when they listened to their staff proposals on enhancements of patient safety. This dimension also explores whether employees believe these proposals are taken seriously and eventually incorporated in the organization guidelines for actual practices (Figure 2). Supervisors and managers who enthusiastically compliment their employees for implementing patient safety procedures and reward those who endorse safe care create strong safety cultures in their work environments (Sorra & Nieva, 2004; Blegen et al., 2009; Sorra & Dyer, 2010). A monetary gratuity to employees who speak up when a breach in safety procedures occurs could be a simple example of such a reward. Employees need to feel secure when they report such adverse events with their actions praised and encouraged by their supervisors and managers.

7. Communication Openness

In this dimension, staff members speak up freely if they see something negatively affecting patient care. They also have the freedom of questioning the authority about a safety violation (Blegen et al., 2009; Sorra & Nieva, 2004; Sorra & Dyer, 2010). Errors are readily fostered in work environments with threatening and punitive behaviors which prevent mutual communication (The Joint Commission, 2008). An example of Communication Openness might involve a nurse enquiring about an aspect of a physician's decision, and the physician would not be offended by this questioning in an open communication environment. Moreover, through an inter-professional exchange of ideas, the physician would clarify the reason for the decision, consequently improving the nurse's level of understanding and satisfaction with the course of treatment (Sorra et al., 2016; The Joint Commission, 2008).

8. Feedback and Communication about Error

In this dimension, staff are informed of errors and how they can be prevented. In addition, staff are informed of relevant changes that have been induced to prevent future adverse events (Blegen et al., 2009; Sorra & Nieva, 2004; Sorra & Dyer, 2010). An example of this dimension could encompass a hospital manager non-punitively discussing the occurrence of an error with a practitioner or all members of the team involved in that error. If any changes were necessary, the newly introduced procedures would be communicated throughout the hospital to prevent similar occurrences in the future.

9. Teamwork across Hospital Units.

In this dimension, hospital units cooperate and coordinate to provide the best patient care. This dimension explores whether hospital systems foster a sense of synergy between multiple

hospital units or between specialized groups (Blegen et al., 2009; Sorra & Nieva, 2004; Sorra & Dyer, 2010). For the patient's well-being, the variations between individual issues and system issues are disregarded. To achieve such a spirit of solidarity, patient care teams must effectively collaborate with relevant teams in other units. The multiple teams should unanimously and explicitly agree upon the set goals, objectives, roles, processes and outcomes (Siarkowski-Amer, 2013). In order to surpass the sometimes unavoidable ideological differences between team members across units, explicitly defined and deliberate strategies and systems must be established in advance. Such ideological differences, if neglected, can create an undesired sub-safety culture. For example, if a practitioner in hematology does not clearly express a patient's vital clinical diagnosis to a surgeon prior to surgery, the fact that the patient is hemophilic might be unnoticed. The lack of solidarity among health care teams indeed renders the patient vulnerable to an increased risk, such as experiencing unnecessary bleeding during surgery in the case of this hemophilic patient. In conclusion, effective communication across hospital units is essential to assure patient care is safe from one specialty to another.

10. Hospital Handoffs and Transitions

This dimension is pertaining to whether practitioners believe necessary information about the patient is circulated in the forms of handoffs among care providers across hospital units and during the change of work shifts (Sorra & Nieva, 2004; Blegen et al., 2009; Sorra & Dyer, 2010). A handoff is defined as the process of transferring care responsibility from one practitioner to another or from one unit within the hospital to another (Arora et al., 2009). Similar processes closely related to handoffs are transitions, which are defined as moving the patients between

health care practitioners and settings, such as hospital units and across medical specialties, according to the requirements of their condition and care change (Arora et al., 2009). For instance, patients might receive care from physicians in outpatient settings. Then they are transitioned to hospital nurses, physicians or specialists for inpatient care before once again being transitioned to skilled care facilities (The Joint Commission, 2008). If a patient has an adverse reaction to medication during these transitions or handoffs, this event should be communicated to all medical care teams on the following shifts or across hospital units if the patient is transferred. If the patient's information is not adequately circulated, the transition or handoff could jeopardize the patient's safety. Ineffective transitions and handoffs are usually encountered in poor hospital cultures and lead to preventable errors, prolonged hospital stay, and additional expenses of health care (Medicare Payment Advisory Commission, 2008; The Joint Commission, 2008).

As discussed, a hospital's safety culture influences the quality of services and outcomes. Consequently, errors are reported (Sorra & Nieva, 2004; Mardon et al., 2010; Hansen et al., 2011; Sorra et al., 2012; DiCuccio, 2015). As discussed, quality outcomes are often associated with the occurrence of SREs. Examples of such events would be a patient's serious injury or death because of unsafe blood product infusion and severe injury or death associated with a medication error (National Quality Forum, 2011). Two HSPSC dimensions that address outcomes are discussed below.

11. Frequency of Event Reporting

This dimension measures staff's perception of the frequency of reporting adverse events. According to this dimension, errors are measured from three perspectives: the frequency of catching mistakes and reporting them before they affect the patient; the frequency of reporting mistakes that have no potential harm to the patient; the frequency of reporting mistakes that could have harmed the patient, but did not (Blegen et al., 2009; Sorra & Nieva, 2004; Sorra & Dyer, 2010). For example, a physical therapist may have provided therapy to the wrong patient. This therapy caused no harm to the patient. The incident may not have been reported, as the patient was not harmed. Nonetheless, not reporting such an error pauses potential risks for other patients who may have encountered an analogous accident or may have been harmed when similar wrong care was provided. Understanding why this care was provided to the wrong patient would be of real concern to health care staff and the whole organization.

12. Overall Perceptions of Safety

This outcome dimension is defined as individuals' perceptions of their organization's error-prevention strategies and system procedures widely shared (Blegen et al., 2009; Sorra & Nieva, 2004; Sorra & Dyer, 2010). Patient safety is defined by the National Patient Safety Foundation (2015) as "the freedom from accidental or preventable injuries caused by medical care". As a result, this dimension investigates professional individuals' perceptions of the care they provide and whether procedures and systems that fail to support their care endanger the patient's safety. Employees' perceptions that their hospital management is unconcerned about patient safety become problematic, resulting in low job satisfaction and a high rate of patient harm (Sarac et al., 2011; Siarkowski-Amer, 2013).

2.6 Literature Review

2.6.1 Introduction

The main content of the literature review is adapted from the systematic review paper by (Azyabi, Karwowski and Davahl,2021), which has been published in the MDPI access journal.

According to the World Health Organization, patient safety (PS) is about preventing medical errors and their adverse effects on patients during healthcare delivery (Colla et al., 2005; World Health Organization, 2009; Gaal et al., 2011). Unsafe medical practices can lead to patient injury, death, or disability (Nieva and Sorra, 2003.)The proliferation of such incidents has led to the recognition of the need to improve patient safety culture (PSC) in the healthcare industry worldwide. Furthermore, patient safety has been considered as one of the strategic components of healthcare management (Ramil Hermida et al., 2011). Kohn et al. (1990) argued that safety is a crucial and fundamental aspect of patient care research. Kohn et al. (1990), in a landmark of PS publications, advocate for error prevention and mitigation using a systematic approach to PS management. Therefore, to ensure the highest level of safety culture in the healthcare industry, it is also essential to understand the beliefs, attitudes, norms, and values of PS and its thresholds (Ghobashi et al., 2014).

The present study focuses on patient safety culture (PSC) in hospitals. This article's main objective is to discuss the research tools used to assess PSC and identify its essential components. The preferred reporting items for systematic reviews and meta-analyses (PRISMA)

were used for this review to ensure reliable results. The PRISMA protocol contains 27 items that aim to analyze and report scientific evidence reliably (Moher et al., 2009).

This paper is structured as follows: the methodology section explains research questions and research strategy; the results section represents the primary outcomes; the discussion section answers research questions.

2.6.2 Materials and Methods

This review aimed to evaluate current research on PSC in the healthcare setting. The following two research questions have been posed:

1. What research instruments are used to study patient safety culture?
2. What are the essential dimensions of patient safety culture assessment?

The study follows the guidelines of PRISMA, as discussed by Moher et al. (2009). First, the protocol was used to specify the search strategy and research questions. Next, the Hawker Assessment Tool was used to assess the quality of the articles identified (Hawker et al., 2002). Sources for the systematic review included peer-reviewed articles, proceedings, textbooks, conference presentations, and reference books within the scope of PSC. At the exploration stage, the bibliography search focused on academic databases, including CINAHL, MEDLINE, Embase, ProQuest, Google Scholar, PsycINFO, and PubMed. Each of these databases provided adequate information regarding PSC in hospitals.

Eligibility criteria for the search space were applied to articles published after 2006. Articles were identified based on the combination of keywords 1-4, as illustrated in Table 1.

Table 1 Keywords Used in the Present Review

Row	Step
Keywords 1	"safety culture" OR "safety climate" OR "patient safety culture" OR "patient safety climate" OR "patient safety"
Keywords 2	"perception" OR "measure" OR "evaluate" or "assess" OR "survey" OR "instrument" OR "tool"
Keywords 3	"hospital" OR "teaching" OR "tertiary"
Keywords 4	"nurse" OR "doctor" OR "physician" OR "staff" OR "health professional"
Search	#1 AND #2 AND #3 AND #4

The eligibility criteria allowed us to narrow down the subject literature and to identify publications that were relevant to the stated research questions. The articles selected for this study met specific inclusion criteria; namely, these papers (a) were written in English; (b) had been peer-reviewed; (c) identified or described PSC; (d) applied to hospital settings; (e) utilized a survey tool to measure dimensions of PSC among acute care hospital personnel; and (f) applied to general, secondary, tertiary, teaching, or university hospitals. Exclusion criteria included (a) book chapters; (b) papers that, upon review, were found to not be related to the research questions; (c) opinions, viewpoints, anecdotes, letters, and editorials; (d) studies with small sample sizes; and (e) case studies that focused on only one specific hospital unit or sector. Paper titles and abstracts were analyzed based on the stated inclusion and exclusion criteria. Any

discrepancies that arose during this phase were resolved through a process of discussion and consensus.

Hawker et al. (2002) noted that the quality of any given paper must be assessed against a set of predefined criteria to determine whether it is appropriate for further study. They also proposed that such an appraisal should be performed through the use of appropriate appraising tools. The present study applied the Hawker Assessment Tool, which enables the user to score the quality of papers reviewed. This tool has a uniform assessment form for all types of papers, thereby providing consistency in the evaluation process. One of the assessment factors is the consideration of whether the abstract offers a description of the study. Other factors include the introduction of the paper under review, the paper's aims, background study, and findings. This tool also enables the user to analyze the study's implications concerning the topic under review and indicates how the findings can be converted into policies. A maximum score of 36 (Hawker et al., 2002) was used to assess the quality of potential papers to be included in the present study. The range of the reviewed studies' quality score ranges from a minimum of 9 points to a maximum of 36 points. To create the overall quality grades, we used the following definitions: high quality (A), 30–36 points; medium quality (B), 24–29 points; and low quality (C), 9–24 points.

A data extraction template from the Hawker Assessment Tool was used to collect data regarding the properties of the adopted studies. This template allows for a literature analysis with a minimal selection bias (Elamin et al., 2009; Tacconelli, 2010).

Through a search of all relevant databases, a total of 1339 publications were initially identified. The databases searched included CINAHL, MEDLINE, Embase, ProQuest, Google Scholar, PsycINFO, and PubMed. Further analysis was required to eliminate duplicate titles, which resulted in 601 duplicates being discarded. This step was followed by the application of exclusion criteria, as previously described. The abstracts for the remaining 261 titles were read, which led to the selection of 137 relevant articles whose entire texts were analyzed. It should be noted that no additional articles were added after the references from the initially selected papers were examined. Figure 3 provides a flowchart illustrating the article selection process. A total of 66 articles that met all eligibility criteria and that had been published between 2006 and 2020 were selected for the study.

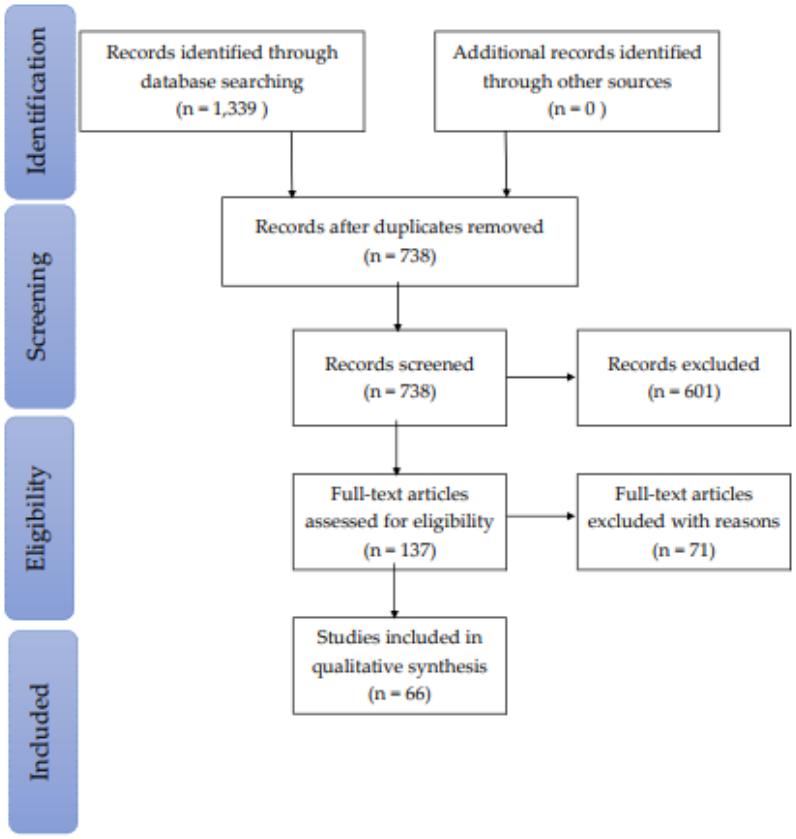

Figure 3 Flow diagram of the methodology and selection process (Moher et al., 2009).

To identify research instruments used to study patient safety culture, two researchers (authors) independently read the selected articles' full texts to identify research instruments and their aspects. Subsequently, the two authors compared their findings to develop unified results. Disagreements between the two researchers concerning research instruments and their identified aspects were discussed and resolved in sessions with the third researcher.

2.6.3 Results

All included records were categorized according to objective, strength, limitation, finding and quality score as it is represented in APPENDIX C.

A total of 1,690,225 participants took part in the reviewed studies. The response rate ranged from 17% (Turunen et al., 2013; Zaheer et al., 2015) to 100% (Chakravarty et al., 2015). However, some studies did not report the response rate (Abdelhai et al, 2012; Feng et al., 2012; Amarapathy et al.,2013; Ammouri et al., 2015; Kiaei et al., 2016; Boughaba et al., 2019). The study participants included nurses, doctors, and administrators. Figure 4 shows the distribution of participants. Seventeen papers focused on nurses, 38 studies included clinical and non-clinical staff, and 11 studies included clinical staff only.

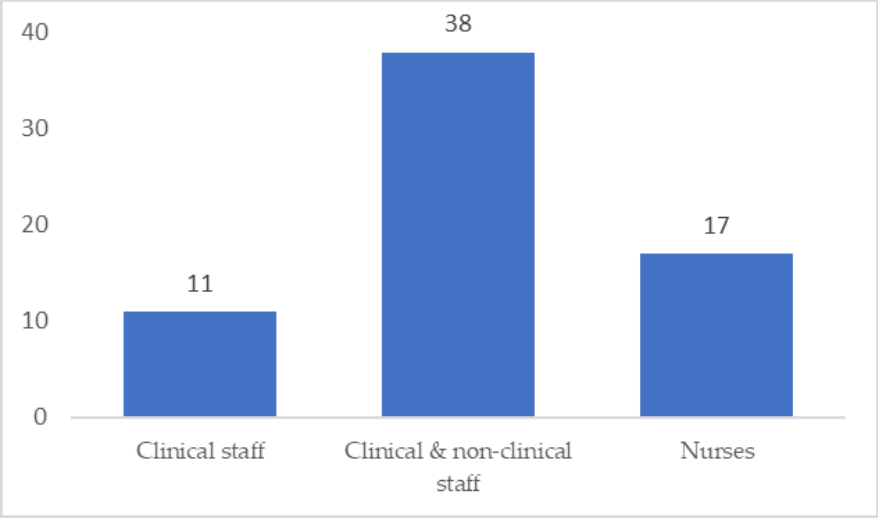

Figure 4 Focus of each study according to participants.

The reviewed articles reported several limitations concerning the applied methodology and results. First, articles mainly used quantitative approaches to measure PSC, where these methods are not efficient for measuring complex and dynamic attributes such as culture. Second,

cross-sectional designs were commonly used among included articles with data collected at one point at a time. Therefore, it is not possible to determine the causal relationships between PSC and the explanatory variables. Third, self-reported questionnaires were applied to collect data, which introduced social desirability biases to the reported research results. Fourth, seven articles did not report their participants' response rate, and 26 articles reported a relatively low response rate (less than 60%). The majority of the reviewed papers concluded that their results could not be generalized because their studies represented unique cultures, the large variations of the applied research instruments, variation in sample sizes, differences in the type of healthcare facilities, and the diversity of study participants.

The global distribution of the included articles is represented in Figure 5. Several studies targeted more than one country.

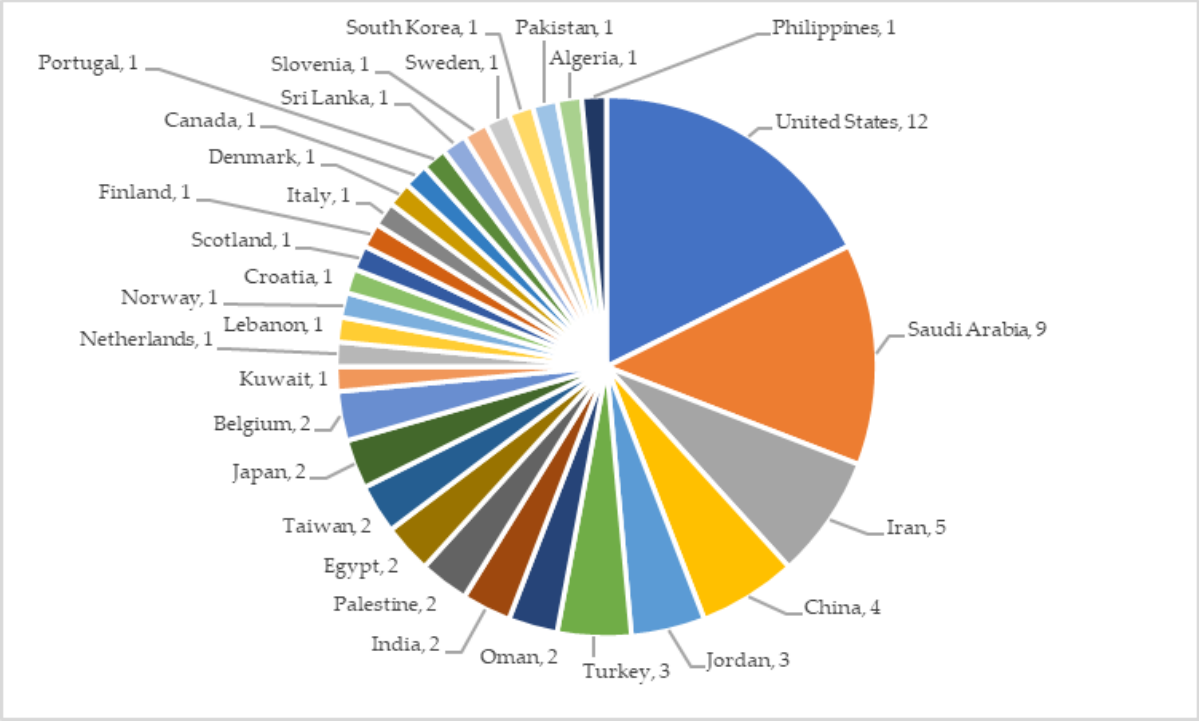

Figure 5 Global distribution of the articles included in this analysis.

The map of the co-occurrence of terms in included papers is depicted in Figure 6. The nodes represent specific terms, their sizes indicate their frequency, and links show the co-occurrence of the terms. In the title and abstract of included papers, frequently co-occurring terms created a cluster that appeared with the same color (green, blue, and red color). The three core nodes of these clusters are safety climate, safety culture, and survey. Furthermore, the relationship between the core node of "safety culture" and other high-frequency terms is shown in Figure 7. The thickness of links between nodes represents the strength of the co-occurrence relationships.

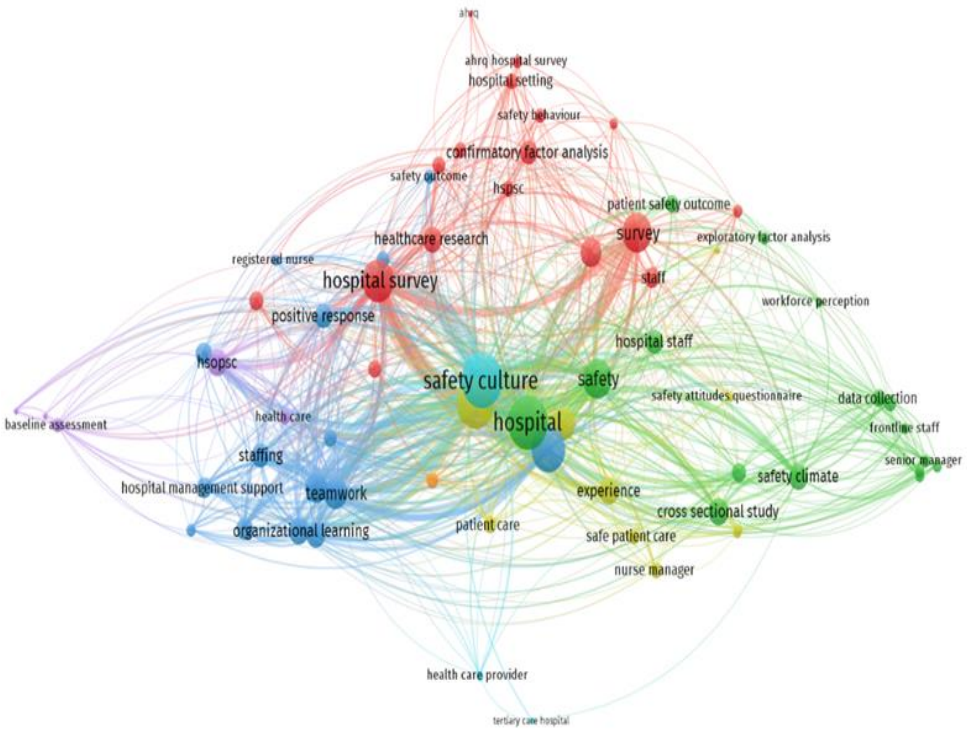

Figure 6 The map of the co-occurrence of terms in the title and abstract.

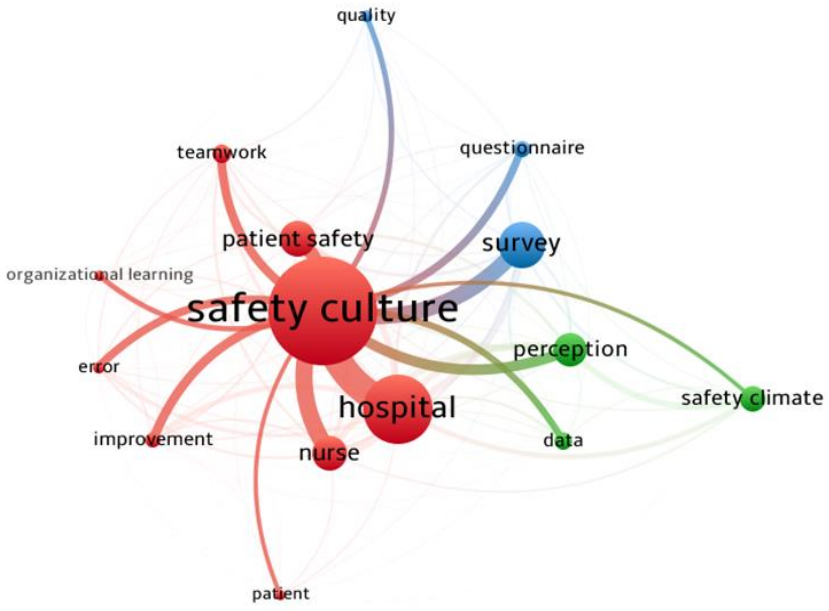

Figure 7 The map of the co-occurrence between safety culture and other high-frequency terms.

2.6.4 Discussion

In this section, two research questions are answered in two subsections of PSC instruments and PSC dimensions.

2.6.4.1 PSC Instruments

This review identified five primary instruments that have been used to assess PSC in hospital settings. The first instrument, the Hospital Survey on Patient Safety Culture (HSPSC), was used in 54 studies. By contrast, the Safety Attitudes Questionnaire (SAQ) tool was used in five studies, and the Patient Safety Climate in Health Care Organizations (PSCHO) was used in five studies. The Scottish Hospital Safety Questionnaire (SHSQ) and the Modified Stanford Instrument-2006 (MSI-2006) were used by one study each as shown in APPENDIX C.

Table 2 Five Measurements of PSC Dimensions

Survey	PSC Dimensions
HSPSC	Management support for PS Teamwork within units Teamwork across units Communication openness Frequency of events reported Feedback and communication about errors Organizational learning—continuous improvement Nonpunitive responses to errors Handoffs and transitions Staffing Supervisor/manager expectations and actions that promote PS Overall perceptions of PS
SAQ	Teamwork climate Safety climate Job satisfaction Stress recognition Perceptions of management Working conditions

Survey	PSC Dimensions
PSCHO	Engagement of senior managers Organizational resources Overall emphasis on PS Unit safety norms Unit support and recognition for safety efforts Fear of blame Fear of shame
MSI	Organization leadership for safety Unit leadership for safety Perceived state of safety Shame and repercussions of reporting Safety learning behaviors
SHSQ	Supervisors' expectations and actions Organizational learning/improvement Teamwork within hospital units Communication openness Feedback and communication about error Non-punitive responses to errors Staffing Hospital management support for PS Teamwork across hospital units Hospital handoffs Frequency of incident reporting Overall perceptions of safety

2.6.4.1.1 Hospital Survey on Patient Safety Culture (HSPSC)

In 2004, the AHRQ developed the HSPSC within the United States (U. S.) Department of Health and Human Services, which became a widely used survey. This survey allows for an assessment of staff opinions concerning medical errors, adverse event reporting, and other issues relevant to PS (Aljabri, 2012; Alshammari et al., 2019). Although the original survey was primarily intended for use by hospitals, it has been enhanced with various versions. This survey currently measures the safety culture of patients in ambulatory settings, outpatient health offices (such as primary care), nursing homes, and public pharmacies. The HSPSC is available in

different languages, including Arabic, Spanish, French, and Dutch. The hospital questionnaire version contains 42 items and assesses 12 composites that are treated as subscales.

2.6.4.1.2 Safety Attitudes Questionnaire (SAQ)

The SAQ was developed by Sexton and colleagues at the University of Texas in the U.S. The SAQ comprises six main components (Table 2). The primary advantage of the SAQ is that it can be applied to different healthcare settings. The complete version of the SAQ uses a total of 60 components or items, with 30 items considered as standard across all environments. The survey utilizes a five-point Likert scale ranging from strongly agree to strongly disagree. In addition to the 30 standard items, this survey can incorporate another 6 items, with 3 additional items that focus on demographic studies. The statements utilized by the short-form SAQ can also be addressed using the five-point Likert scale. The short form is easily accessible and available in different languages, including English, Swedish, Dutch, Norwegian, German, Arabic, and Chinese (Sexton et al., 2006).

2.6.4.1.3 Patient Safety Climate in Health Care Organizations (PSCHO)

According to Singer et al. (2007), PSCHO was designed with the aid of the Stanford Safety Instrument. The PSCHO tool includes 38 items that are used to assess work units, interpersonal factors, and inter-related organizational topics (Singer et al., 2007). Using a Likert scale, items are rated via a two-page form. PSCHO is considered to be the first tool that analyzed safety constituents and provided information by measuring the safety climate in corporations outside hospitals. Information from this survey regarding management and clinical personnel can be applied to a wide range of healthcare organizations. PSCHO has undergone psychometrical

tests and can be used to compare the performance of several types of hospital units. The earlier form of this tool has been modified with respect to its length (Singer et al., 2009) and has been adapted for use in multiple languages (Zhou et al., 2015).

2.6.4.1.4 Scottish Hospital Safety Questionnaire (SHSQ)

The SHSQ was designed for the Scottish NHS clinical staff, with the main aim of gauging the safety outcomes and climate for both patients and staff. The SHSQ includes 4 primary components: 44 items related to the hospital survey (HSPSC), 10 worker safety behavior aspects, 2 items concerned with self-reported patient and worker injuries (see Table 2), and 7 items that focus on demographics (Agnew et al., 2013).

2.6.4.1.5 Modified Stanford Instrument-2006

The MSI-2006 Patient Safety Culture in Healthcare Organizations Survey (Zaheer et al., 2015) was designed to evaluate 32 unique items encompassing five aspects. These aspects include, but are not limited to, issues associated with seeking help, shame, and self-awareness (Table 2). Modification of the MSI-2006 tool has facilitated the assessment of perceptions of a wide range of hospital staff, including direct care workers, technicians, health practitioners, managers, and nurses. This tool also includes assessments of other aspects, such as support service personnel, as these workers are an essential part of the hospital and healthcare setting. MSI-2006 was developed for a wide range of hospital settings with the aim of generating relevant and accurate data over the long term.

2.6.4.2 PSC Dimensions

To understand the effect of PS on healthcare organizations and their staff, the process and structure of each system needs to be broken into subsystems. The type of instruments and their

varying dimensions, as well as the groups targeted in each study, were among the most interesting points to be considered when attempting to understand PS.

Five instruments were used in the reviewed studies to measure PSC within the healthcare facilities examined. As indicated in APPENDIX C, teamwork, organizational and behavioral learning, reporting of errors and safety awareness, gender and demographics, work experience, and staffing levels were perceived as factors that significantly impacted patient safety. Personal variables, such as the age and experience of medical professionals, were also related to PS perceptions. By examining results from individual hospitals or groups of hospitals, we identified the aspects of safety culture that need improvement, including considerations of working conditions and management support.

The reviewed studies differ in their focus on relevant PS variables across different hospitals in various geographical regions. However, many standard components of safety culture indicators and risk factors have been identified (Abdelhai et al., 2012; Moussavi et al., 2013; Güneş et al., 2015).

2.6.4.2.1 Teamwork

Teamwork and mutual help provided by team members in task performance within specific hospital units were the factors that represented PS through the use of different instruments (Singer et al., 2008). A high score of positive teamwork within units indicates the existence of healthy work relationships and respect among members within a unit (Boughaba et al., 2019). Moreover, vertical hierarchy, horizontal hierarchy, and years of working within a unit influenced the level of teamwork within units. The level of skill competency also affected

teamwork within units (Cho et al., 2018). However, teamwork across units was reported to have low positive scores (Abdelhai et al., 2012; El-Sayed Desouky et al., 2019). Besides, attitudes towards colleagues from different units and managers' or supervisors' actions and expectations towards PS affected teamwork performance across units (Moussavi et al., 2013). According to Hamdan and Saleem (2013), skills and organizational learning were significantly related to knowledge teamwork across units. However, supportive managers or supervisors increased the level of teamwork across units. Moreover, colleagues who worked closely together and supported each other in their work duties often resulted in mutual respect (Hamdan and Saleem, 2013). Therefore, while it could be concluded that teamwork is one of the important factors that impact PS, there are always opportunities for improvement.

After reviewing the studies, the HSPSC and SAQ instruments are the only two that are focused on the teamwork dimension. Among the studies that used the SAQ, the pronounced difference in PSC was notable among the front-line healthcare staff, supervisors, and managers (Kristensen et al., 2015). Furthermore, a great variance in PS perception was observed within specific hospital units compared with differences between units. Chakravarty et al. (2015) reported low variations in scores between hospitals based on the PS index. However, their study also revealed significant differences in individual measures of PS, including the perception of management, teamwork, and stress recognition, when using the PS index score (Chakravarty et al., 2015).

The HSPSC provides more details about teamwork performance within and between units of hospitals. Additionally, teamwork is the most factor that has a relationship with the other

characteristics of PS. Among studies using the HSPSC, high scores were obtained for teamwork within units, especially in different developing countries (Bagnasco et al., 2011; Ito et al., 2011; Ugurluoglu et al., 2012; Amarapathy et al., 2013; Davoodi et al., 2013; Moussavi et al., 2013; Nie et al., 2013; Boughaba et al.,2019). These results confirm that the healthcare industry greatly relies on interdisciplinary teams of specialists with the skill sets needed to perform specialized tasks. Such teams also collaborate to achieve common safety goals (Danielsson et al., 2017). Different teams use shared resources and rely on communication to adapt to ever-changing healthcare environments. The behavior of these teams was analyzed through observational studies. The results indicated that the teams' clinical performance was influenced by how they communicated, coordinated, and practiced effective leadership (Danielsson et al., 2017).

2.6.4.2.2 Organizational and Behavioral Learning

Organizational learning is also a critical factor that affects the PS. In most of the survey studies examined, positive responses were given for organizational learning/continuous improvement as a composite for PS (Bahrami et al., 2013; Al-Mandhari et al., 2014; Kiaei et al., 2016; Alshammari et al., 2019). Continuous improvement can be gained from daily work routines and incidents. PS can also improve by enhancing relevant personnel's skills and knowledge based on incident analysis. Additionally, the junior staff can learn from more experienced staff as they worked together (Singer et al., 2007).

Although organizational and behavioral learning had positive responses, the outcome dimension, frequency of events reported, did not have positive responses in all the studies included in this review. Therefore, the learning process in PSC should be enhanced by

establishing formal methods instead of informal practices to avoid harming patients. In the U. S., as a result of the IOM's report, the U. S. Congress passed the Patient Safety and Quality Improvement Act in 2005, which aimed to improve quality and safety via the collection and analysis of data on patient events. This shows that PS has to be enhanced by the participation of healthcare providers and patients.

In 28 of the studies examined, 55% of the participants agreed that these factors were important components of organizational learning and continuous improvement processes at the examined healthcare facilities. These processes are also responsible for communicating and conveying information that is essential for PS and healthcare. Such processes occur in both formal and informal learning environments within healthcare systems that perform complex and interconnected operations, which should be considered to enhance the PSC.

2.6.4.2.3 Reporting of Errors and Safety Awareness

Two of the dimensions that received low positive scores were non-punitive responses to errors and the frequency of event reporting (El-Jardali et al.,2014). That is because a large percentage of respondents indicated that they do not report incidents to their managers or supervisors. The reason behind this could be that staff members fear being reprimanded for an error and the lack of safety awareness. Such a culture might cause the staff to hide issues that could later influence the efficacy of PS. A culture that includes non-punitive responses to errors could arise from managers, supervisors, and colleagues (Feng et al., 2012). Another reason behind this finding could be the risks of patients complaining; patient demands for compensation might have also reduced the frequency of event reporting (Sorra et al., 2010).

Moreover, another study that was conducted in Saudi Arabia illustrated that one of the dimensions that indicated a high positive response was feedback and communication about errors (Alswat et al., 2017). The factors requiring improvement included non-punitive responses to error reporting and adequate personnel staffing (Alswat et al., 2017). The survey showed that the overall perception of PS was 59.9%, while the reporting frequency was 68.8% (Alswat et al., 2017). Another study that was conducted in Scotland by Agnew et al. (2013) found that the overall perception of PS was judged at 56%; the reported frequency of incident reporting was also 56%. Another study in Saudi Arabia showed that the frequency of reporting adverse safety events was 57% (Al-Awa et al., 2012). Additionally, A study conducted by Khater et al. (2015) among senior nurses in Jordan showed a positive correlation between non-punitive responses to medical errors and the frequency of medical error reporting. The result was a reduction in adverse events regarding PS and risks of complaints from patients. The overall perception of senior nurses was 51.5% before education and 60.6% after educational sessions. The frequency of event reporting increased from 54.2% to 64.3% after implementing suitable educational training (Khater et al.,2015).

In a related study, Hellings et al. (2010) described a PSC improvement approach implemented in five Belgian hospitals. The results showed that management support for PS increased along with supervisor expectations and actions that promoted safety practices. Medical personnel from Dutch-speaking hospitals had a higher positive perception of PS compared with French-speaking hospitals (Hellings et al.,2010). The survey also showed that respondents working in pediatrics, rehabilitation, and psychiatry departments (units) provided more positive

feedback about perceived PSC. By contrast, medical professionals working in emergency departments (units) provided lower positive feedback (Hellings et al.,2010). These differences in the hospitals' departments and languages are some of the reasons for reporting low scores in the non-punitive responses to errors (Hellings et al.,2010).

A positive perception of PS was observed among medical personnel in China and U.S. managers. In both countries, these individuals expressed a higher level of perceived PS compared with front-line personnel. However, Chinese staff had higher scores for work-related fear of shame and blame compared with their American counterparts (Zhou et al., 2015). The U.S. hospitals have fewer cases of "fear of blame" compared to Chinese hospitals (Zhou et al., 2015).

As noted earlier, a reduction in avoidable incidents with potential or actual medical harm is a key objective in developing a robust PSC (El-Jardali et al., 2010; Bahrami et al., 2013; Kiaei et al., 2016). Harm can be measured by the frequency of reported events. Effective reporting of safety incidents is essential for identifying the causes of failures in a healthcare work environment. The present analysis indicates a need to implement more effective reporting systems. Reporting provides relevant information about the frequency of events that can adversely affect PS.

A culture of blame was evident in 22 studies, representing 43% of those examined. In these studies, punitive responses to medical errors were prevalent and created a culture that discouraged personnel from reporting safety incidents and occurrences (Jafree et al., 2017). Such a culture impeded the hospitals' ability to determine the causes of errors and, consequently, to

learn from previous mistakes (Abdelhai et al., 2012; Aboul-Fotouh et al., 2012; Aljabri et al., 2014). In instances in which an influential safety culture exists, workers can highlight potential risk factors and also identify failures when they occur with a focus on PS (Fujita et al., 2013). Additionally, adverse events arise from multiple unintentional causes. Blame was judged to be appropriate when addressing individuals who consistently commit frequent and careless errors or who ignore established safety standards and policies. Competent institutions should maintain a culture of accountability to ensure that patient care is maintained at the highest levels.

A study conducted in Canada by Zaheer et al. (2015) focused on supervisory and senior leadership support for PS. The survey noted that ease in reporting provided the hospital with a platform for learning and improving through reported incidents. Among the supervisory and senior leadership, ease in reporting was recorded at 11% and 12%, respectively. These findings suggest that hospitals should ensure that front-line staff are aware of and contribute to their organization's reporting systems. Ease in reporting should provide organizations with an opportunity to improve strategy, commitment, and the overall efficacy of PSC in sample facilities (Zaheer et al., 2015).

2.6.4.2.4 Gender and Demographics

PSC is a multidimensional concept that requires a strict analysis to identify its vital elements. The perception of PSC is always measured through the dimensions of the tools used. However, gender and demographic characteristics can be used to analyze participants' responses to a survey (Aboshaiqah and Baker, 2013). Many of the studies analyzed herein demonstrate the correlation between PSC perception with gender and demographics.

Numerous differences in nurses' perceptions of PSC arose due to demographic characteristics, including gender, age, level of education, years of experience, the language used, and length of work shift (Elsous et al., 2017). In general, female nurses had a more positive view of the prevalent PSC than did their male counterparts. Moreover, nurses between the ages of 40 and 60 years had a more positive view of the PSC than nurses between 20 and 40 years of age (Zaheer et al., 2015). As 85.4% of the nurses had a Bachelor of Science in nursing, it is plausible that their education levels did not affect their perception of PS (Aboshaiqah and Baker, 2013). However, as Hamdan and Saleem (2013) observed, education is generally one of the most critical aspects of healthcare delivery to patients worldwide.

Elsous et al. (2017) evaluated nurses' perception regarding PSC and investigated the influence of age, hierarchal position, working hours, and experience. Job satisfaction and perception by management concerning PS had a strong influence on these variables. Front-line clinicians had a less positive attitude toward PS than did nurse managers. Moreover, positive attitudes increased with years of experience. Work shift hours and ages of the nurses had a direct effect on the perception of PS. Nurses working within the normal hours allocated per week and aged 35 years or older showed a better PS perception (Elsous et al., 2017). The study also reported no differences in safety attitude scores between nurses and doctors due to gender, age, and work experience (Elsous et al., 2017). The studies of the potential effects of gender and demographics on the perception of PSC should be expanded in the future.

2.6.4.2.5. Work Experience

Relevant work experience was strongly related to the perception of the PSC. Work experience was also associated with the perceived quality of care among nurses (Hamdan and Saleem, 2013). Furthermore, more experienced healthcare providers had a better understanding of patient care needs than did less experienced nurses (Zaheer et al., 2015). A study conducted in the U. S. by Hansen et al. (2011) investigated the relationship between hospital PSC and rehospitalization rates within 30 days of discharge. A survey done in 67 hospitals discovered that higher readmission rates of acute myocardial infarction and heart failure patients were directly related to a lower safety climate (Hansen et al., 2011). Additionally, frontline staff workers reported a lower level of perceived safety climate with the readmissions, which were the management's responsibility (Hansen et al., 2011). In another study, a survey was conducted in 97 hospitals in the U. S. that revealed that frontline workers perceived a climate of safety more frequently than did the managers and the supervisors (Singer et al., 2008). Furthermore, among the clinicians, nurses perceived a safety climate more than physicians (Singer et al., 2008). Based on that, it could be concluded that the work environment plays a key role in perceiving the PSC.

Moreover, another study illustrated that language also has effects on perceiving the PSC (Aboshaiqah and Baker, 2013). Non-Arabic-speaking nurses had more positive views of PSC than did Arabic-speaking nurses (Aboshaiqah and Baker, 2013). This finding was unanticipated as the Arabic-speaking nurses and their patients spoke the same language. The low PSC scores might have been due to disparities in educational systems affecting PS perceptions. Furthermore, nurses working on day shifts had more positive PSC perceptions than nurses working night shifts

or alternating shifts (Aboshaiqah and Baker, 2013). It was noted that day-shift nurses were more time engaging with and involved in their patients' progress, which resulted in a positive PSC (Aboshaiqah and Baker, 2013). Day-shift nurses also interacted with their managers and became more familiar with relevant aspects of the PSC (Aboshaiqah and Baker, 2013). Therefore, it could be concluded that work experience and the possibility of knowledge exchange had a measurable impact on perceptions related to the PSC.

2.6.4.2.6. Staffing

The availability of human resources also impacts the perceptions of the PSC. A study conducted in Scotland by Agnew et al. (2013) aimed to analyze the relationship between the medical personnel safety behavior and reported injury measures for patients and healthcare providers. At the hospital level, the authors found a strong correlation between overall PS scores and patient and personnel injury measures and behavior (Agnew et al., 2013). Therefore, the level of hospital staffing, coupled with management support for PS, also influenced the perception of PS within the studied facilities (Agnew et al., 2013). Generic safety climate factors and patient-specific items showed a strong correlation with perceived safety outcomes (Agnew et al., 2013). To summarize, a total of 24 studies reported on the issue of healthcare personnel understaffing. The staff reported feelings of being overburdened and overloaded with their daily responsibilities in approximately half of the hospitals (Moussavi et al., 2013; Nie et al., 2013; Wu et al., 2013; Saleh et al., 2015; Vlayen et al., 2015; Zhao et al., 2017). Consequently, this issue had a negative impact on the quality of care provided by the staff (Amarapathy et al.,

2013). Therefore, the availability of adequate staffing plays a critical role in perceiving the PSC because employees' focuses might be harmed due to overload.

2.6.5. Study Limitations

The present study has some important limitations. This systematic review focused only on articles written in English; moreover, a meta-analysis was not performed. The results of the reviewed studies are difficult to generalize due to the application of a diverse set of PSC measures with different dimensions. Furthermore, the reviewed studies also varied in the type of participants included (doctors, nurses, and administrators), the periods over which the measurements were conducted, the sampling strategies used, and the cultural settings. For example, the results that focused primarily on results from nurses were obtained from convenience samples of participants and as such cannot be generalized to the entire nursing staff. Finally, this study did not account for language and cultural disparities prevalent in the specific countries in which the reported studies were conducted.

2.6.6. Conclusions

Enhancing the perception of the PSC in health sectors plays a key role in improving their overall quality, efficiency, and productivity. This paper contributes to the body of knowledge related to PSCs by identifying important critical factors and illustrating the instruments that have been developed and used to generate data. A comprehensive review of perceiving the PSC in hospital settings was provided. A systematic literature review was conducted using the PRISMA protocol for the period of 2006 to 2020. The paper reviewed 66 studies that were identified based on carefully selected keywords. The Hawker Assessment Tool was also implemented in this

paper to enable the researcher to score the quality of the papers reviewed. The paper analyzed PSC perception in the hospital setting, determined available instruments, and identified the most critical factors that have an impact on the PSC. Our findings revealed that teamwork and organizational and behavioral learning are some of the factors that have a significant impact on the PSC. This paper also illustrated that reporting errors and safety awareness, gender and demographics, work experience, and staffing are additional critical factors that need to be considered further to improve perceptions of PSCs.

In the future, the impact of culture on PS might be analyzed in greater depth. PS, particularly in hospitals, is a dynamic and complex phenomenon. Therefore, it is recommended that research and surveys be performed every two to three years to ensure the best practices for PS. Such an approach could also enhance the quality of healthcare delivery. A large number of hospitals in many different countries have been studied and the specific characteristics of the healthcare management systems in these countries greatly vary. Consequently, for future studies, a broader study population crossing the national boundaries would help to ensure that the findings can have an impact on the development of high-quality, affordable healthcare worldwide.

Finally, it should be pointed out that although the reported survey questionnaires described in the reviewed studies were anonymous, some respondents might not have been candid in providing their answers. Some of the questionnaires were long and some of the respondents may have become distracted during the process, lost interest, or answered some questions inaccurately. Additionally, some inconsistencies in using different survey tools due to

cultural and language diversities were noted. For future, investigations including qualitative evaluations of these relationships should be conducted. Finally, the long-term effects of safety incidents on patients' health and their long-term impact on families have not been investigated. Future studies should evaluate the effects of such experiences in hospital settings.

2.7 Gaps in Research

This literature review has uncovered gaps in the current research. Over 16 years, 66 studies evaluating patient safety culture in hospital settings were found internationally, with most research occurring from 2006 to 2020. From this review, it is clear that research concerned with the hospital safety culture is in the early stages of development. Continued research on the effectiveness of improving the safety culture of hospitals and how the safety culture impacts patient outcomes is crucial.

The literature indicated that the Psychometric properties of the HSPSC tool had been considered reliable and valid in the U.S. (Sorra & Nieva, 2004; Blegen et al., 2009; Sorra & Dyer, 2010) and internationally (Bodur & Filiz, 2010; Eiras et al., 2014; Hedskold et al., 2013; Ito et al., 2011; Moghri et al., 2012; Nie et al., 2013; Nordin et al., 2013; Occelli et al., 2013; Olson, 2008; Sarac et al., 2011; Smits et al., 2008; Vlayen et al., 2015). However, no study examines the second-order factor of the HSPSC factors. This study will address this gap.

The respondent characteristics such as staff positions (El- Jardali, 2014; Vlayen et al., 2015; Zhao et al., 2017), and the hospitals characteristics such as teaching status (Mardon, 2010; Güneş, 2015; Ammouri, 2015; Khater, 2015) and geographic region (Wu, 2013; Fujita, 2013; Wagner, 2013; Eiras, 2014) have significant influences on the perception of patient safety culture

and its outcome. No study examines the combination between Personal and Hospital Characteristics. This study will address this gap.

2.8 Choosing an Appropriate PSC Questionnaire

In several comprehensive reviews of patient safety culture tools in health care, the HSPSC and SAQ have repeatedly come up as suggested tools (Flin, 2007, Halligan and Zecevic, 2011, Jackson et al., 2010, Singla et al., 2006). The HSPSC and the SAQ were identified as the only tools detailing the scale development process and meeting most of the set psychometric criteria in Flin et al. (2006) review. The four tools of HSPSC, SAQ, PSCHO, and Hospital Safety Climate Scale (HSCS), according to Jackson et al. (2010), are the most frequently and extensively used in the U.S. and internationally across various clinical settings. According to the researchers, the four tools have adequate psychometric characteristics. The HSPSC and SAQ were also shown to list perceptions at the dominant unit level for accumulating responses. Meanwhile, studies using PSCHO have provided evidence for hospital-level variance.

Fleming (2005) recognized the HSPSC and SAQ as freely available tools which were extensively and largely tested. Both tools were equipped with reported psychometric properties and obtainable benchmarking data. However, they both have the disadvantage of being comparatively prolonged. The author adds that the HSPSC features more comprehensive coverage of safety culture components, together with acceptable psychometric properties and subsidiary documentation. These findings appear to match those reached by Singla et al. (2006).

The choice of the HSPSC as the most suitable tool for this study was based on various reasons. Since it evaluates critical aspects of patient safety at multiple levels of analysis, the

HSPSC is largely a comprehensive measure of safety culture in health care settings. This tool is equally workable across all individuals, units, and hospital levels. Its features as a multi-dimensional approach help establish a reference line to inspire and lead further initiatives for patient safety improvement (Madsen, 2001).

The survey was originally formulated for hospital use. Later, it has been adapted to fit in patient safety climate evaluation in diverse health care settings, including community pharmacies, ambulatory surgeries, nursing homes, and outpatient medical offices (Agency for Health care Research and Quality, 2016). Jackson et al. (2010) note that the HSPSC and the majority of safety climate studies have been conducted on a large scale, and all focus on exploring perceptions of several unit staffs across hospitals in one health care organization. The effectiveness of quality enhancement initiatives and interferences have been tested by the HSPSC use (Blegen et al., 2010; Jackson et al., 2010). The process includes determining the impact of a multi-disciplinary collaboration of pharmacy, nursing, medicine teams, and communication interventions to enhance a unit-based safety culture (Blegen et al., 2010). Significant improvement was revealed by five out of eleven safety culture sub-scales. The associations between different aspects of safety culture and incident reporting behaviors were thoroughly scrutinized (Patterson and Pace, 2016, Richter et al., 2015).

Furthermore, the HSPSC is applicable for benchmarking the strengths of safety cultures over time and across organizations on both national and international levels (Blegen et al., 2009). A cross-sectional retrospective and prospective study was conducted using the HSPSC to assess

the impact of accreditation in a university hospital in Saudi Arabia (AlAwa et al., 2012) and Lebanon (El-Jardali et al., 2011).

So far, the HSPSC is the sole freely available survey with a national database acknowledged worldwide and has reliable and valid psychometric findings (Smits et al., 2008; Hellings, 2010; Waterson et al., 2010; Occelli et al., 2013; Vlayen et al., 2015;). Additionally, the available national database is regularly and readily cleaned and managed by Westat®, an independent contractor that provides a national source for this tool (Westat®, 2020).

The HSPSC is a self-administered tool supported by the AHRQ. The tool takes about 10–15 minutes to complete and is available in electronic or paper format to facilitate administration with minimal disruption to an employee's daily routine (Sorra & Nieva, 2004). For this study, these fundamental characteristics were important in deciding on the HSPSC to survey hospital administrators and practitioners across the U.S. A discussion of the instrument's development will provide additional evidence of the tool's beneficial psychometric properties.

2.8.1 Review of the Development of the HSPSC: Pilot Study

The latent variables of the culture of patient safety in hospital settings were the fundamental phenomenal construct the HSPSC was basically designed to measure (Waltz et al., 2010). The tool was created to estimate the true extent of this unobservable paradigm at a given point in time (Waltz et al., 2010). The study aimed to create a short survey instrument that measured meaningful, independent, and reliable safety culture dimensions (Sorra & Nieva, 2004). The tool was also intended to measure appropriate and inappropriate attitudes and actions of a facility and illuminate the rewarded, or otherwise, punished processes and procedures

regarding patient safety (Sorra & Dyer, 2010). The funding and supervision of his task were by AHRQ and the sponsor was the Medical Errors Workgroup of the Quality Interagency Coordination Task Force (QuIC) (Sorra & Nieva, 2004).

Using diverse aspects such as literature reviews, examination results of published safety culture instruments, and psychometric analysis findings, critical dimensions of hospital safety culture were specified and included in the draft version of the tool (Sorra & Nieva, 2004). Researchers, hospital administrators, and employees from various fields and units reviewed and revised the draft based on their own experiences with hospital safety culture (Sorra & Nieva, 2004).

Finally, a patient safety pilot survey was created, with two single-item outcome measures and 14 multiple-item dimensions (Sorra & Nieva, 2004). The survey included items and questions that used a five-point Likert scale for agreement, ranging from strongly disagree to strongly agree, as well as a frequency range of never to always (Sorra & Nieva, 2004). The tool was eventually pilot-tested in 21 hospitals across six states, with varying teaching status and bed sizes (Sorra & Nieva, 2004).

4,983 surveys were sent out, with 1,437 (29%) being filled out. The majority of the people who took part in this survey were females (81 percent). The average age of the participants was 43, and they had direct contact with patients. They worked in the intensive care unit (18%), surgical unit (15%), general medicine (12%), or other hospital units (14%) at the time and had spent an average of ten years at their respective hospital (Sorra & Nieva, 2004).

The researchers wanted three to five items, or questions, to measure each aspect of safety culture. For the 12 safety culture dimensions identified in the confirmatory factor model, the researchers used exploratory factor analysis (EFA), confirmatory factor analysis (CFA), fit indices, composite scores with inter-correlations, and an internal consistency reliability coefficient (Sorra & Nieva, 2004). The dimensionality of the survey was evaluated in the EFA (Sorra & Nieva, 2004). Principal component analysis (PCA) and varimax rotation were applied to maximize the independence of the dimensions within the survey (DeVellis, 2021). The EFA and PCA discovered the tool's multiple dimensions and proposed many basic item groupings found in the literature review. There were 14 distinct factors identified, with acceptable values greater than or equal to 1.0. These 14 factors accounted for 64.5 percent of the total variance. The factor-loading of most items was greater than or equal to 0.40). (Sorra & Nieva, 2004; DeVellis, 2021).

Researchers were interested in the model's fit they proposed during the confirmatory factor analysis stage. They were interested in seeing how the specific number of factors and items loaded onto each factor affected the final result (Sorra & Nieva, 2004). A number of indices, including the goodness-of-fit index (GFI), the adjusted GFI (AGFI), the normalized fit index (NFI), and the non-normalized fit index (NNFI), confirmed the data's fit (NNFI). All of the indices were at or near 0.90. (Sorra & Nieva, 2004). The root mean square of approximation (RMSEA) was 0.4, which was a good fit because the lower the RMSEA, the better the fit (Sorra & Nieva, 2004). Researchers arrived at a final confirmatory factor model with 12 dimensions

(two outcome dimensions and ten safety culture dimensions) and three to four items, or questions, per dimension, for a total of 42 questions in the survey (Sorra & Nieva, 2004).

Any instrument's validity is determined by its best approximation of the truth (Trochim & Donnelly, 2008). The mean of the various responses to each item was used to create composite scores for the 12 dimensions (Sorra & Nieva, 2004). All of the items were expressed positively and negatively, with all negatively worded items being reverse coded first, resulting in a higher score indicating a more positive response in all cases (Sorra & Nieva, 2004). All the questions used 5-point Likert scales, with composite scores ranging from 1.0 to 5.0. After calculating these composite scores, the safety culture dimensions were correlated with one another. The inter-correlations were within the expected moderate to high range of 0.23- 0.60, indicating parsimony and construct validity of the tool (Sorra & Nieva, 2004). Weakly related dimensions were defined as those with correlations of less than 0.20. Dimensions with high correlations of 0.85 or higher, on the other hand, indicate that the items should be combined or removed because they were measuring the same concept (Sorra & Nieva, 2004).

The twelve dimensions of the pilot tool proved to have acceptable reliability, with coefficients ranging from 0.6–0.84 (see Table 3) (defined as a Cronbach's alpha greater than or equal to 0.60). (Sorra & Nieva, 2004). With a Cronbach's alpha of 0.63, the Staffing dimension had the lowest reliability (Sorra & Nieva, 2004). Appropriate staffing levels were identified as a significant theme for improving patient safety during hospital stays (Page, 2004). Because of the report's emphasis on staffing, this low composite was kept.

Table 3 Pilot Study Reliability Findings (Sorra & Nieva, 2004)

Patient Safety Culture Dimension	**Cronbach's ∝**	**Items or Questions per Dimension**
1. Communication Openness	0.72	3
2. Feedback and Communication about Error	0.78	3
3. Frequency of Event Reporting	0.84	3
4. Hospital Handoffs and Transitions	0.80	4
5. Hospital Management Support for Patient Safety	0.83	3
6. Non-punitive Response to Error	0.79	3
7. Organizational Learning-Continuous Improvement	0.76	3
8. Overall Perceptions of Safety	0.74	4
9. Staffing	0.63	4
10. Supervisor/Manager Expectations and Actions Promoting Safety	0.75	4
11. Teamwork Across Hospital Units	0.80	4
12. Teamwork Within Hospital Units	0.83	4

In conclusion, along with additional demographic questions, the final HSPSC includes 12 dimensions and 42 items, with sound psychometric properties constituting a valid and reliable instrument. The construct validity of individual dimensions was reflected in correlations in the moderate to high range of 0.23–0.60, with reliability coefficients ranging from 0.63–0.84. This testing proved that using this specific tool for this research study was a good idea (Sorra & Nieva, 2004).

2.8.2 Hospital Survey on Patient Safety Culture: A Review of Psychometric Analyses

On the AHRQ's HSPSC Research Reference List, there were a total of 26 psychometric studies (AHRQ, 2019). Five of these studies were excluded because of specific criteria related to the study's research objectives or modified the original HSPSC. As a result, 21 psychometric

studies were chosen and carried out for this evaluation. Three of them were national, while the other 18 were international.

2.8.2.1 U.S. Psychometric Testing Post-Pilot Study

The AHRQ funded a comparative database in 2006 to serve as a central repository for HSPSC hospital data (Sorra & Dyer, 2010). The database was created due to a public call for data submission. Data from 382 hospitals, representing over 100,000 hospital survey respondents, created the first comparative database (Sorra & Dyer, 2010). In 2007, the database was made public, along with the results of the survey's items and composite scores (Sorra & Dyer, 2010).

To evaluate the factors indicating the dimensions of this tool, Sorra and Dyer (2010) conducted a psychometric analysis of secondary data from the 2007 database. They looked at the tool's multi-level psychometric properties to see if the survey constructs could be used to assess patient safety culture at the individual, unit, and hospital levels (Sorra & Dyer, 2010). The database included responses from 331 hospitals in the United States, 2,267 hospital units, and 50,513 people. The psychometric analysis examined the six areas of "psychometric properties of the survey's items and composites, item factor loadings, intra-class correlations (ICCs), design effects, internal consistency reliabilities, and multi-level confirmatory factor analyses" in addition to the inter-correlations among hospitals (Sorra & Dyer, 2010, p. 1). The analysis confirmed the multi-level nature of the data supporting the claim.

All levels of analysis had acceptable psychometric properties, which were defined as Cronbach's alpha equal to or greater than.60 (Sorra & Nieva, 2004, p. 62). Furthermore, one hospital-level model dimension for "Supervisor/Manager Expectations and Actions Promoting Patient Safety" had a composite fit index of 0.82. All of the other dimensions of this scale had acceptable psychometrics (Sorra & Dyer, 2010). At the individual level, the average dimension inter-correlations were 0.42, 0.50 at the unit level, and 0.56 at the hospital level (Sorra & Dyer, 2010). The tool's overall psychometric properties well support the tool's items and dimensions. The HSPSC is regarded as reliable and valid both nationally and internationally.

2.8.2.2 International Review of Psychometric Performance

The HSPSC is one of the most commonly used surveys to evaluate safety culture in health care settings (Vlayen et al., 2015). There is enough evidence that even after alterations for international use, the tool retains its high psychometric properties reliability (Bodur & Filiz, 2010; Eiras et al., 2014; Hedskold et al., 2013; Ito et al., 2011; Moghri et al., 2012; Nie et al., 2013; Nordin et al., 2013; Occelli et al., 2013; Olson, 2008; Sarac et al., 2011; Smits et al., 2008; Vlayen et al., 2015).

2.8.3 Reliability of survey

The survey demonstrated overall high reliability (Cronbach's alpha > 0.70) both nationally and internationally, with only one dimension (Staffing) falling below the acceptable level of a Cronbach's alpha (Blegen et al., 2010; Eiras et al., 2014; Hedskold et al., 2013; Nie et al., 2013; Nordin et al., 2013; Occelli et al., 2013; Sarac et al., 2011; Vlayen et al., 2015). As a

result, Blegen et al. (2010) advised users to consider using alternative methods to evaluate the Staffing dimension in the future.

Even when the French and Dutch translations were used in psychiatric hospitals, the study revealed that the tool's psychometrics were still acceptable and valuable in this unique setting (Vlayen et al., 2015). The HSPSC was used in both hospital and primary care settings in Sweden, with acceptable reliability composites ranging between 0.66 and 0.87. (Hedskold et al., 2013). Hedskold et al. (2013) believed that having a single tool to assess patient safety culture across various care settings would benefit Sweden because it would allow for comparisons within the country's national safety care system (Hedskold et al., 2013).

2.8.4 Validity of survey

The international HSPSC surveys demonstrated good validity, with factor analyses supporting between 10–12 dimensions at the individual, unit, and hospital levels. In addition, the published reliabilities were consistently acceptable (Ito et al., 2011; Robida, 2013; Sorra & Dyer, 2010). A study conducted in Iran that was translated into Farsi had factor structures identical to those of the original study (Moghri et al., 2012). Furthermore, researchers discovered that the 12-dimensional structures addressed the unique characteristics of each population in the majority of studies. Although, in the original HSPSC model, it was suggested that these be adjusted in translated versions.

2.8.5 Poorly performing translations of survey

Three international studies found that translated versions of the survey performed poorly (Haugen et al., 2010; Perneger et al., 2014; Pfeiffer & Manser, 2010). According to Perneger et al. (2014), such inefficiencies could be caused by inaccuracy in the translation process or more general instrument complications. Many of the survey items were not applicable to non-clinical staff such as clerks and housekeepers, according to Pfeiffer and Manser (2010) in a German study. As a result, it was suggested that a more detailed survey be created to assess the patient safety culture within this sector of the healthcare team. Before using the Norwegian version in research, Haugen et al. (2010) found that the psychometric properties needed to be revised.

Waterson et al. (2010) discovered that the questionnaire may have measured different constructs of patient safety culture, which is particularly interesting in the United Kingdom. Although the researchers used the original HSPSC (Waterson et al., 2010), they found that the "Overall Perceptions of Safety" and "Staffing" were unreasonably linked in their model. This could be due to a greater tendency in the United Kingdom to associate staffing levels with patient safety when compared to U.S. staffing strategies (Waterson et al., 2010). According to Waterson et al. (2010), the national health care system may have limited the extent to which the HSPSC is applicable outside the United States due to specific cultural differences between the United States and the United Kingdom. A distinct national culture would undoubtedly have an impact on the economy.

2.8.6 Considerations for tool development, Psychometric Analyses and Limitations

When comparing data from different national cultures, the researchers warned against making assumptions (Eiras et al., 2014; Najjar et al., 2013; Nie et al., 2013; Vlayen et al., 2015). Multiple studies have discovered that there are differences in each society's perceptions of safety culture due to the differences in each culture's perceptions. When safety culture tools are used in such diverse settings and health-care systems, these differences must be considered (Najjar et al., 2013; Nie et al., 2013; Pfeiffer & Manser, 2010; Waterson et al., 2010). Pfeiffer and Manser (2010) advocated for creating a specific survey to determine whether these differences are explained by cultural differences or by national differences in healthcare systems.

Sarac et al. (2011) had some interesting comments when they noted that health care delivery risks could harm the patients and the health care staff. They suggested examining the impacts of a hospital safety culture on patients with the current tool, Sarac et al. (2011). Likewise, they added that this tool should be adapted to evaluate the extent of impact the safety culture of an institution has on the staff of that institution (Sarac et al., 2011). Disruptive behaviors tend to create adverse cultures in hospitals and cause injury to staff.

The HSPSC has met more psychometric criteria than any other instrument in the field due to its thorough testing and widespread acceptance (Hellings et al., 2010). The HSPSC's reliability in the U.S. and international studies has ranged from 0.60–0.88 when equipped with CFAs that support the 12 dimensions of safety culture determined in the pilot study (Sorra & Nieva, 2004; Hedskold et al., 2013; Nordin et al., 2013; Occelli et al., 2013). The tool has adequate

psychometric properties for measuring various factors, including individual attitudes and group culture (Blegen et al., 2009; Sorra & Dyer, 2010).

Results are found to provide practical evidence that helps concerned stakeholders develop effective strategies in the health care field. This may assist researchers in improving the quality of health care and ensure patient safety (Hellings et al., 2010; Robida, 2013; Nie et al., 2013). To reiterate, the HSPSC has value as a common instrument for measuring health care systems regarding national patient safety improvement initiatives and, at the same time, enhancing organizational awareness of patient safety (Bodur & Filiz, 2010; Hedskold et al., 2013). The tool provides vast abilities to examine safety culture from an individual's perspective, to enable the concerned bodies to learn from past events (Sarac et al., 2011; Nordin et al., 2013).

CHAPTER 3: METHODS AND PROCEDURES

3.1 Introduction

The current study aims to evaluate health care workers' perceptions of patient safety in different hospitals around the U.S. The research was directed to health care staffs consisting of the following included medical staff (Registered Nurses, Physician Assistants/Nurse Practitioners, LVN/LPN, Patient Care Assistants/Hospital Aides/Care Partners, Attending/Staff Physicians, Resident Physicians/Physician in Training, Pharmacists, Dieticians, Respiratory Therapists, Physical, Occupational, or Speech Therapists; and non-medical staff: Technicians (e.g., EKG, Lab, Radiology) and Administrations/Managements. The research tried to find whether the current patient safety culture affects the number of reported errors and adverse events. The research also endeavors to determine the general insights about patient safety concepts. Additionally, the research aims to test the extent of the influence of hospital characteristics in defining the concept of patient safety culture and the impact on all staff involved with providing health care. The frequency of reported errors and the general perceptions of patient safety are critical issues in evaluating the impacts of patient safety culture. Hence, the implementation of this study is mainly centered on answers to the following questions:

Q1: What is the effect of PSC dimensions on (ERFREQ) and (OVERALL) in U.S hospital settings?

Q2: What is the effect of each hospital characteristic (Teaching Status and Geographic Region) on perceived PSC?

Q3: What is the effect of each hospital characteristic (Teaching Status and Geographic Region) on the Frequency of events reported (ERFREQ) and Overall perceptions of patient safety (OVERALL)?

Q4: What is the relationship between (OVERALL) and (ERFREQ)?

The generated study hypotheses are exemplified by a proposed patient safety culture assessment model in order to assess a multitude of factors under study. These include the anticipated associations between the patient safety culture dimensions, Frequency of events reported (ERFREQ) and Overall perceptions of patient safety (OVERALL), and hospital characteristics (Teaching Status and Geographic Region). Figure 5 below shows the proposed study model of assessing patient safety culture in U.S hospital settings. The proposed model also tests the effects of hospital characteristics on patient safety culture dimensions and Frequency of events reported (ERFREQ) and Overall perceptions of patient safety (OVERALL), as illustrated in Figure 8.

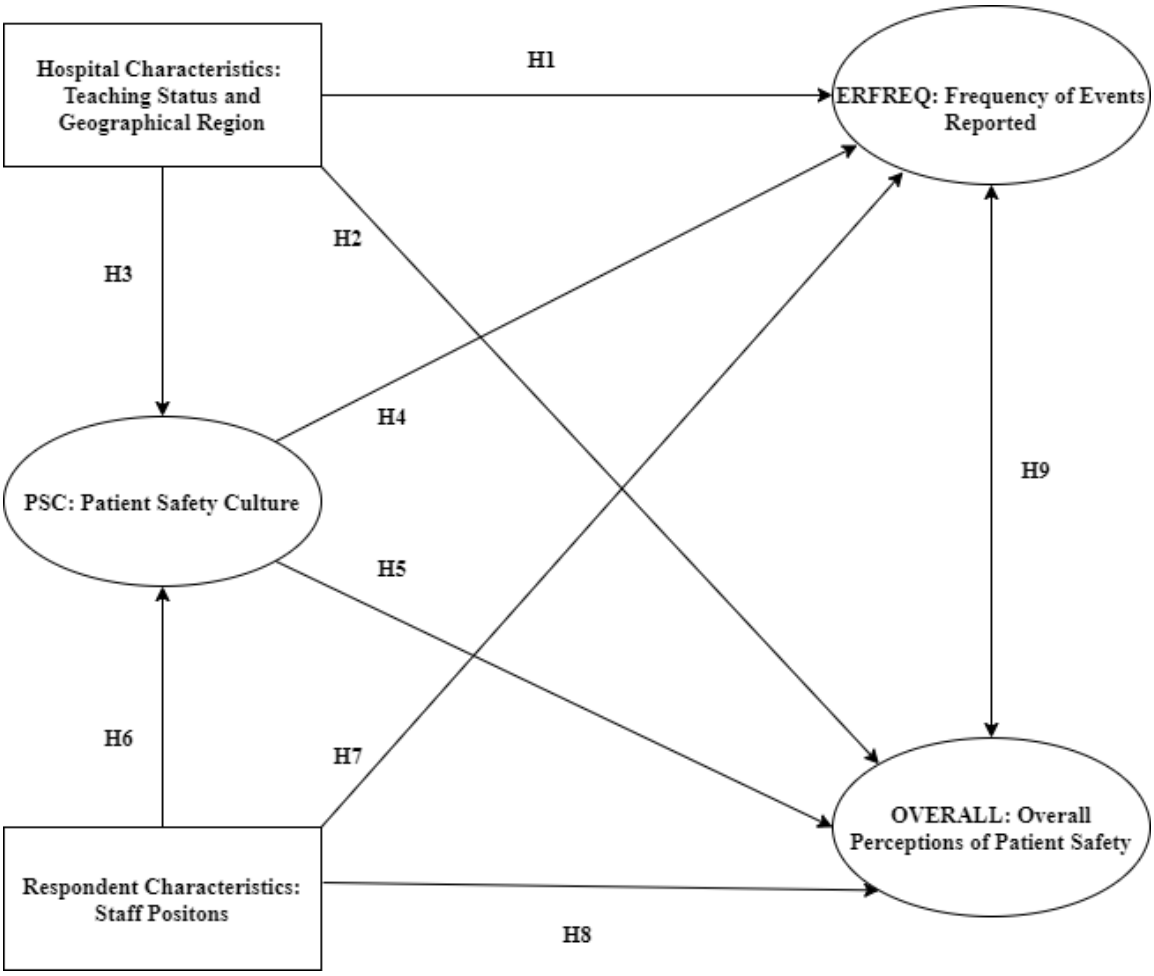

Figure 8 Conceptual Proposed Study Model of Patient Safety Culture Assessment

All the variables in this quantitative study were assessed by the use of the secondary data source (i.e., the 2018 Agency for Healthcare Research and Quality's (AHRQ) Hospital Survey on Patient Safety Culture (HSPSC) comparative database). Through this chapter, detailed descriptions of the study design will be provided, the research sample will be illustrated, the precautions taken to guarantee the protection of human rights will be exemplified, and a description of the secondary data source will be presented (i.e., the 2018 Agency for Healthcare

Research and Quality's (AHRQ) Hospital Survey on Patient Safety Culture (HSPSC) comparative database). Besides, the chapter will conclude with descriptions of the various variables assessed and all the necessary particulars regarding the procedures implemented for data collection, data cleaning and eventually data analyses. Partial least squares structural equation modeling (PLS-SEM) is used to validate and analyze the scrutinized latent factors and the relationships between the research constructs.

3.2 Research Design and Study Sample

This is a cross-sectional clustered design retrospective study. The study uses a convenience sample from the AHRQ's HSPSC 2018 comparative database, a nonprobability sample (Famolaro et al., 2018; Hulley et al., 2014; Trzesniewski et al., 2011). Each hospital was in charge of administering and cleaning the surveys, and strict instructions were followed. The data was then sent to a Westat®-managed central location, where the second level of cleaning was completed. The final dataset included all U.S. hospitals that volunteered to participate in the HSPSC comparative database.

3.2.1 Obtaining the HSPSC Database

Westat®, an independent contractor, provided a national repository (Westat, 2017). Westat® required a formal written request to obtain the database for the study, which was approved (APPENDIX D). In August 2020, the 2018 U.S. HSPSC dataset was finalized, officially accepted, and electronically received from Westat®.

3.2.2 Human Subjects Protection

The issues surrounding survey participation have been handled with care. The population asked to participate in the HSPSC was chosen at the hospital's discretion. As a result, everyone's participation was entirely voluntary. The organizations had complete autonomy over whether or not they wanted to participate in the comparative database. All participating hospitals voluntarily provided their survey data at the individual level. Furthermore, all hospitals that submitted data for the 2018 comparative database signed a data use agreement, which was kept at Westat®, allowing their de-identified data to be easily accessible for legal and ethical health care research purposes (Sorra et al., 2018).

Even though designated humans were involved in data collection, this study only used de-identified data. Westat® was the sole source of these de-identified data (Sorra et al., 2018). The Internal Review Board at the University of Central Florida determined that this study was exempt after thorough reviews (APPENDIX E).

3.3 Description of the HSPSC Comparative Database

AHRQ began making the HSPSC available to the public in November 2004. (Sorra & Nieva, 2004). In 2006, an open letter was sent to all hospitals in the United States, requesting voluntary submission of all available hospital survey data. Leaderships of various U.S. hospitals eagerly submitted data from over 100,000 respondents for the initial 2007 comparative HSPSC database in a positive response to the request (Famolaro et al., 2018). The AHRQ also established a central repository for comparative databases, which Westat® was tasked with

maintaining. HSPSC data were collected on an annual basis from 2007 to 2014. The call for data collection was extended to every two years starting in 2014 (Famolaro et al., 2018).

Before submitting their data for the comparative database, it was critical that all hospitals strictly followed AHRQ's guidelines (Famolaro et al., 2018). It is also worth noting that all hospital researchers were required to follow the survey implementation guidelines. Nonetheless, there was no way to verify that hospitals followed the guidelines to the letter. The procedures for all of the surveys were described below, as well as how the study populations were chosen, how the survey data was analyzed, and how comparative datasets were created (Famolaro et al., 2018).

3.3.1 Hospital Guidelines in Implementing the Survey

The surveys were distributed via the internet, paper, or a combination of both at each hospital. As mentioned in Chapter Two, the HSPSC included items and questions that used a five-point Likert scale for agreement (starting with strongly disagree and ending with strongly agree) or frequency (from never to always) (Sorra & Nieva, 2004). At staff meetings, paper surveys were distributed, emphasizing hospital leadership's support for the project. Electronically distributed surveys took advantage of the respondents' email addresses through web-based distributions. They introduced each respondent to the project, reminded staff to participate in the study, and encouraged them to complete the survey by sending out scheduled notifications (Sorra et al., 2018). All web-based surveys were tested before the administration on the same types of computers that hospital staff used, ensuring convenience and efficiency. The survey's

administration was also tested ahead of time with various Internet browsers (Explorer, Safari, Firefox, Chrome, Mozilla, and Opera) and display settings (Sorra et al., 2018).

Although most hospitals preferred web-based survey administration, AHRQ reported that paper-based survey administration had slightly higher average response rates (Sorra et al., 2018). Individually and anonymously, the surveys were completed. If more than one hospital was surveyed, a hospital-level identifier was assigned to track the surveys from each facility and produce feedback reports for each (Sorra et al., 2018). Hospitals were allowed to use outside vendors to collect data if necessary, and they were given a time limit of up to 10 weeks to complete their survey projects (Sorra et al., 2018).

3.3.2 Survey population selection

The survey queries targeted all hospital staff. The project directors determined the survey's sample, and the survey questions were directed at all hospital employees. The project directors chose the survey sample from the facility's population. A great deal of care was taken to ensure that the sample chosen accurately reflected the population at that facility (Sorra et al., 2018). AHRQ recommended that for hospitals with physician and staff populations of 500 or less, a consensus survey be conducted in which information is gathered from all employees in that hospital (Sorra et al., 2018). AHRQ requested a minimum of 500 respondents from hospitals with physicians and staff ranging from 501 to 999. A minimum of 600 respondents was recommended for institutions with physicians and staff ranging from 1,000 to 2,999. (Sorra et al., 2018). These

sample sizes were calculated using the assumptions that the sample was simple random or systematic random, with a 50% response rate and a +/- 5% confidence interval (Sorra et al., 2018).

Staff in specific professional categories, such as nursing, or staff in specific units, such as the operating room or the pediatric unit, were included in the samples (Sorra et al., 2018). When research teams decided on the sample, they made a list with the participants' first and last names, internal addresses, hospital areas or units, and staffing category or job title. These lists were kept in their respective facilities in a secure location. In addition, researchers who used email correspondence to send pre-notification or conducted web-based surveys kept records of participants' email addresses in a similarly secure location (Sorra et al., 2018). Employees who no longer worked at the facility were on administrative or sick leave or had already left the facility were filtered from the list by the hospital researchers in charge prior to administering the survey (Sorra et al., 2018).

3.3.3 Analysis and first level of data cleaning by hospitals

At the hospital level, the first phase of data cleaning processes for the comparative database took place. Researchers at hospitals and hospital organizations either did their data entry, data analysis and report preparation or hired someone to do it for them. Researchers excluded surveys with blank areas or the same answer for all questions when they received the paper surveys back. In addition, illegible, mismarked, or double-response survey papers were excluded and properly discarded (Sorra et al., 2018).

3.3.4 Creating datasets

A response rate was calculated and a dataset was created after the first process of cleaning the surveys was completed. The data from the paper survey administration was entered into a data file using SAS®, SPSS®, Microsoft Excel®, or by sending the data to Westat® via the electronic address databasesonsafetyculture@westat.com in an easily imported file format. All information was safely stored on a Westat®-protected server (Sorra et al., 2018).

Surveys were de-identified and serial numbers were assigned to all surveys for paper survey administration. All information linking the numbers to the names of the respondents was obliterated (Sorra et al., 2018). Participants in web surveys were assured that all surveys were anonymously administered and that all responses were strongly coded and accurately captured in authentic computer-based data files by hospital personnel involved in survey administration (Sorra et al., 2018). Although space for free text comments was provided at the end of the survey, these comments were not captured in the AHRQ dataset, and those were not included in this study.

3.3.5 Second level of data cleaning by Westat®.

Westat® completed the second round of data cleaning procedures. Westat® used response frequencies to look for breaches, outliers, missing variables, and other anomalies in each hospital's data (Sorra et al., 2018). If any data errors were discovered, the hospitals were asked to correct them and resubmit their information (Sorra et al., 2018). To ensure that the dataset Westat® received was accurate, each participating hospital received a copy of its data frequencies (Sorra et al., 2018). All respondents who gave the same answers in or across survey

sections with no variations in ratings, or those who only answered demographic questions, were deleted prior to data analysis (Sorra et al., 2018). Hospitals that did not administer the entire survey did not specify which unit the respondent worked in or had only one unit respond to the survey were also excluded by Westat® (Sorra et al., 2018; Sorra & Dyer, 2010). If there were fewer than three respondents, or if the unit was identified as "other" or "many different work units," the unit was dropped. The basic assumption in all of these cases was that the individuals did not belong to the same unit and, as a result, should not be grouped for statistical purposes.

3.3.6 Justification of Sample Size

The 2018 HSPSC dataset had been found to have an adequate sample size for this study, with data collected between 2016 and 2018. The dataset included data from 382,834 respondents from 630 hospitals across the United States (Famolaro et al., 2018). The statistical power to test complex multi-variable analyses for this study was fully supported by the available 2018 U.S. database (Trzesniewski et al., 2011).

3.4 Study Variables

The following three independent variables were extracted from hospital and respondent characteristics: (Teaching Status, Geographic Region and Staff Positions). The 12 dependent variables were (Teamwork Within Hospital Units, Organizational Learning-Continuous Improvement, Staffing, Non-punitive Response to Error, Communication Openness, Supervisor/Manager Expectations and Actions Promoting Safety, Feedback and Communication About Error, Management Support for Patient Safety, Teamwork Across Hospital Units, Handoffs and Transitions). The final two outcome dimensions were as follows: (Frequency of

reported events and Overall perceptions of patient safety). The description of all the variables in the study is summarized in Table 5. These variables included exogenous, endogenous, and control or demographic variables, all listed in the last section of Table 5. Below are the conceptual and operational definitions for each item.

3.4.1 Independent Variables

The independent variables were categorized into three groups: (Teaching Status, Geographic Region and Staff Positions). These variables will be investigated to determine how they affect the dependent variables, which are the 12 safety culture dimensions.

Within the United States, the independent variables were demographic characteristics of the participants, which were also extracted from the original dataset. The independent variables were chosen to see if practitioners' perceptions differed depending on their positions, location, and hospital teaching status.

3.4.2 Dependent Variables

The 10 safety culture dimensions and the two outcome dimensions were the dependent variables, as described in Chapter Two (Figure 2). Table 4 lists each dimension and the terminology that identifies the survey items or questions pertaining to that dimension. The four items or questions pertaining to the dimension of Staffing, for example, can be found in section A, items 2, 5, 7, and 14, of the HSPSC (Table 4 and APPENDIX B).

As described in Chapter Two, the dependent variables were the 10 PSC dimensions and two outcome dimensions (Figure 2). Each dimension is shown in Table 4, and the items or questions in the survey refer to that dimension. The four items or questions that refer to the

dimension of Staffing, for example, can be found in section A, items 2, 5, 7, and 14 of the HSPSC (Table 4 and APPENDIX B).

Table 4 HSPSC Categories, Culture Categories, Dimensions and Items

Patient Safety Culture Dimension	Items or Questions per Dimension
Teamwork Within Hospital Units	A1, A3, A4, A11
Organizational Learning-Continuous Improvement	A6, A9, A13
Staffing	A2, A5, A7, A14
Non-punitive Response to Error	A8, A12, A16
Hospital Management Support for Patient Safety	F1, F8, F9
Supervisor/Manager Expectations and Actions Promoting Safety	B1, B2, B3, B4
Feedback and Communication About Error	C1, C3, C5
Communication Openness	C2, C4, C6
Teamwork Across Hospital Units	F2, F4, F6 F10
Hospital Handoffs and Transitions	F3, F5, F7, F11
Frequency of Event Reporting	D1, D2, D3
Overall Perceptions of Safety	A10, A15, A17, A18

A five-point Likert scale was used to rate the items and questions in the HSPSC for agreement (from strongly disagree to strongly agree) and frequency (from never to always) (Sorra & Nieva, 2004). The survey's (APPENDIX B) items were both positively and negatively phrased, such as "Staff feel free to question the decisions or actions of those with more authority," and "Staff are afraid to ask questions when something does not seem right" (Famolaro

et al., 2018). Prior to the 2018 HSPSC dataset release, Westat® converted negative responses to a positive Likert scale (Famolaro et al., 2018).

In the following section, the dependent variables, the patient safety culture dimensions, are conceptually and operationally defined. The survey's corresponding items and questions for these dimensions are also listed below (Sorra et al., 2018; Sorra & Nieva, 2004).

1. "Teamwork within hospital units" is defined as the support and respect shown by hospital staff within a unit to one another. The survey items A1, A3, A4, and A11 were used to operationalize this.
2. "Staffing" is defined as the number of employees who are believed to be adequate to meet the workload in order to provide high-quality patient care. The survey items A2, A5, A7, and A14 operationalized this.
3. "Organizational Learning-Continuous Improvement" is defined as the belief that employees can learn from their mistakes and use that knowledge to make positive changes in the workplace. The survey items A6, A9, and A13 operationalized this.
4. A "non-punitive response to error" is defined as the staff's understanding that any previous mistakes they made would not be held against them and that written reports of such events would not be kept in their personnel file. The survey's items A8, A12, and A16 were used to operationalize this.
5. "Supervisor/Manager Expectations and Safety-Promoting Actions" refers to hospital employees' perceptions of their supervisors' and managers' involvement in activities that improve patient safety. The survey items B1, B2, B3, and B4 were used to operationalize this.

6. "Feedback and Communication about Error" refers to how employees feel about being informed about recent errors and receiving feedback on how to avoid them. Furthermore, employees believed they were informed of changes to prevent future adverse events. The survey items C1, C3, and C5 were used to operationalize this.

7. "Communication Openness" is defined as employees' perception that they have the freedom to speak up if they see something that harms patient care. They also had the option of questioning the authorities. The survey's items C2, C4, and C6 were used to operationalize this.

8. "Teamwork across hospital units" is defined as hospital units working together to collaborate and coordinate patient care activities in the best interests of their patients. This dimension also considers whether hospital systems encourage hospital unit synergies. The survey's items or questions F2, F4, F6, and F10 were used to operationalize this.

9. The dimension "Hospital Handoffs and Transitions" is defined as whether practitioners believe important patient information has been transferred from one care provider to another, across hospital units, and during shift changes. The survey's items or questions F3, F5, F7, and F11 were used to operationalize this.

10. "Hospital Management Support for Patient Safety" is defined as employees' perceptions that their hospital management created a work environment that promoted patient safety and assured employees that patient safety was a top priority. The survey items F1, F8, and F9 were used to operationalize this.

11. "Frequency of Event Reporting" is defined as the staff's perceptions of how often errors occur and the frequency with which they are reported. The survey items D1, D2, and D3 were used to operationalize this outcome dimension.

12. "Overall Perceptions of Safety" refers to employees' overall impressions of their company's error-prevention procedures and systems. The survey's items or questions A8, A10, A15, and A17 were used to operationalize this outcome dimension.

Table 5 Summary of the Study Variables

Study variables	Dimensions	Variables Descriptions
Patient Safety Culture Endogenous Variables	Teamwork Within Hospital Units	Staff support each other, treat each other with respect, and work together as a team.
	Organizational Learning- Continuous Improvement	Mistakes have led to positive changes and changes are evaluated for effectiveness.
	Staffing	There are enough staff to handle the workload and work hours are appropriate to provide the best care for patients.
	Non-punitive Response to Error	Staff feel that their mistakes and event reports are not held against them and that mistakes are not kept in their personnel file.
	Communication Openness	Staff freely speak up if they see something that may negatively affect a patient and feel free to question those with more authority.
	Supervisor/Manager Expectations and Actions Promoting Safety	Supervisors/managers consider staff suggestions for improving patient safety, praise staff for following patient safety procedures, and do not overlook patient safety problems.
	Feedback and Communication About Error	Staff are informed about errors that happen, are given feedback about changes implemented, and discuss ways to prevent errors.
	Management support for patient safety	Hospital management provides a work climate that promotes patient safety and shows that patient safety is a top priority
	Teamwork Across Hospital Units	Hospital units cooperate and coordinate with one another to provide the best care for patients.
	Handoffs and Transitions	Important patient care information is transferred across hospital units and during shift changes.

Endogenous Variable	**Dimensions**	**Variables Descriptions**
	Frequency of events reported	Mistakes caught and corrected before affecting the patient Mistakes with no potential to harm the patient. Mistakes that could harm the patient but do not.
	Overall perceptions of patient safety	Procedures and systems are good at preventing errors and there is a lack of patient safety problems.
Hospital and Respondent Characteristics	Geographic Region	1 = 'Northeast' 2 = 'South Atlantic / Associated Territories' 3 = 'E. Central' 4 = 'W. Central' 5 = 'West'
	Teaching Status	Teaching, Nonteaching hospital
	Staff Positions	Medical, Non-Medical

3.5 Statistical Analysis

The statistical procedures in this study contained descriptive statistics and partial least squares structural equation modeling (PLS-SEM) for model validation for analyzing the relationships between model factors and testing the study hypotheses. The statistical analysis methods used in this study are detailed in the following sections.

3.5.1 Descriptive Statistics

Descriptive statistics analyze the hospital participant information and determine normality based on the provided data. The reviewed statistics include range, mean, standard deviation, skewness and kurtosis. As the survey format is a Likert scale, it is expected the range for all variables, excluding categorical demographic data, will be between 1-5. IBM SPSS® Version 28 is used to perform these tests.

The means and standard deviation identify the average response and extent of deviation of the responses assuming a normally distributed response. Skewness is a measure of symmetry or the distortion of the data set with a value of 0, indicating the data matches a normal curve exactly. High kurtosis indicates that the data has heavy tails, with the extreme case being a uniform distribution. The data is not normally distributed if there is significant skewness and kurtosis. When using SEM, acceptable skewness values are between 3 and + 3, and acceptable kurtosis values are between 10 and + 10. (Brown, 2006). Although normality is preferred, it is not required for PLS-SEM (Hair et al., 2014).

Excessive collinearity is another issue to consider. Pearson's coefficient determines

whether two values with normally distributed variables have a linear relationship (Akoglu,2018). Collinearity issues are more likely if the value is greater than 0.85.

3.5.2 PLS-SEM Model

The final model is identified and tested using SmartPLS 3 and PLS-SEM with the consistent PLS model. The factor weighting scheme is used to calculate the outer model, followed by the path weighting scheme for evaluation of the final model. To determine statistical significance and p-values, bootstrapping is used. The option of complete bootstrapping with 5000 samples was chosen.

The first set of targets is related to the outer measurement model. The outer loadings in the model are used to assess indicator reliability. To add value to the model, the loadings must be sufficient. Loadings above 0.7 are preferred, and loadings above 0.5 are appropriate for use in the model, according to Hair et al. (2019).

The outer loadings (indicator loadings) represent the simple correlations between measured variables and the associated latent variable, are used to assess indicator reliability. The preferred minimum of 0.7 is based on a loading of 0.708 representing 50% of an item's variance.(Hair et al., 2019). In a measurement model, however, it is common to find a few outer loadings less than 0.7. Indicators with loadings less than 0.4 should be removed from the equation (Hulland, 1999).

Internal consistency is commonly measured using three different methods (Hair et al., 2019). Each of these is related and has a target between 0.7 and 0.9, with values greater than 0.95 indicating redundant items. Cronbach's alpha is regarded as a conservative measure of reliability, whereas composite reliability (Jöreskog, 1971) is regarded as liberal. The difference is that

composite reliability is weighted based on the indicator's loadings. As a compromise between Cronbach's alpha and composite reliability, the ρA measure is used (Joseph F Hair et al., 2019). Convergent validity is measured using the average variance extracted (AVE). An acceptable AVE is considered 0.5, indicating that at least half of the variance in the items is explained (Joseph F Hair et al., 2019). These assessments are summarized in Table 6.

Collinearity, model fit, effect size, and the statistical significance of the path coefficients are among the second set of assessments related to the structural model.

Table 6 Summary of the Measurement Model Validity Assessments

	Measurement	**Target**	**Supporting Literature**
Indicator reliability	Outer loadings	> 0.7 Preferred > 0.5 Acceptable	Hair et al. (2019)
Internal consistency	Cronbach's alpha	0.7 – 0.9	Hair et al. (2019)
	ρA	0.7 – 0.9	Hair et al. (2019)
	Composite reliability	0.7 – 0.9	Hair et al. (2019)
Convergent validity	Average variance extracted (AVE)	> 0.5	Hair et al. (2019)
Discriminant validity	Heterotrait-monotrait ratio (HTMT)	< 0.85 Preferred 0.85 - 0.90 Acceptable	Hair et al. (2019)

For model fit, endogenous variables should have coefficients of determination (R^2) of at least 0.75, 0.50, and 0.25, which are considered substantial, moderate, and weak, respectively (Hair et al., 2019). R^2 greater than 0.9 indicates that the model is overfit and includes noise.

Model fit in covariance-based SEM is often analyzed using the standardized root mean square error (SRMR), which measures the Euclidean distance between the empirical correlation matrix and the model implied matrix. Hu and Bentler (1999) defined a cutoff of 0.8 for covariance-based SEM models. No defined value is widely accepted, though the acceptable value for PLS-SEM would likely be higher than 0.8. (Hair et al., 2014)

Another journal article takes the position that a cutoff value of 0.08 is considered reasonable (Henseler et al., 2016). An SRMR will be reported for this analysis, but no applicable target value will be applied.

Cohen (1988) identified the f^2 statistic to measure effect sizes with at least 0.02 for a small effect, 0.15 for a medium effect, and 0.35 for a large effect.

The blindfolding procedure can be used to test the model's prediction capability. The Q^2 criterion of Stone-Geisser assesses a model's ability to predict endogenous latent variables. Q^2 values greater than zero indicate that the model path has a predictive value, while values less than zero indicate that the path does not.

The assessment parameters for structural model validity assessments are summarized in Table 7.

Table 7 Summary of the Structural Model Validity Assessments

	Measurement	**Target**	**Supporting Literature**
Model fit	R^2	> 0.90 Overfit > 0.75 Substantial > 0.50 Moderate > 0.25 Weak	Hair et al. (2019)
	SRMR	<0.08 Preferred	Henseler, Hubona, & Ray (2016)
Effect size	f^2	> 0.02 Small > 0.15 Medium > 0.35 Large	Cohen (1988)
Path Coefficient for direct and indirect effects	p-value	< 0.05	Hair et al. (2019); Hulland (1999)
Model Prediction Capability	Q2	>0	Hair et al., (2011); Shanmugapriya & Subramanian (2016)

CHAPTER 4: RESEARCH FINDINGS

4.1 Introduction

Research findings include the responses, demographics, data, and associated descriptive statistical results from the survey are reported. Path analysis using partial least squares analysis is used, which bases estimates on explaining the maximum amount of variance.

4.2 Survey Results and Demographic Variables

With data collected between 2016 and 2018, the 2018 HSPSC dataset was discovered to have an adequate sample size for this study.. 630 U.S. hospitals submitted data from 382,834 respondents in the dataset (Famolaro et al., 2018). The available 2018 U.S. database fully supported the statistical power to test complex multi-variable analyses for this study (Trzesniewski et al., 2011). The average hospital response rate was 54 percent, with an average of 608 completed surveys per hospital.

Samples were taken from five regions in the U.S Northeast, South Atlantic/ Associated Territories, East Central, West Central and West (Table 8). To meet the study objectives, the data was stratified based on geographic region, and the participants were divided into two groups medical and non-medical staff (Table 10). In order to obtain an adequate representation by regions and increase the generalizability of the research findings, the data was extracted by following the confidence interval 99% and margin of error 1% with total sample size 67,010 participants, as shown in Table 10. The participants were working on teaching or non-teaching hospitals as shown in Table 9, where 56% of participants were from teaching hospitals.

Table 8 Statistics of participants' Geographic Regions

Region	Population	Sample	Percent
Northeast	70,870	13,477	20.1
South Atlantic/ Associated Territories	107,584	14,412	21.5
East Central	101,984	14,307	21.4
West Central	64,091	13,212	19.7
West	38,305	11,602	17.3
Total	382,834	67,010	100

Note: Northeast: New England, Mid Atlantic; East Central: East North Central; East South Central; West Central: West North Central; West South Central; West: Mountain & Pacific

Table 9 Statistics of participants' Geographic Regions

Teaching Status	Number of Sample	Percent
Teaching	37,548	56
Nonteaching	29,462	44
Total	67,101	100

Table 10 Statistics of participants' Professionals

Participants	Number	Percent
Medical	52,960	79
Non-Medical	14,050	21
Total	67,010	100

Note: Medical: Attending/Physician/Resident/NP or PA; Dietician; Patient Care assistant/Hospital aide/Care partner; Pharmacist; LVN/LPN/Registered Nurse; Therapist; Non-Medical: Administration/Management; Technician (e.g., EKG, Lab, Radiology; Unit Assistant/Clerk/Secretary

4.3 Descriptive Statistics - Normality and Collinearity

Normality is measured using skewness and kurtosis. All variables are normally distributed, with values of skewness fall between − 3 and + 3, and kurtosis is appropriate from a range of − 10 to + 10 (Brown, 2006), as shown in Table 11.

Table 11 Descriptive Statistics

	Range	Mean	Standard deviation	Skewness	Skewness
C2	1-5	3.74	1.395	-1.465	1.572
C4	1-5	3.13	1.425	-0.664	-0.260
C6R	1-5	3.51	1.401	-1.138	0.698
C1	1-5	3.31	1.483	-0.949	0.122
C3	1-5	3.48	1.526	-1.094	0.308
C5	1-5	3.64	1.504	-1.291	0.796
A14R	1-5	3.01	1.326	-0.497	-0.448
A2	1-5	3.02	1.350	-0.328	-0.898
A5R	1-5	3.02	1.332	-0.564	-0.358
A7R	1-5	3.43	1.459	-0.951	0.191
F10	1-5	3.261	1.475	0.245	-1.063
F2R	1-5	2.84	1.459	-0.557	-0.595
F4	1-5	3.09	1.464	-0.975	-0.018
F6R	1-5	3.11	1.530	-0.916	-0.193
F1	1-5	3.63	1.391	-1.427	1.295
F8	1-5	3.52	1.497	-1.206	0.523
F9R	1-5	3.06	1.514	-0.670	-0.560
A12R	1-5	3.13	1.318	-0.680	-0.027
A16R	1-5	2.89	1.289	-0.388	-0.307
A8R	1-5	3.20	1.296	-0.657	-0.098
A13	1-5	3.57	1.159	-1.424	2.164
A6	1-5	3.95	1.081	-1.777	3.854
A9	1-5	3.50	1.095	-1.299	2.033
B1	1-5	3.63	1.466	-1.315	0.821
B2	1-5	3.64	1.476	-1.353	0.903
B3R	1-5	3.61	1.442	-1.332	0.977
B4R	1-5	3.66	1.540	-1.249	0.514
F11R	1-5	2.85	1.488	-0.658	-0.476
F3R	1-5	2.71	1.439	-0.490	-0.587
F5R	1-5	2.95	1.494	-0.755	-0.371
F7R	1-5	2.83	1.432	-0.678	-0.344
A1	1-5	4.05	1.128	-1.834	3.581
A11	1-5	3.55	1.313	-1.198	0.900
A3	1-5	4.03	1.125	-1.831	3.687
A4	1-5	3.88	1.167	-1.563	2.472
A10R	1-5	3.43	1.302	-0.797	0.076
A15	1-5	3.42	1.335	-0.809	-0.018
A17R	1-5	3.46	1.315	-0.884	0.234
A18	1-5	3.65	1.108	-1.446	2.348
D1	1-5	3.29	1.590	-0.862	-0.252
D2	1-5	3.28	1.606	-0.844	-0.305
D3	1-5	3.54	1.653	-1.125	0.089

Pearson's coefficients for all measured variables in each hypothesized latent variable have a significant p-value of 0.000, indicating correlation is present. Pearson's coefficient

identifies if a linear relationship exists between two values for normally distributed variables (Akoglu, 2018). The bivariate Pearson's coefficient for each group of variables is shown in Tables 12-23, demonstrating that a linear relationship is present for all variables in each latent variable.

Table 12 Pearson's Correlation for Communication Openness

		C2	C4	C6R
C2	Pearson Correlation	1		
	Sig. (2-tailed)			
C4	Pearson Correlation	0.677	1	
	Sig. (2-tailed)	0.000		
C6R	Pearson Correlation	0.685	0.668	1
	Sig. (2-tailed)	0.000	0.000	

Table 13 Pearson's Correlation for Feedback and Communication About Error

		C1	C3	C5
C1	Pearson Correlation	1		
	Sig. (2-tailed)			
C3	Pearson Correlation	0.731	1	
	Sig. (2-tailed)	0.000		
C5	Pearson Correlation	0.743	0.763	1
	Sig. (2-tailed)	0.000	0.000	

Table 14 Pearson's Correlation for Staffing

		A2	A5R	A7R	A14R
A2	Pearson Correlation	1			
	Sig. (2-tailed)				
A5R	Pearson Correlation	0.268	1		
	Sig. (2-tailed)	0.000			
A7R	Pearson Correlation	0.264	0.455	1	
	Sig. (2-tailed)	0.000	0.000		
A14R	Pearson Correlation	0.500	0.412	0.396	1
	Sig. (2-tailed)	0.000	0.000	0.000	

Table 15 Pearson's Correlation for Teamwork Across Units

		F4	F10	F2R	F6R
F4	Pearson Correlation	1			
	Sig. (2-tailed)				
F10	Pearson Correlation	0.770	1		
	Sig. (2-tailed)	0.000			
F2R	Pearson Correlation	0.711	0.699	1	
	Sig. (2-tailed)	0.000	0.000		
F6R	Pearson Correlation	0.698	0.703	0.657	1
	Sig. (2-tailed)	0.000	0.000	0.000	

Table 16 Pearson's Correlation for Management Support for Patient Safety

		F1	F8	F9R
F1	Pearson Correlation	1		
	Sig. (2-tailed)			
F8	Pearson Correlation	0.759	1	
	Sig. (2-tailed)	0.000		
F9R	Pearson Correlation	0.624	0.701	1
	Sig. (2-tailed)	0.000	0.000	

Table 17 Pearson's Correlation for Nonpunitive Response to Error

		A8R	A12R	A16R
A8R	Pearson Correlation	1		
	Sig. (2-tailed)			
A12R	Pearson Correlation	0.632	1	
	Sig. (2-tailed)	0.000		
A16R	Pearson Correlation	0.609	0.626	1
	Sig. (2-tailed)	0.000	0.000	

Table 18 Pearson's Correlation for Organizational Learning and Continuous Improvement

		A6	A9	A13
A6	Pearson Correlation	1		
	Sig. (2-tailed)			
A9	Pearson Correlation	0.456	1	
	Sig. (2-tailed)	0.000		
A13	Pearson Correlation	0.560	0.490	1
	Sig. (2-tailed)	0.000	0.000	

Table 19 Pearson's Correlation for Supervisor/manager Expectations and Actions Promoting Patient Safety

		B1	B2	B3R	B4R
B1	Pearson Correlation	1			
	Sig. (2-tailed)				
B2	Pearson Correlation	0.845	1		
	Sig. (2-tailed)	0.000			
B3R	Pearson Correlation	0.724	0.741	1	
	Sig. (2-tailed)	0.000	0.000		
B4R	Pearson Correlation	0.680	0.713	0.732	1
	Sig. (2-tailed)	0.000	0.000	0.000	

Table 20 Pearson's Correlation for Handoffs and Transitions

		F3R	F5R	F7R	F11R
F3R	Pearson Correlation	1			
	Sig. (2-tailed)				
F5R	Pearson Correlation	0.725	1		
	Sig. (2-tailed)	0.000			
F7R	Pearson Correlation	0.731	0.753	1	
	Sig. (2-tailed)	0.000	0.000		
F11R	Pearson Correlation	0.679	0.748	0.711	1
	Sig. (2-tailed)	0.000	0.000	0.000	

Table 21 Pearson's Correlation for Teamwork within Units

		A1	A3	A4	A11
A1	Pearson Correlation	1			
	Sig. (2-tailed)				
A3	Pearson Correlation	0.752	1		
	Sig. (2-tailed)	0.000			
A4	Pearson Correlation	0.769	0.713	1	
	Sig. (2-tailed)	0.000	0.000		
A11	Pearson Correlation	0.563	0.594	0.541	1
	Sig. (2-tailed)	0.000	0.000	0.000	

Table 22 Pearson's Correlation for Overall Perceptions of Patient Safety

		A15	A18	A10R	A17R
A15	Pearson Correlation	1			
	Sig. (2-tailed)				
A18	Pearson Correlation	0.478	1		
	Sig. (2-tailed)	0.000			
A10R	Pearson Correlation	0.396	0.428	1	
	Sig. (2-tailed)	0.000	0.000		
A17R	Pearson Correlation	0.510	0.507	0.495	1
	Sig. (2-tailed)	0.000	0.000	0.000	

Table 23 Pearson's Correlation for Frequency of Events Reported

		D1	D2	D3
D1	Pearson Correlation	1		
	Sig. (2-tailed)			
D2	Pearson Correlation	0.878	1	
	Sig. (2-tailed)	0.000		
D3	Pearson Correlation	0.829	0.864	1
	Sig. (2-tailed)	0.000	0.000	

4.4 Partial Least Squares Structural Equation Modeling (PLS-SEM) Model

The hypothesized structural causal path model was identified from the survey data collected and is shown in Figure 9.

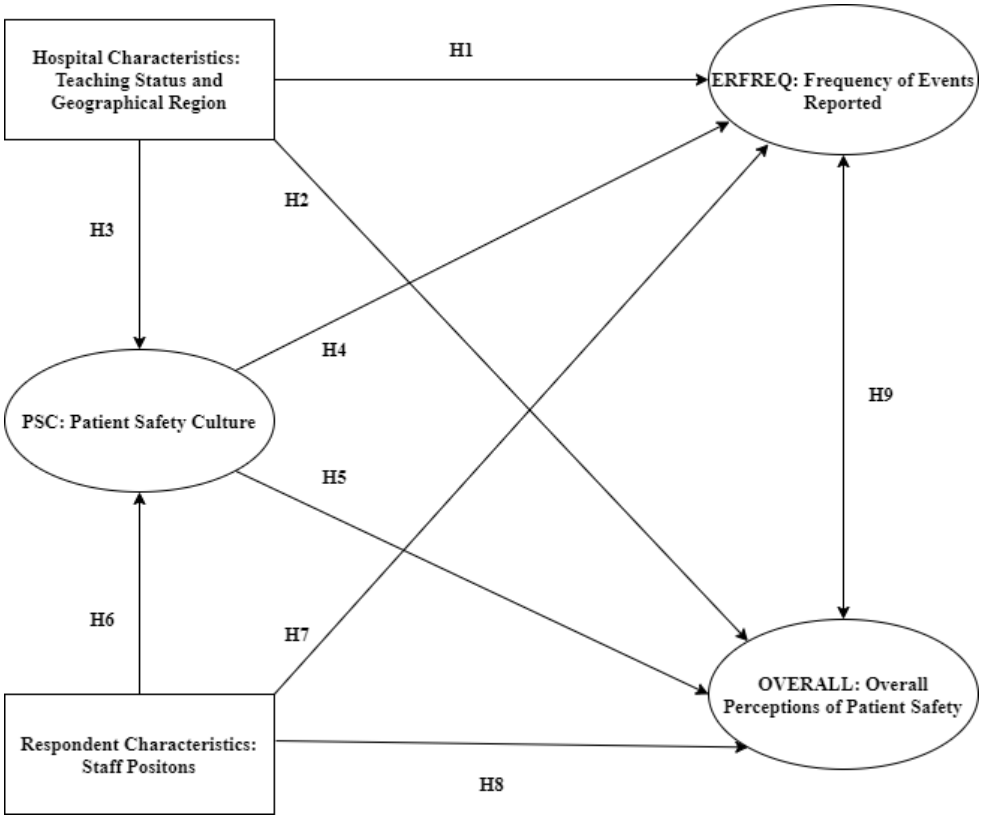

Figure 9 The hypothesized structural causal path model

The associated hypotheses for the model include:

- H1: Hospital characteristics have a significant influence on ERFREQ
- H2: Hospital characteristics have a significant influence on OVERALL.
- H3: Hospital characteristics have a significant influence on PSC
- H4: PSC has a relationship with the Frequency of events reported (ERFREQ).
- H5: PSC has a relationship with OVERALL
- H6: Respondent characteristics have a significant influence on perceived PSC.
- H7: Respondent characteristics have a significant influence on ERFREQ.
- H8: Respondent characteristics have a significant influence on OVERALL.
- H9: OVERALL and ERFREQ are significantly related.

The hypothesized identified model represents one exogenous variable representing patient safety culture (PSC). The model also includes two endogenous variables representing the frequency of event reporting (ERFREQ) and overall perception of patient safety (OVERALL). Moreover, three independent variables extracted from the hospital and respondents' characteristics included the (Staff Position, Teaching Status and Geographic Region). PSC is conceptualized as a reflective- reflective hierarchical component model (HCM). HCM is beneficial as it allows a less complex and parsimonious path model, especially for multi-dimensional constructs (Hair, 2014). PSC is a reflective second-order construct, and its 10 dimensions are first-order reflective measurement constructs. A two-stage (or sequential latent score) approach is recommended when the path model in PLS-SEM involves a higher-order construct (Hair, 2014; Sarstedt et al., 2016).

SmartPLS version 3 is used to perform the PLS analysis. The basic PLS algorithm used includes (SmartPLS):

1. Outer approximation of the latent variable scores,
2. Estimation of the inner weights,
3. Inner approximation of the latent variable scores
4. Estimation of the outer weights

The consistent PLS (PLSc) algorithm adds a correction to address inconsistency in PLS estimates for reflexive variables by adding a correction for path coefficients, inter-construct correlations, and indicator loading. The PLSc algorithm extends the base PLS algorithm by adding additional steps (Dijkstra & Henseler, 2015):

5. Estimate reliability
6. Correct for attenuation
7. Estimate consistent coefficients

The data is analyzed using the PLSc algorithm. Where needed, bootstrapping with the complete bootstrapping option with 5000 iterations is used to provide p-values for tests where a p-value is needed.

4.5 Model Results

Structural equation models include two sub-models, an inner structural model and an outer measurement model. The measurement identifies the linear relationship between the measured indicator variables and the associated latent variables. The structural model identifies the linear relationship between endogenous and exogenous latent variables (Wong, 2013). All results shown except where noted reflect the final model, including only statistically significant paths and indicators retained in the final model.

4.5.1 Measurement Model Analysis of Lower Order Construct

As discussed in Chapter 4, the validity and reliability of the measurement model are evaluated by assessing: (1) indicator reliability; (2) internal consistency reliability; (3) convergent validity; and (4) discriminant validity. The following sections present the results for all analyses to evaluate the validity and reliability of the measurement model.

Indicator reliability is assessed using the outer loadings (indicator loadings) that represent the simple correlations between measured variables and the associated latent variable. The preferred minimum is 0.7. However, it is common to find a few outer loadings in a measurement

model to be less than 0.7. Indicators with loadings less than 0.4 should be dropped (Hulland, 1999). Table 24 shows the outer loadings with 40 measured variables having a loading above 0.7, and the remaining two measured variables have a loading above 0.6.

Three related calculations measure internal consistency and reliability, including Cronbach's alpha, ρA, and composite reliability, with targets above 0.7 (Hair et al., 2019). Cronbach's alpha is considered a conservative measure of reliability, whereas composite reliability (Jöreskog, 1971) is considered a liberal measure of reliability. The ρA measure used to adjust results in the consistent PLS algorithm (Dijkstra & Henseler, 2015) compromises Cronbach's alpha and composite reliability (Hair et al., 2019). All variables have values for each of these measures above 0.7, as shown in Table 25.

Convergent validity is measured using the average variance extracted (AVE). An acceptable AVE is considered 0.5, indicating that at least half of the variance in the items is explained (Hair et al., 2019). The average variance is at or above 0.5 for all variables.
The results for internal consistency and convergent validity are shown in Table 25.

Table 24 Outer loadings of the Measured Variables on the Latent Variables

Construct	Item	Outer Loading
Communication openness (COMMUN)	C2	0.899
	C4	0.876
	C6R	0.882
Feedback and communication about error (FEED)	C1	0.904
	C3	0.910
	C5	0.919
Staffing (STAFF)	A14R	0.841
	A2	0.688
	A5R	0.685
	A7R	0.703
Teamwork across units (TEAMAC)	F10	0.902
	F2R	0.866
	F4	0.901
	F6R	0.862
Management support for patient safety (MGMT)	F1	0.890
	F8	0.922
	F9R	0.866
Nonpunitive response to error (NONPUN)	A12R	0.881
	A16R	0.859
	A8R	0.854
Organizational learning—Continuous improvement (ORGLRN)	A13	0.857
	A6	0.825
	A9	0.768
Supervisor/manager expectations and actions promoting patient safety (SUPV)	B1	0.902
	B2	0.920
	B3R	0.892
	B4R	0.873
Handoffs and transitions (HANDOFF)	F11R	0.880
	F3R	0.880
	F5R	0.906
	F7R	0.897
Teamwork within units (TEAMIN)	A1	0.888
	A11	0.800
	A3	0.885
	A4	0.870
Overall perceptions of patient safety (OVERALL)	A10R	0.745
	A15	0.759
	A17R	0.814
	A18	0.785
Frequency of events reported (ERFREQ)	D1	0.949
	D2	0.960
	D3	0.944

Table 25 Internal Reliability and Convergent Validity Statistics

	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)
COMMUN	0.863	0.867	0.916	0.784
ERFREQ	0.947	0.947	0.966	0.905
FEED	0.898	0.899	0.936	0.830
HANDOFF	0.913	0.913	0.939	0.794
MGMT	0.872	0.873	0.922	0.797
NONPUN	0.832	0.836	0.899	0.748
ORGLRN	0.751	0.762	0.858	0.668
OVERALL	0.779	0.781	0.858	0.602
STAFF	0.713	0.747	0.821	0.536
SUPV	0.919	0.920	0.943	0.805
TEAMAC	0.906	0.907	0.934	0.780
TEAMIN	0.884	0.884	0.920	0.742

Discriminant validity is assessed using the heterotrait-monotrait (HTMT) ratio. Values above either 0.85 for more distinct measures or 0.90 for less distinct measures are suggested as limits. As this is a theoretical model using related reflexive factors, 0.9 would be considered a targeted limit acceptable, and 0.85 is the preferred limit. All values are below 0.85. A summary of these targeted values and values for the structural model addressed next is shown in Table 26.

Table 26 Discriminant Validity HTMT Ratios

	COMMUN	ERFREQ	FEED	HANDOFF	MGMT	NONPUN	ORGLRN	OVERALL	STAFF	SUPV	TEAMAC
ERFREQ	0.385										
FEED	0.856	0.533									
HANDOFF	0.451	0.454	0.405								
MGMT	0.552	0.407	0.494	0.768							
NONPUN	0.451	0.392	0.515	0.319	0.350						
ORGLRN	0.539	0.393	0.501	0.446	0.538	0.568					
OVERALL	0.553	0.368	0.480	0.469	0.560	0.640	0.859				
STAFF	0.377	0.400	0.526	0.360	0.377	0.793	0.561	0.750			
SUPV	0.594	0.305	0.524	0.382	0.497	0.448	0.568	0.569	0.421		
TEAMAC	0.460	0.520	0.568	0.826	0.818	0.472	0.424	0.441	0.519	0.398	
TEAMIN	0.363	0.353	0.531	0.222	0.298	0.643	0.561	0.515	0.700	0.385	0.486

4.5.2 Measurement Model Analysis of Higher Order Construct

The higher-order construct is also validated as part of the measurement model assessment. The high construct was assessed by: internal consistency reliability, convergent validity, and discriminant validity. The results for reliability and validity of the higher-order constructs show that both reliability and validity were established. The reliability and convergent validity for the constructs are established as the value for Cronbach's alpha, ρA, and composite reliability, with targets above 0.7 (Hair et al., 2019), and the Convergent validity is measured using the average variance extracted where AVE is greater than 0.50 (Table 27). Further to the

assessment of reliability and validity, discriminant validity of the higher-order constructs with the lower-order constructs is also assessed using the HTMT where is lower than 0. 90 Table 28.

Table 27 Internal Reliability and Convergent Validity Statistics

	Cronbach's Alpha	rho_A	Composite Reliability	Average Variance Extracted (AVE)
ERFREQ	0.947	0.947	0.966	0.905
OVERALL	0.779	0.782	0.858	0.602
PSC	0.885	0.887	0.907	0.493

Table 28 Discriminant Validity HTMT Ratios

	ERFREQ	OVERALL
OVERALL	0.368	
PSC	0.583	0.815

4.5.3 Structural Model Analysis

Items to assess in the structural model include model fit, effect size, and the statistical significance of the path coefficients. For model fit, the coefficient of determination or R^2 for endogenous variables should have values of at least 0.75, 0.50, and 0.25, which are considered substantial, moderate, and weak, while an R^2 value (Hair et al., 2019). R^2 greater than 0.9 indicates an overfit that includes noise in the model. For this model, the Frequency of events reported (ERFREQ) and Overall perceptions of patient safety (OVERALL) have weak determination coefficients, as shown in Table 29. Model fit may also be analyzed using the standardized root mean square error (SRMR), which measures the Euclidean distance between the empirical correlation matrix and the model implied matrix model implied. While no cutoff A

cutoff value of 0.08 is considered reasonable (Henseler et al., 2016). The estimated model had an SRMR of 0.068.

Table 29 Coefficient of Determination for Endogenous Variables

	R^2	R^2 Adjusted
ERFREQ	0.285	0.285
OVERALL	0.471	0.471

The effect size is measured using the f^2 statistic. Cohen (1988) identified effect sizes for the f^2 statistic of at least 0.02 for a small effect, 0.15 for a medium effect, and 0.35 for a large effect. PSC to the frequency of events reported has a medium effect, and PSC to overall perceptions of patient safety has a large effect Table 30.

Table 30 Effect Size for Model Paths

	ERFREQ	OVERALL
PSC	0.399	0.890

Once the model is developed, model prediction capability can be evaluated using the blindfolding procedure. Stone-Geisser's Q^2 criterion evaluates the capability of the model to predict endogenous latent variables. Q^2 values greater than zero indicate the model path's predictive value, while values of less than zero indicate the path does not have a predictive value. The frequency of events reported (ERFREQ) has a Q^2 value of 0.261, and Overall perceptions of patient safety (OVERALL) has a Q^2 value of 0.282, indicating that the exogenous variables have predictive relevance on the associated endogenous variables. For PLS-SEM, the cross-validated

redundancy approach to measuring the Q^2 value for each endogenous variable is used (Hair et al., 2011; Shanmugapriya & Subramanian, 2016).

4.4.4 Hypothesis Testing

The selected causal model meets validity assessments for both the measurement and structural models, as shown in Tables 31-32. All assessments are acceptable.

Table 31 Summary of the Measurement Assessment Results

	Measurement	**Target**	**Model results**	**Supporting Literature**
Indicator reliability	Outer loadings	> 0.7 Preferred > 0.5 Acceptable	40 variables preferred 2 variable acceptable	Hair et al. (2019)
Internal consistency	Cronbach's alpha	> 0.7	All variables > 0.7	Hair et al. (2019)
	ρA	> 0.7	All variables > 0.7	Hair et al. (2019)
	Composite reliability	> 0.7	All variables > 0.7	Hair et al. (2019)
Convergent validity	Average variance extracted (AVE)	> 0.5	All variables > 0.5	Hair et al. (2019)
Discriminant validity	Heterotrait monotrait ratio (HTMT)	< 0.85 Preferred 0.85 - 0.90 Acceptable	All variables preferred except 2 variables acceptable	Hair et al. (2019)

Table 32 Summary of the Structural Model Assessment Results

	Measurement	Target	Model results	Supporting Literature
Model fit	R^2	> 0.90 Overfit > 0.75 Substantial > 0.50 Moderate > 0.25 Weak	No variables overfit No variable substantial No variable moderate 2 variables weak	Hair et al. (2019)
	SRMR	<0.08 Preferred	0.068	Henseler et al. (2016); Hair et al. (2019)
Effect size	f^2	> 0.02 Small > 0.15 Medium > 0.35 Large	None None 2 in range	Cohen (1988)
Path Coefficient for direct and indirect effects	p-value	< 0.05	23 of 24 coefficients in range (23 variables ≤ 0.05)	Hair et al. (2019); Hulland (1999)
Model Prediction Capability	Q^2	>0	All endogenous variables above 0	Hair et al. (2011); Shanmugapriya & Subramanian (2016)

The overall objective of this approach is to identify a significant set of paths in a causal model that addresses OVERALL and ERFREQ. The structural model with results shown in Table 33 is significant, with P-values of 0.001 or less for both direct and indirect effects.

Table 33 Causal Model Path Coefficients and Hypothesis Testing

Hypothesized Path	Original Sample	Sample Mean	Standard Deviation	T Statistics	P - Values
RG1 → ERFREQ	-0.062	-0.062	0.004	14.031	0.000
RG1 → OVERALL	0.068	0.069	0.004	18.016	0.000
RG1 →PSC	-0.090	-0.090	0.005	17.249	0.000
RG2 → ERFREQ	0.054	0.054	0.004	12.575	0.000
RG2 → OVERALL	-0.081	-0.081	0.004	20.893	0.000
RG2 →PSC	0.128	0.128	0.005	24.994	0.000
RG3 → ERFREQ	0.056	0.056	0.004	13.237	0.000
RG3 → OVERALL	-0.053	-0.053	0.004	14.147	0.000
RG3 →PSC	0.152	0.152	0.005	30.491	0.000
RG4 → ERFREQ	0.054	0.054	0.004	12.694	0.000
RG4 → OVERALL	-0.052	-0.052	0.004	13.916	0.000
RG4 → PSC	0.110	0.110	0.005	21.485	0.000
RG5 → ERFREQ	0.063	0.063	0.004	15.188	0.000
RG5 →OVERALL	-0.065	-0.065	0.004	17.830	0.000
RG5 →PSC	0.085	0.085	0.005	17.457	0.000
Teach →ERFREQ	0.008	0.008	0.003	2.312	0.021
Teach →OVERALL	0.004	0.004	0.003	1.587	0.112
Teach →PSC	-0.051	-0.051	0.004	12.945	0.000
PSC → ERFREQ	0.522	0.522	0.004	147.799	0.000
PSC → OVERALL	0.698	0.698	0.003	262.460	0.000
Staff Position → ERFREQ	0.066	0.066	0.003	19.462	0.000
Staff Position → OVERALL	-0.052	-0.052	0.003	17.851	0.000
Staff Position → PSC	0.095	0.095	0.004	24.090	0.000
OVERALL → ERFREQ	-0.079	-0.079	0.005	14.877	0.000

Hypothesis testing for the model is shown in Table 34. The final model is shown in Figure 10.

Table 34 Hypothesis testing results

	Hypotheses	F^2	Path Coefficient(β)	T Statistic	P-Value	The result
H1a1	RG1 → ERFREQ	0.003	-0.062	14.031	0.000	Supported
H2a1	RG1 → OVERALL	0.005	0.068	18.016	0.000	Supported
H3a1	RG1 →PSC	0.005	-0.090	17.249	0.000	Supported
H1a2	RG2 → ERFREQ	0.003	0.054	12.575	0.000	Supported
H2a2	RG2 → OVERALL	0.008	-0.081	20.893	0.000	Supported
H3a2	RG2 →PSC	0.010	0.128	24.994	0.000	Supported
H1a3	RG3 → ERFREQ	0.003	0.056	13.237	0.000	Supported
H2a3	RG3 → OVERALL	0.003	-0.053	14.147	0.000	Supported
H3a3	RG3 →PSC	0.014	0.152	30.491	0.000	Supported
H1a4	RG4 → ERFREQ	0.002	0.054	12.694	0.000	Supported
H2a4	RG4 → OVERALL	0.003	-0.052	13.916	0.000	Supported
H3a4	RG4 → PSC	0.007	0.110	21.485	0.000	Supported
H1a5	RG5 → ERFREQ	0.004	0.063	15.188	0.000	Supported
H2a5	RG5 →OVERALL	0.005	-0.065	17.830	0.000	Supported
H3a5	RG5 →PSC	0.005	0.085	17.457	0.000	Supported
H1b	Teach →ERFREQ	0.000	0.008	2.312	0.021	Supported
H2b	Teach →OVERALL	0.000	0.004	1.587	0.112	Unsupported

	Hypotheses	F2	Path Coefficient(β)	T Statistic	P-Value	The result
H3b	Teach →PSC	0.003	-0.051	12.945	0.000	Supported
H4	PSC → ERFREQ	0.375	0.522	147.799	0.000	Supported
H5	PSC → OVERALL	0.903	0.698	262.460	0.000	Supported
H6	Staff Position → ERFREQ	0.006	0.066	19.462	0.000	Supported
H7	Staff Position → OVERALL	0.005	-0.052	17.851	0.000	Supported
H8	Staff Position → PSC	0.009	0.095	24.090	0.000	Supported
H9	OVERALL → ERFREQ	0.005	-0.079	14.877	0.000	Supported

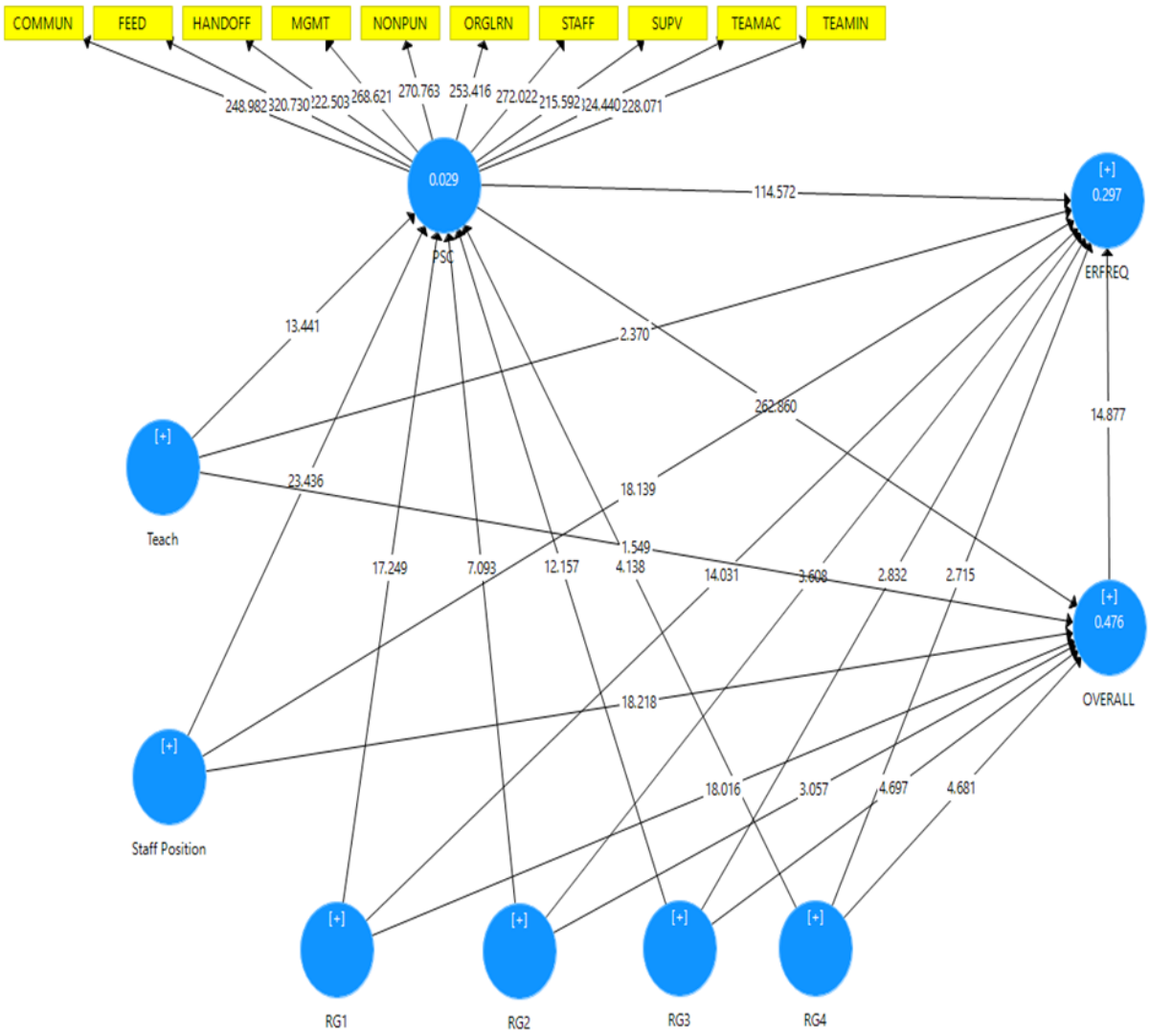

Figure 10 Structural Model with t-statistics

CHAPTER 5: CONCLUSION

The main objective of this research is to assess the patient safety culture in U.S. hospitals. The research has also examined the relationships between patient safety culture, Frequency of Event Reporting, Overall perceptions of patient safety and the effect of hospital and respondent characteristics. The discussion of the study outcomes, research implications, limitations, direction for future research and conclusions will be provided and elaborated on in subsequent sections.

5.1 Discussion

The overarching purpose of this research was to investigate the extent of the relationships between the perception of PSC, overall perception of patient safety and frequency on event reporting, hospital and respondent characteristics among staff and administration in U.S. hospitals. The results reveal four aspects that underline these relationships.

First, PSC is the shared value among organization members regarding the operations interaction with work unit and systems, which produce behavioral norms in the organization that promote safety (Singer et al., 2009). Patient safety culture as a second-order latent factor is conceptualized by ten main, first-order factors including organizational learning-continuous improvement, teamwork within hospital units, hospital management support for patient safety, nonpunitive response to error, staffing, supervisor/manager expectations and actions promoting safety, teamwork across hospital units, hospital handoffs and transitions, feedback and communication about error and communication openness.

The results in this study show that the perception of PSC has a positive influence on overall perception of patient safety ($\beta = 0.698$, $t = 262.460$, $p = 0.000$), and frequency of event reporting ($\beta = 0.522$, $t = 147.799$, $p = 0.000$). The strong correlations attest to PSC as a higher-order construct is valid and reliable for the model, where HOC has been used to reduce the number of path model relationships. A hospital with a positive PSC is open and fair with staff and learn from mistakes rather than blame individuals (Lee et al., 2016; Nieva & Sorra, 2003). PSC is associated with procedural efficiency, adequate staffing, managerial support for nurses and good relationships among staff (Olds et al., 2017). In general, successful hospitals and rapidly transparent health systems will be the ones that apply systematic solutions to enhance patient safety (Frankel et al., 2008). PSC has a significant impact on safety outcomes, including reporting frequency and overall perception of patient safety (Dicuccio, 2015; Park & Kim, 2013; Singer et al., 2009).

Next, as predicted, hospitals characteristics including regions and teaching status both have a significant influence on PSC, frequency of event reporting and overall perception of participants. As the results show, they significantly influence the PSC, ERFREQ and overall perceptions of participants. The staff in U.S. hospitals have high perception in the four of the five regions except staff in region one (Northeast of U.S.) who have the lowest perception of PSC ($\beta = -0.090$, $t = 17.249$, $p = 0.000$), and frequency of event reporting ($\beta = -0.062$, $t = 14.031$, $p = 0.000$). However, staff hospitals in the Northeast region have a higher perception of overall perceptions of patient safety than the other regions ($\beta = 0.068$, $t = 18.016$, $p = 0.000$). These variations in perception may occur because of the diversity of populations, culture, work

experience; therefore, each region should be investigated individually. Wagner (2013) found similar variations in patient safety culture between hospitals in the U.S. and hospitals in the Netherlands and Taiwan, while Eiras (2014) found differences in perceptions of PSC between hospitals in northern, central, and southern Portugal.

Furthermore, staff in teaching hospitals have higher perception of frequency of event reporting than non-teaching staff ($\beta = 0.008$, $t = 2.312$, $p = 0.021$), and lower perception of PSC than non-teaching ($\beta = -0.051$, $t = 12.945$, $p = 0.000$). However, teaching status do not have influence on staff perception about overall perceptions of patient safety ($\beta = 0.004$, $t = 1.587$, $p = 0.112$). These variations could appear regarding blaming culture, educational programs and their availability in health systems. Rather than blaming individuals, a hospital with a positive PSC is open and fair with staff and learns from it. Güneş et al. (2016) found no relationship between PSC and hospital type. However, Ammouri et al. (2015) found that nurses who were working in teaching hospitals had more perception of patient safety culture.

Third, the participants in the research have been divided into medical and non-medical to get a general understanding of perceiving PSC. The results revealed that medical staff has a higher perception of frequency of event reporting ($\beta = 0.066$, $t = 19.462$, $p = 0.000$), and PSC ($\beta = 0.095$, $t = 24.090$, $p = 0.000$) than non-medical staff but a lower perception of overall perceptions of patient safety ($\beta = -0.052$, $t = 17.851$, $p = 0.000$) than non-medical staff. This implies that hospital Administrators/Managers differ in their perception of the volume and efficacy of error reporting as it contributes to the hospital's safety culture. These findings are consistent with publications that suggest positive safety settings were related to increased

reporting of medication errors and professionals' willingness to advocate for patient safety (Dicuccio, 2015; Hansen et al., 2011; Mardon et al., 2010; J. Sorra et al., 2012).

Finally, overall perception of patient safety has a significant negative relationship with the frequency of event reporting ($\beta = -0.079$, $t = 14.877$, $p = 0.000$). Many reasons may lead to this negative relationship, such as self-reported surveys and blaming culture. Therefore, hospital executives must create cultures where employees learn from their mistakes, which may increase reporting errors. This finding is consistent with publications that found negative relationships between overall safety culture and outcomes for patient safety. For example, hospitals with positive patient safety culture scores had lower rates of in-hospital complications or AE (Mardon et al., 2010). Also, another study found that a higher level of safety culture was associated with a lower hospital-acquired pressure ulcer rate (Brown & Wolosin, 2013) and fewer medication or dislodgement errors (Valentin et al., 2013).

5.2 Study Implications

Findings support those significant differences exist between the perceptions of patient safety culture within U.S. hospitals. In addition, an understanding of the perception of the patient safety culture in the U.S. has a wide range of implications for organizational leadership, healthcare policy and educational systems that support future healthcare professionals.

This study discovered a significant gap between hospital executives' and frontline workers' perceptions. The safety culture within hospital settings could improve by strengthening relationships between these professional groups, thereby impacting the quality of care (DiCuccio, 2015).

The literature indicated a gap between frontline workers and administration/management. According to research, organizations with hierarchical managerial systems as their dominant culture have more negative safety cultures than those with more team-focused governance systems (Hannah et al., 2008; Prenestini et al., 2015). Risk-taking, innovation, self-awareness, and ingenuity are essential characteristics of excellent leadership (Burkhart et al., 2008). Hospital administrators and managers must better understand hospital settings and develop policies and care practices that support programs such as Team Strategies and Tools to Enhance Performance and Patient Safety (TeamSTEPPS®) to improve interprofessional practices in order for hospital safety cultures to improve. TeamSTEPPS® is a set of evidence-based teamwork tools designed to improve patient outcomes by optimizing interprofessional team functions (AHRQ, 2017).

According to Townsend (2007), a leader is who " "manifests vision, integrity, and courage in a consistent pattern of behavior that inspires trust, motivation and responsibility on the part of followers, who in turn become leaders themselves". Healthcare leaders must create environments that support effective care while also ensuring the safety of patients, employees, and visitors (The Joint Commission, 2008). Because certain possible channels may not be available, a hierarchical structure can reduce communication volume. The exchange of critical data necessary to improve the safety culture within care facilities is also hampered as the flow of patient care information is slowed (Hannah et al.,2008; Reason, 2000; Singer et al., 2009; The Joint Commission, 2008).

Reason's Swiss Cheese Model/Human Factor Model (1998) assists leaders in improving care outcomes by identifying latent factors that impede success. Given the disparity between frontline professionals and hospital leadership, it is necessary to alter how these two groups interact. Although it is difficult to change the human condition, organizations can change the conditions under which humans work (Reason, 1990). The emphasis in HROs is on minimizing variability and its consequences. In order to do so, hospital employees must be given the ability to speak up and report errors (Reason, 2000).

Leadership must promote just cultures that operate within cultures that value event reporting to create a culture that learns from its errors (Sorra and Nieva, 2004). Employees who work in a just culture are rewarded and encouraged to report errors in nonpunitive work environments with monetary incentives (Reason, 2000). Previous research has found that in punitive cultures where feedback about change is not addressed, hospital staff are hesitant to report an error (Alligood and Burhans, 2010; Sorra & Nieva, 2004; The Joint Commission, 2008). Hospitals have a habit of penalizing employees for minor incidents while failing to implement procedures for those responsible for serious errors (Chassin and Loeb, 2013).

For hospital cultures to improve, the practice of blaming individuals within the care environment must be abandoned (Landro, 2010; Feldman, 2018; Hicks et al., 2017). Hospital executives must succeed in creating cultures where employees learn from their mistakes, explaining why hospital employees lack trust (Chassin and Loeb, 2013). More research is needed to support leaders in developing nonpunitive learning environments that promote safety cultures.

Learning cultures in nonpunitive environments were linked to more AEs being reported. According to the literature, fear of retaliation has been found to deter error reporting and undermine the safety culture in hospitals around the world (The Joint Commission, 2008; Leape, 2009; World Health Organization, 2010).

The findings of this study back up the idea that event reporting will increase in nonpunitive cultures where individuals can learn from their mistakes and where communication within their units is open. In Higher reliability organizations (HROs), feeling safe to report an error in a nonpunitive work environment is essential. HROs were the first to recognize errors through effective communication and teamwork, allowing staff at all levels of care to make a contribution to the identification of factors that may contribute to patient harm (Page, 2004; Berwick et al., 2015). This research supports the need for continued efforts to improve communication between professional groups in nonpunitive care settings, using programs such as TeamSTEPPS®.

The World Health Organization and its partners recognize the need for innovative educational strategies in interprofessional collaboration (World Health Organization: Health Workforce, 2010). Healthcare leaders have demonstrated a willingness to contextualize, commit to, and champion interprofessional education by implementing new learning strategies that improve attitudes and interpersonal skills related to teamwork and collaboration (Parsell & Bligh, 1999; World Health Organization: Health workforce, 2010; Vandergoot et al., 2017;).

This research has implications for academic institutions in the U.S. According to this study, the disparities in perceptions of safety culture among medical and non-medical staff in

hospital settings highlighted the need for interprofessional education to prepare a "collaborative practiced ready" workforce (World Health Organization, 2010). The health workforce must be better prepared for collaborative practices to develop. Some of the flaws identified in this study could be addressed through educational programs that focus on improving collaborative practices while reducing punitive practices.

The World Health Organization (World Health Organization, 2010) and its partners recognize that innovative educational strategies are needed in interprofessional collaboration. Healthcare leaders carry a willingness to contextualize, commit and champion interprofessional education through new learning strategies that improve attitudes and interpersonal skills regarding teamwork and collaboration (Parsell and Bligh, 1999; Vandergoot et al., 2018; World Health Organization, 2010). Interprofessional learning occurs when "two or more professions learn with, from and about each other to improve collaboration and care quality" (Vandergoot et al., 2018; Goldman, 2011). Practitioners from various backgrounds who are trained to collaborate with patients, families, careers, and communities to provide excellent care are needed in the workforce (Reed et al., 2017; World Health Organization, 2010).

As a result, integrated health and education policies will encourage such effective educational practices and shape effective health worker culture and attitudes (World Health Organization, 2010). Evidence-based frameworks, including TeamSTEPPS®, have the potential to transform organizational cultures within medical and nursing academic institutions through Interprofessional Learning, increasing their understanding of their specific professional roles for

team-based care that can be applied in the practice setting (Reilly et al., 2014; Thomas & Galla, 2013; Reed et al., 2017).

5.3 Study Limitations

The study design included several limitations due to the inherent limitations of using secondary data. This was a cross-sectional study that provided a snapshot of safety culture perceptions (Hulley et al., 2013). This was a convenience sample of hospitals who chose to participate in the database on their own initiative (Hulley et al., 2013). According to AHRQ's requirements, only hospitals that independently administered the survey were included in the database.

Another limitation was the manner in which the surveys were conducted. There was no way to verify that each hospital followed AHRQ's data collection procedures because investigators overseeing survey distribution were not required to undergo any training. Although hospital officials were required to follow specific administrative guidelines, there was no way of ensuring compliance.

Moreover, the surveys were administered using various methods, which would be another limitation. Hospitals used paper surveys, Web-based surveys, and a combination of the two, resulting in a wide range of responses (Famolaro et al., 2018). Some hospitals conducted a general census, while others surveyed specific populations within the facility. The Agency for Healthcare Research and Quality required hospitals with fewer than 500 physicians and staff to conduct a census survey, and the methods used by each hospital are not publicly available (Famolaro et al., 2018). As a result, there is no way to tell if these data collection methods impacted the study's findings.

Another weakness is that the AHRQs 2018 database provided by Westat® may have been incomplete, inaccurate, or measured in ways that were not optimal for addressing the study's research goals. There were limitations to measuring and recording such important variables (Hulley et al., 2013). Westat® did provide a detailed description of the data cleaning procedures. Furthermore, this study was limited to hospitals in the U.S. and may not be applicable to healthcare systems in other countries. Because hospitals tend to be country-specific, public policymakers and markets may have different effects and influences in different countries.

The final limitation is the overall perception of patient safety and frequency of event reporting were only survey items. The overall perception of patient safety and frequency of event reporting were measured only based on the respondents' perception as an estimate of reporting rather than actual measures. In addition to the overall perception of patient safety and frequency of event reporting, the number of events reported was a survey item rather than a true measure.

5.4 Future Research

On a national level, this study investigated the relationships between PSC perception, the overall perception of patient safety, and frequency of event reporting, hospital and respondent characteristics among staff and administration in U.S. hospitals. This study revealed that the perception of PSC had a positive influence on the overall perception of patient safety and the frequency of event reporting. Furthermore, the findings revealed that hospital and respondent characteristics had varying effects on patient safety culture, the overall perception of patient safety, and the frequency of event reporting. Additional research is needed to determine the nuances surrounding this varying.

The location of hospitals has a significant influence on PSC, frequency of event reporting and overall perception of participants. As the results show, the staff in U.S. hospitals had high perceptions in four of the five regions. Only the staff in hospitals in the Northeast region had low perception of PSC ($\beta = -0.090$, $p = 0.000$) and ERFREQ ($\beta = -0.062$, $p = 0.000$). However, staff in the Northeast region had higher overall perceptions of patient safety ($\beta = 0.068$, $p = 0.000$) than the staff in other U.S. hospitals. The hospitals in the northeast of the U.S. need to be investigated to discover the differentiate of PSC and frequency of event reporting of the staff's perception than other regions.

There is a need for research to develop, implement, and test strategies to improve the safety culture in hospitals and specialty units. A combination of qualitative and quantitative designs would be used to investigate the many factors that underpin cultural values and the deeper social assumptions that underpin this study's descriptive findings (Sorra and Dyer, 2010; Vlayen et al., 2015). Even though many studies support evidence-based clinical practices that validate better quality care in controlled environments, translating these findings into practice has proven difficult due to the many variables that influence organizational culture and the multifactorial attributes (Woods et al., 2005; Burkhart et al., 2016). Secondary data analysis of objective data from safety culture questionnaires and electronic health records allows for the evaluation of quality indicators over time and identifying the impact that innovations may have, regardless of organizational or patient-related variables.(Burkhart et al., 2016; Larrison et al., 2018).

Qualitative approaches involving observations, focus groups, and interviews should be initiated in addition to quantitative studies (Leonard et al., 2012; Burkhart and Vlasses, 2017). Burkhart and Vlasses (2017) evaluated nurse-led, patient-centered, interprofessional teams that collaborated to understand the

needs of a previously underserved population. The photovoice method was used in this qualitative participatory action research (PAR), which revealed deeper values and challenges of patient participants and congruence between patient and provider perspectives. The PAR that assesses professionals' perspectives on practice environments and how hospital leadership supports their efforts would add to the body of knowledge in safety culture and healthcare system redesign (Burkhart & Vlasses, 2017).

Due to the high risks and the effect of Covid-19, there are inherent stressors in a hospital setting. Long work hours, intense physical and psychological activities and routines, coordinating with various hospital staff, and serving as guardians of patients during treatment are all part of the job description in hospitals. The numerous tasks can exacerbate the stress level. Nonetheless, the impact of various types of job-related stress on employee perceptions of patient safety culture is unknown. As a result, the impact of work-related stress (e.g., stress from interpersonal relationships, nurse-patient relationships, work environment, and workload) must be investigated.

5.5 Conclusion

Patient safety is based on continuous learning because there is a significant need to report and learn from errors, accidents, near misses, and adverse events in order to prevent them in the future. As the healthcare system becomes complex, the traditional approach to patient safety, which is based on establishing mortality committees and scrutinizing accidents, can no longer be effective. Major health organizations such as the World Health Organization (WHO), the National Patient Safety Foundation (NPSF), the Joint Commission International (JCI), and the

Institute for Health Care Improvement (IHI) are encouraged healthcare organizations to adopt a safety culture as an effective strategy for long-term improvement (Elmontsri et al. 2017).

A growing body of evidence revealed that the rate of medical errors and adverse events are linked to healthcare professionals' attitudes toward safety. In this regard, patient safety culture, which is considered a component of organizational culture, refers to employees' shared beliefs, attitudes, values, norms, and behavioral characteristics, which will influence staff members' attitudes and behaviors regarding their organization's ongoing organization patient safety performance. Over the last decade, frameworks, surveys, and assessment tools have been developed to help organizations measure and understand what type of culture they have and identify areas of strength and gaps so that factors that could help or hinder improvement efforts can be identified.

The present research evaluated patient safety culture in U.S. hospitals and investigated the effect of hospital and respondents' characteristics on perceiving patient safety culture. A total of 67,010 respondents from the Agency for Health care Research and Quality (AHRQ) 2018 comparative database was analyzed using partial least squares structural equation modeling (PLS-SEM). The results in this study showed that the perception of PSC positively influenced the overall perception of patient safety and frequency of event reporting. Moreover, the results revealed that hospital and respondents' characteristics which included the (Staff Position, Teaching Status and Geographic Region), had varying influenceS on patient safety culture, on the overall perception of patient safety and frequency of event reporting.

To establish hospital safety cultures in the United States, all levels of the care team must understand and work within common ethical frameworks to ensure that the best care is provided consistently to all people at all levels of care. This research can inform initiatives to guide nursing and interprofessional education, practice, policy, and research toward the goal of improving healthcare by identifying gaps in hospital safety culture.

APPENDIX A: HOSPITAL SURVEY ON PATIENT SAFETY CULTURE (HSPSC) DIMENSIONS AND ITEMS/QUESTIONS

Dimensions	HSPSC Items/Questions
Organizational Learning-Continuous Improvement	We are actively improving patient safety Mistakes have led to positive changes here After we make changes to improve patient safety, we evaluate their effectiveness
Teamwork Within Hospital Units	People support one another in this unit When a lot of work needs to be done quickly, we work together as a team to get the work done In this unit, people treat each other with respect When one area in the unit gets busy, others help out
Hospital Management Support for Patient Safety	Hospital management provides a work climate that promotes patient safety The actions of hospital management show that patient safety is a top priority Hospital management seems interested in patient safety only after an adverse event happens (R)
Nonpunitive Response to Error	Staff feel their mistakes are held against them (R) When an event is reported, it feels like the person is being written up, not the problem (R) Staff worry that mistakes they make are kept in their personnel file (R)
Staffing	We have enough staff to handle the workload Staff in this unit work longer hours than is best for patient care (R) We use more agency/temporary staff than is best for patient care (R) We work in "crisis mode" trying to do too much, too quickly (R)
Supervisor/Manager Expectations and Actions Promoting Safety	My supervisor/manager says a good word when he/she sees a job done according to established patient safety procedures My supervisor/manager seriously considers staff suggestions for improving patient safety Whenever pressure builds up, my supervisor/manager wants us to work faster, even if it means taking shortcuts (R) My supervisor/manager overlooks patient safety problems that happen over and over (R)
Teamwork Across Hospital Units	Hospital units don’t coordinate with each other (R)

	There is good cooperation among hospital units that need to work together (R) It is often unpleasant to work with staff from other hospital units Hospital units work well together to provide the best care for patients (R)
Hospital Handoffs and Transitions	Things "fall between the cracks" when transferring patients from one unit to another (R) Important patient care information is often lost during shift changes (R) Problems often occur in the exchange of information across hospital units (R) Shift changes are problematic for patients in this hospital (R)
Feedback and Communication About Error	We are given feedback about changes put into place based on event reports We are informed about errors that happen in this unit In this unit, we discuss ways to prevent errors from happening again
Communication Openness	Staff will freely speak up if they see something that may negatively affect patient care Staff feel free to question the decisions or actions of those with more authority Staff are afraid to ask questions when something does not seem right (R)
Frequency of Event Reporting	How often is a mistake reported that was corrected before affecting patients? 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?
Overall Perceptions of Safety	It is just by chance that more serious mistakes don't happen around here (R) Patient safety isn't sacrificed for productivity We have patient safety problems in this unit (R) Our procedures and systems prevent errors

(R) denotes reverse coding; (Sorra & Nieva, 2004; Blegen et al.,2009)

APPENDIX B: HOSPITAL SURVEY ON PATIENT SAFETY CULTURE: SAMPLE SURVEY

Hospital Survey on Patient Safety

Instructions

This survey asks for your opinions about patient safety issues, medical error, and event reporting in your hospital and will take about 10 to 15 minutes to complete.

If you do not wish to answer a question, or if a question does not apply to you, you may leave your answer blank.

- *An "event" is defined as any type of error, mistake, incident, accident, or deviation, regardless of whether or not it results in patient harm.*
- ***"Patient safety"** is defined as the avoidance and prevention of patient injuries or adverse events resulting from the processes of health care delivery.*

SECTION A: Your Work Area/Unit

In this survey, think of your "unit" as the work area, department, or clinical area of the hospital where you spend *most* of your work time or provide *most* of your clinical services.

What is your primary work area or unit in this hospital? Select ONE answer.

- ☐ a. Many different hospital units/No specific unit
- ☐ b. Medicine (non-surgical)
- ☐ c. Surgery
- ☐ d. Obstetrics
- ☐ e. Pediatrics
- ☐ f. Emergency department
- ☐ g. Intensive care unit (any type)
- ☐ h. Psychiatry/mental health
- ☐ i. Rehabilitation
- ☐ j. Pharmacy
- ☐ k. Laboratory
- ☐ l. Radiology
- ☐ m. Anesthesiology
- ☐ n. Other, please specify: _____

Please indicate your agreement or disagreement with the following statements about your work area/unit.

Think about your hospital work area/unit...	Strongly Disagree	Disagree	Neither	Agree	Strongly Agree
1. People support one another in this unit	☐1	☐2	☐3	☐4	☐5
2. We have enough staff to handle the workload	☐1	☐2	☐3	☐4	☐5
3. When a lot of work needs to be done quickly, we work together as a team to get the work done	☐1	☐2	☐3	☐4	☐5
4. In this unit, people treat each other with respect	☐1	☐2	☐3	☐4	☐5
5. Staff in this unit work longer hours than is best for patient care	☐1	☐2	☐3	☐4	☐5

SECTION A: Your Work Area/Unit (continued)

Think about your hospital work area/unit...	Strongly Disagree ▼	Disagree ▼	Neither ▼	Agree ▼	Strongly Agree ▼
6. We are actively doing things to improve patient safety	☐1	☐2	☐3	☐4	☐5
7. We use more agency/temporary staff than is best for patient care	☐1	☐2	☐3	☐4	☐5
8. Staff feel like their mistakes are held against them	☐1	☐2	☐3	☐4	☐5
9. Mistakes have led to positive changes here	☐1	☐2	☐3	☐4	☐5
10. It is just by chance that more serious mistakes don't happen around here	☐1	☐2	☐3	☐4	☐5
11. When one area in this unit gets really busy, others help out	☐1	☐2	☐3	☐4	☐5
12. When an event is reported, it feels like the person is being written up, not the problem	☐1	☐2	☐3	☐4	☐5
13. After we make changes to improve patient safety, we evaluate their effectiveness	☐1	☐2	☐3	☐4	☐5
14. We work in "crisis mode" trying to do too much, too quickly	☐1	☐2	☐3	☐4	☐5
15. Patient safety is never sacrificed to get more work done	☐1	☐2	☐3	☐4	☐5
16. Staff worry that mistakes they make are kept in their personnel file	☐1	☐2	☐3	☐4	☐5
17. We have patient safety problems in this unit	☐1	☐2	☐3	☐4	☐5
18. Our procedures and systems are good at preventing errors from happening	☐1	☐2	☐3	☐4	☐5

SECTION B: Your Supervisor/Manager

Please indicate your agreement or disagreement with the following statements about your immediate supervisor/manager or person to whom you directly report.

	Strongly Disagree ▼	Disagree ▼	Neither ▼	Agree ▼	Strongly Agree ▼
1. My supervisor/manager says a good word when he/she sees a job done according to established patient safety procedures	☐1	☐2	☐3	☐4	☐5
2. My supervisor/manager seriously considers staff suggestions for improving patient safety	☐1	☐2	☐3	☐4	☐5
3. Whenever pressure builds up, my supervisor/manager wants us to work faster, even if it means taking shortcuts	☐1	☐2	☐3	☐4	☐5
4. My supervisor/manager overlooks patient safety problems that happen over and over	☐1	☐2	☐3	☐4	☐5

SECTION C: Communications

How often do the following things happen in your work area/unit?

Think about your hospital work area/unit...	Never	Rarely	Some-times	Most of the time	Always
1. We are given feedback about changes put into place based on event reports	☐1	☐2	☐3	☐4	☐5
2. Staff will freely speak up if they see something that may negatively affect patient care	☐1	☐2	☐3	☐4	☐5
3. We are informed about errors that happen in this unit	☐1	☐2	☐3	☐4	☐5
4. Staff feel free to question the decisions or actions of those with more authority	☐1	☐2	☐3	☐4	☐5
5. In this unit, we discuss ways to prevent errors from happening again	☐1	☐2	☐3	☐4	☐5
6. Staff are afraid to ask questions when something does not seem right	☐1	☐2	☐3	☐4	☐5

SECTION D: Frequency of Events Reported

In your hospital work area/unit, when the following mistakes happen, *how often are they reported?*

	Never	Rarely	Some-times	Most of the time	Always
1. When a mistake is made, but is *caught and corrected before affecting the patient*, how often is this reported?	☐1	☐2	☐3	☐4	☐5
2. When a mistake is made, but has *no potential to harm the patient*, how often is this reported?	☐1	☐2	☐3	☐4	☐5
3. When a mistake is made that *could harm the patient*, but does not, how often is this reported?	☐1	☐2	☐3	☐4	☐5

SECTION E: Patient Safety Grade

Please give your work area/unit in this hospital an overall grade on patient safety.

☐	☐	☐	☐	☐
A	B	C	D	E
Excellent	Very Good	Acceptable	Poor	Failing

SECTION F: Your Hospital

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

Think about your hospital...	Strongly Disagree	Disagree	Neither	Agree	Strongly Agree
1. Hospital management provides a work climate that promotes patient safety	☐1	☐2	☐3	☐4	☐5
2. Hospital units do not coordinate well with each other	☐1	☐2	☐3	☐4	☐5
3. Things "fall between the cracks" when transferring patients from one unit to another	☐1	☐2	☐3	☐4	☐5
4. There is good cooperation among hospital units that need to work together	☐1	☐2	☐3	☐4	☐5

SECTION F: Your Hospital (continued)

Think about your hospital...	Strongly Disagree	Disagree	Neither	Agree	Strongly Agree
5. Important patient care information is often lost during shift changes	☐1	☐2	☐3	☐4	☐5
6. It is often unpleasant to work with staff from other hospital units	☐1	☐2	☐3	☐4	☐5
7. Problems often occur in the exchange of information across hospital units	☐1	☐2	☐3	☐4	☐5
8. The actions of hospital management show that patient safety is a top priority	☐1	☐2	☐3	☐4	☐5
9. Hospital management seems interested in patient safety only after an adverse event happens	☐1	☐2	☐3	☐4	☐5
10. Hospital units work well together to provide the best care for patients	☐1	☐2	☐3	☐4	☐5
11. Shift changes are problematic for patients in this hospital	☐1	☐2	☐3	☐4	☐5

SECTION G: Number of Events Reported

In the past 12 months, how many event reports have you filled out and submitted?

- ☐ a. No event reports
- ☐ b. 1 to 2 event reports
- ☐ c. 3 to 5 event reports
- ☐ d. 6 to 10 event reports
- ☐ e. 11 to 20 event reports
- ☐ f. 21 event reports or more

SECTION H: Background Information

This information will help in the analysis of the survey results.

1. **How long have you worked in this hospital?**
   - ☐ a. Less than 1 year
   - ☐ b. 1 to 5 years
   - ☐ c. 6 to 10 years
   - ☐ d. 11 to 15 years
   - ☐ e. 16 to 20 years
   - ☐ f. 21 years or more

2. **How long have you worked in your current hospital work area/unit?**
   - ☐ a. Less than 1 year
   - ☐ b. 1 to 5 years
   - ☐ c. 6 to 10 years
   - ☐ d. 11 to 15 years
   - ☐ e. 16 to 20 years
   - ☐ f. 21 years or more

3. **Typically, how many hours per week do you work in this hospital?**
   - ☐ a. Less than 20 hours per week
   - ☐ b. 20 to 39 hours per week
   - ☐ c. 40 to 59 hours per week
   - ☐ d. 60 to 79 hours per week
   - ☐ e. 80 to 99 hours per week
   - ☐ f. 100 hours per week or more

SECTION H: Background Information (continued)

4. What is your staff position in this hospital? Select ONE answer that best describes your staff position.

- ☐ a. Registered Nurse
- ☐ b. Physician Assistant/Nurse Practitioner
- ☐ c. LVN/LPN
- ☐ d. Patient Care Asst/Hospital Aide/Care Partner
- ☐ e. Attending/Staff Physician
- ☐ f. Resident Physician/Physician in Training
- ☐ g. Pharmacist
- ☐ h. Dietician
- ☐ i. Unit Assistant/Clerk/Secretary
- ☐ j. Respiratory Therapist
- ☐ k. Physical, Occupational, or Speech Therapist
- ☐ l. Technician (e.g., EKG, Lab, Radiology)
- ☐ m. Administration/Management
- ☐ n. Other, please specify.

5. In your staff position, do you typically have direct interaction or contact with patients?

- ☐ a. YES, I typically have direct interaction or contact with patients.
- ☐ b. NO, I typically do NOT have direct interaction or contact with patients.

6. How long have you worked in your current specialty or profession?

- ☐ a. Less than 1 year
- ☐ b. 1 to 5 years
- ☐ c. 6 to 10 years
- ☐ d. 11 to 15 years
- ☐ e. 16 to 20 years
- ☐ f. 21 years or more

SECTION I: Your Comments

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

THANK YOU FOR COMPLETING THIS SURVEY.

APPENDIX C: ARTICLES INCLUDED IN THE LITERATURE REVIEW

Articles included in the literature review

Instrument/Country/Reference	Aim(s)	Strength(s)	Limitation(s)	Finding(s)	Quality Score
HSPSC, Saudi Arabia, (Alshammari et al., 2019)	Investigate the perceptions of healthcare professionals toward PSC in hospitals throughout the Hail region	• Variety of healthcare professionals (nurses, physicians, and administrators/managers) considered for collecting data. • Response rate among participants was 99.22%	Only four hospitals considered for data collection.	• Healthcare professionals have a positive perception of patient safety. • Organizational learning was the strongest area in PSC. • Professionals with a greater number of employment years were more willing to communicate. • Among respondents, 63.53% stated that they had never reported a case of patient safety. • The low rate of reported cases was attributed to fear of the cases being recorded in the respondent's file.	32
HSPSC, Saudi Arabia, (Aljabri, 2012)	Identify general strengths and recognize areas of patient safety improvements	• Variety of clinical and medical staff (physicians, nurses, technicians, pharmacists, and others) considered.	Response rate among participants was 61%. Only two general hospitals considered	• Organizational learning/continuous improvement and teamwork within units received positive outcomes at 79% and 77%, respectively. • Non-punitive responses to errors and staffing had low positive response rates at 22% and 31%, respectively, representing areas for improvement. • The overall percentage of positive responses among dimensions of patient safety was 58%.	27
HSPSC, Turkey, (Güneş et al., 2016)	Explore and describe nurses' perceptions of PSC	• Response rate among participants 74%. • HSPSC Turkish version used.	Only nurses in four hospitals (one university hospital and three general hospitals), and nurses consiered for collecting data	• The mean positive response rate for the 12 PSC dimensions of the HSPSC survey was 52%. • Within units and organizational learning/continuous improvement were reported. • Non-punitive responses to errors and frequency of event reporting were areas for improvement. • Nurses who had worked for more than 10 years in their profession showed significantly higher PSC scores in all dimensions. • Nurses working in ICUs had higher scores than those working in other units in all patient safety dimensions. • 50.2% of the nurses rated the level of patient safety as good or excellent. • Among nurses, 80.4% indicated that they had never reported an error. • The overall perception of patient safety was 51%.	27
HSPSC, Egypt, (Abdelhai et al., 2012)	Assess PSC perceptions among healthcare providers and identify factors that may critically affect PSC	• Variety of healthcare professionals (doctors, nurses, and technicians) considered • HSPSC Arabic version used.	No response rate reported	• An average of 52% was attained for positive responses for the 12 PSC dimensions of the HSPSC survey. • Non-punitive responses to errors had 24.2% while frequency of event reporting and staffing were 28.4% and 38.4%, respectively. • Poor teamwork across units was identified as having a low response of 48.8%. • Areas for improvement included organizational learning, handoffs and transitions, communication, and support from management. • Patients started reporting errors after being educated, demonstrating the accusatory culture.	27
HSPSC, Saudi Arabia, (Aboshaiqah and Baker, 2013)	Identify factors that nurses perceive as contributing to the PSC	• Response rate was 83%.	Only Nurses in one Tertiary care hospital considered for collecting data.	• Continuous organization learning and management support formed the best areas for the support of patient safety. • Other variables such as reporting errors, staffing, and communication required improvement for better patient safety. • Respondent variables such as gender, level of education, age, years of experience, length of shifts, and Arabic versus non-Arabic language created a variance in patient safety consideration. • Among the nurses interviewed, patient safety was rated as good or excellent.	28
HSPSC, Egypt, (Aboul-Fotouh et al., 2012)	Assess healthcare providers' perceptions of PSC within the organization and determine factors that play a role in PSC	• Variety of healthcare professionals (physicians, nurses, pharmacists, technicians, and staff) considered.		• Dimensions with the highest scores included continuous learning and teamwork, reported at 78.2% and 58.1%, respectively. • Non-punitive responses to errors had the lowest score of 19.5%, representing a dimension that requires improvement.	29

		• Response rate was 69.1% HSPSC Arabic version used.		• Adverse event reporting and recording was reported at 33.4%. • The hospital is a training institution, exhibiting a bias for continuous learning and low error reporting, as errors are recorded in files.	
HSPSC, Iran, **(Moussavi et al., 2013)**	Assess the PSC at Islamic Azad University hospitals	• Variety of clinical and diagnostic staff (physicians, nurses, midwives, assistants, staff, and radiologists) considered. • Response rate was 87.5%. HSPSC Persian version used.		• Teamwork within units scored 48% while non-punitive error responses scored 12%. • Areas identified for improvement included staffing and non-punitive responses to errors. • Among respondents, 35% had a positive view of patient safety.	24
HSPSC, Palestine, **(Hamdan and Saleem, 2013)**	Assess the prevalent PSC in Palestinian public hospitals	• Variety of clinical and non-clinical hospital staff (physicians, nurses, paramedical and support services, hospital managers, and supervisors) considered. HSPSC Arabic version used.	Response rate was 51.2%	• Dimensions with the highest scores were teamwork within units, organizational learning/continuous improvement, and supervisor/manager expectations and actions promoting patient safety at 71%, 62%, and 56%, respectively. • Non-punitive response to errors, frequency of reporting, communication, management support, and staffing had low scores at 17%, 35%, 36%, 37%, and 38%, respectively. • Among respondents, 53.2% had not reported any errors in the past year. • General patient safety was ranked as excellent or very good by 63.5% of the respondents.	25
HSPSC, Saudi Arabia, **(Alahmadi, 2010)**	Evaluate the extent to which the culture supports patient safety at Saudi hospitals	• Variety of health professionals (nurses; physicians/physicians in training; pharmacists; dieticians; unit assistants/clerks/secretaries; respiratory therapists; physical, occupational, or speech therapists; technicians [lab, radiology] administration/management) in 13 general hospitals (9 public and 4 private) considered.		• General patient safety was rated as very good by 60%, acceptable by 33%, and poor by 7% of the respondents. • Composites that showed strength included continuous improvement, feedback, teamwork within units, and feedback and communication about errors. • Staffing, under-reporting of errors, non-punitive response to errors, and teamwork across hospital units had low scores.	31
HSPSC, Saudi Arabia, **(El-Sayed Desouky et al., 2019)**	Evaluate the PSC in Saudi hospitals and improve patient safety and quality of care by implementing safety systems and creating a culture of safety	• Variety of hospital workers (physicians; nurses; pharmacists; dieticians; unit assistants/clerks/secretaries; respiratory therapists; physical, occupational, and speech therapists; technicians [e.g.,lab, radiology], administration/management) considered	Only one Tertiary hospital considered	• Feedback and communication about errors had high scores, ranging from 40.7%–71.3%. • Leadership, communication openness, error reporting, and teamwork across units represented areas requiring improvement.	25
HSPSC, Kuwait, **(Ali et al., 2018)**	Examine the association between the predictors and outcomes of PSC	• Variety of employees (physicians, nurses, pharmacy and laboratory staff, dietary and radiology staff, supervisors, and hospital managers) in 16 public hospitals considered	Response rate was 60.5%	• Continuous improvement, teamwork within units, management support for patient safety, feedback and communication about errors, and supervisor/manager expectations and actions promoting patient safety were highly scored among the respondents. • General perception of patient safety was scored at 60.6% while frequency of events reported was scored at 59.0%.	33
HSPSC, Saudi Arabia, **(Al-Awa et al., 2012)**	Perform an unbiased assessment of the impact of accreditation on PSC	• Response rate was 69.5%. • HSPSC Arabic version used	Only nurses in one university hospital considered for collecting data	• A score of 45% was recorded for overall perceptions of patient safety. • The frequency of reporting events was 57%.	30
HSPSC, Saudi Arabia, **(Alswat et al., 2017)**	Reassess PSC in a large multi-site healthcare facility in Riyadh, Kingdom of Saudi Arabia, and compare it with an earlier assessment conducted in 2012, benchmarked against regional and international studies	• Variety of health professionals (physicians, registered nurses, other clinical or non-clinical staff, pharmacists, laboratory technicians, dietary department staff, radiologists, and administrative staff such as managers and supervisors) considered. • The results compared with U.S.	Only one Tertiary care teaching hospital considered. Response rate was 56.7%	• Teamwork within units and organizational learning/continuous improvement were strong areas while staffing and non-punitive responses to errors required improvement. • A high level of correlation was observed among feedback, managerial support, organizational learning, and improved patient safety. • Improvements in dimensions of patient safety from 2012 to 2015 indicated an improvement in performance. • Overall perceptions of patient safety were reported at 59.5%. • The frequency of reporting events was 68.8%.	33

HSPSC, Iran, (Bahrami et al., 2014)	Assess the safety culture in two educational hospitals	• Response rate was 88.8%. • HSPSC Persian version used.	Only nurses in two teaching hospitals considered	• Non-punitive response to errors, frequency of events reported, and staffing had the lowest positive scores of patient safety dimensions. • Among nurses from Afshar and Firoozgar Hospitals, 29% reported positive perceptions of patient safety.	29
HSPSC, Jordan, (Khater et al., 2015)	Assess PSC in Jordanian hospitals from nurses' perspectives	• Response rate was 82.2%. • 21 hospitals (2 university hospitals, 4 private hospitals, and 15 governmental hospitals) considered. • HSPSC Arabic version used.	Only nurses considered	• A high positive response was reported for teamwork within units while teamwork across units, handoffs and transitions, communication openness, and non-punitive response to errors needed improvement. • Nurses in government hospitals had lower perceptions of patient safety compared with nurses in university hospitals. • Overall perceptions of patient safety were reported at 60.07%. • Frequency of events reported was 69.15%.	34
SAQ, Palestine, (Elsous et al., 2017)	Assess the perception of nurses regarding PSC and determine whether it is significantly affected by the nurses' position, age, experience, and working hours	• Response rate was 91.9%. • SAQ Arabic version used	Only nurses in four public general hospitals considered	• Job satisfaction and perception of management were the top variables affecting patient safety. • Variables such as age, nursing position, working hours, and work experience created a variance in PSC perception. • Front-line clinicians had a less positive attitude towards patients when compared with nurse managers. • The longer the working experience, the higher the likelihood of having a positive attitude towards patient safety • Nurses who worked the minimum weekly hours and who were 35 years or older had better attitudes towards all patient safety dimensions except for stress recognition.	33
HSPSC, Oman, (Ammouri et al., 2015)	Investigate nurses' perceptions of PSC and identify the factors needed to develop and maintain a culture of safety among nurses	•	Only nurses in four governmental hospitals considered. No Response rate reported.	• Feedback and communication about errors, continuous learning, and teamwork within units received high positive scores. • Staffing, non-punitive response to errors, and management support attained low positive scores among the respondents. • An increased number of years of experience combined with working in a teaching hospital increased the perception of PSC. • The rate of positive perceptions of safety was 50.7% among respondents. • Frequency of events reported stood at 58.8%.	33
HSPSC, Oman, (Al-Mandhari et al., 2014)	Illustrate the PSC in Oman and compare the average positive response rates in PSC between Oman and the U.S., Taiwan, and Lebanon	• Variety of health professionals (nurses, physicians, technicians, pharmacists, physiotherapists, and dieticians) considered. • The results compared with U.S., Taiwan, and Lebanon	Only five secondary and tertiary care hospitals considered. No Response rate reported.	• Organizational learning/continuous improvement had the highest positive score. • Non-punitive response to errors was poorly rated among respondents. • Response rates in Oman, Taiwan, the U.S., and Lebanon were similar. • The overall average positive response rate was 58%. • Overall perception of patient safety was 53%. • Frequency of event reporting was 65%.	33
HSPSC, Iran, (Davoodi et al., 2013)	Estimate the relation between PSC and three characteristics of teaching hospitals (number of beds, education condition, and proficiency status)	• Variety of staff (nurses, physicians, laboratory staff, radiology staff, midwives, operation room staff, and general managers without any specialty in therapeutic procedures) in 25 hospitals (11 teaching hospitals and 14 non-teaching hospitals) considered. • Response rate was 76.8%		• Highly scored dimensions included teamwork within units and organizational learning/continuous improvement. • Non-punitive response to errors and staffing were the lowest positively scored dimensions. • Overall perception of safety was 56.56%. • Frequency of events reported was 42.85%.	29
HSPSC, Iran, (Bahrami et al., 2013)	Assess nurses' perceptions of PSC in these hospitals	• Response rate was 83.7%	Only nurses in two teaching hospitals considered	• Organizational learning/continuous improvement had the highest positive score. • Frequency of events reported, staffing, and non-punitive response to errors had the lowest scores of PSC dimensions. • Overall perceptions of safety were 66.22% for the Afshar hospital and 59.5% for the Firouzgar hospital • The frequency of events reported was 34.90% for the Afshar hospital and 50.17% for the Firouzgar hospital.	21

HSPSC, Saudi Arabia, **(El-Jardali et al., 2014)**	Present findings of a baseline assessment of PSC, compare results with regional and international studies, and explore the association between PSC predictors and outcomes, considering respondent characteristics and facility size	• Variety of staff (physicians, nurses, clinical and non-clinical staff, pharmacy and laboratory staff, dietary and radiology staff, supervisors, and hospital managers) considered. • Response rate 85.7% reported. • The results compared with other studies using HSPSC Arabic version	Only one tertiary care university teaching hospital considered	• Teamwork within units and organizational learning/continuous improvement had high positive responses. • Staffing, non-punitive response to errors, and communication openness required improvement. • A high correlation was indicated between smaller facilities, events reported, and patient safety levels. • Overall perception of safety was 65.3%. • Frequency of events reported was 59.4%.	34
HSPSC, Turkey, **(Top and Tekingündüz, 2015)**	Investigate nurses' perceptions of PSC	• HSPSC Turkish version used.	Only nurses in one public hospital considered for collecting data	• High positive scores for hospital management support and manager/supervisor expectations and actions supported an increase in patient safety. • Frequency of event reporting for medical errors had the lowest positive score. • Organizational learning/continuous improvement, hospital management support for patient safety, teamwork within units, and supervisor/manager received high positive scores. • Hospital handoffs and transitions, non-punitive response to errors, frequency of events reported, and communication openness were poorly rated. • Overall perception of safety was 61%. • Frequency of events reported was 40%.	30
HSPSC, Iran, **(Kiaei et al., 2016)**	Evaluate the current status of PSC among hospitals in three central Iran provinces	• Variety of staff (doctors, nurses, administrative staff, and paramedics) in the teaching hospitals considered for collecting data.	No Response rate reported	• Organizational learning was reported as the strongest dimension. • Handoffs and transitions had the lowest score. • Overall perception of safety was 62.93%. • Frequency of event reporting was 55.63%.	21
HSPSC, Turkey, **(Ugurluoglu et al., 2012)**	Assess health personnel perspectives of PSC in a 900-bed university hospital in Ankara, Turkey	• Variety of health professionals (doctors, nurses, technicians, secretaries, and other health personnel) considered • Using HSPSC Turkish version.	Only one university hospital considered. Response rate was 43%	• Teamwork within units had the highest positive feedback. • Frequency of events reported had the lowest average. • Women nurses formed the majority of respondents, with five years or less in terms of work experience in their respective hospital. • Overall perception of patient safety was 55%. • Frequency of events reported was 25%.	21
HSPSC, Lebanon, **(El-Jardali et al., 2010)**	Conduct a baseline assessment of PSC in Lebanese hospitals	• 12,250 staff (physicians, nurses, clinical and non-clinical staff, and others) in 68 hospitals considered. • The results compared with U.S. • HSPSC Arabic version used.	Response rate was 55.56%	• Organizational learning/continuous improvement, hospital management support for patient safety, and teamwork within units were the strongest areas. • Non-punitive response to errors and staffing received low feedback. • Small hospitals and accredited hospitals received higher scores on several composites. • Overall perception of safety was 72.5%. • Frequency of events reported was 67.9%.	31
HSPSC, Japan and Taiwan, **(Wu et al., 2013)**	Clarify the impact of long nurse working hours on PSC in Japan, the U.S., and Chinese Taiwan using HSPSC	• 14 hospitals in Japan, 884 hospitals in the U.S., 74 hospitals in Taiwan (acute care hospitals) considered. • The results compared with U.S.	Only nurses considered for collecting data. Response rate was Japan = 4047 (58.1%) U.S. = 106,710 (37.0%) Taiwan = 5714 (56.3%)	• Patient safety levels declined and number of events reported increased as working hours increased • Among the 12 sub-dimensions of PSC, teamwork within units and staffing received poor ratings	29
HSPSC, Japan and Taiwan, **(Fujita et al., 2013)**	Investigate the characteristics of PSC in Japan, Taiwan, and the U.S.	• Variety of health professionals (nurses; patient care assistants/hospital aides/care partners; physicians; pharmacists; dieticians; unit assistants/clerks/secretaries; respiratory therapists; physical, occupational, or speech therapists; technicians (EKG, lab, radiology); administration/management) in 14 hospitals in Japan, 884 hospitals in the U.S., 74 hospitals in Taiwan (acute care hospitals)	Response rate in U.S. = 35.2%	• The U.S. had the highest overall positive perception of patient safety grade. • Continuous improvement in Japan and the reporting of near-miss events in Taiwan received low scores compared with the other countries. • Overall perceptions of patient safety in Japan, the U.S., and Taiwan were 53%, 63%, and 52%, respectively. • Frequency of events reported in Japan, the U.S., and Taiwan was 68%, 61%, and 33%, respectively.	30

		• The results compared with U.S.			
SAQ, India, **(Chakravarty et al., 2015)**	Explore composite patient safety climate, assess various dimensions of patient safety climate in three hospitals, and identify future directions for developing a strong safety climate	• Variety of health professionals (clinicians, postgraduates, residents, nurses, and paramedical workers) considered. • Response rate was 100%	Only three tertiary care hospitals considered	• The study hospitals did not have disparities in the patient safety index score. • Different categories of medical workers reported different levels for the perception of management and stress recognition and teamwork. • A high correlation exists for perception of management and teamwork with the patient safety index score.	28
HSPSC, Sweden, **(Danielsson et al., 2017)**	Investigate the PSC in all Swedish hospitals; compare the culture among managers, physicians, registered nurses, and enrolled nurses; and identify factors associated with high overall patient safety	• Variety of staff (managers, registered nurses, enrolled nurses, and physicians) considered	Only three work areas: general wards, emergency care, and psychiatry care considered. Response rate was 47.4%	• Teamwork within units had the most positive feedback. • Management support for patient safety received the lowest score. • Managers had the highest score for patient safety. • Registered nurses had the lowest score for patient safety. • Emergency care units showed more patient safety than general wards. • Overall perception of patient safety was 58%. • Frequency of events reported was 54.4%.	30
HSPSC, Netherlands, **(Wagner et al., 2013)**	Examine similarities and differences in hospital PSC in three countries: the Netherlands, the U.S., and Taiwan	• Variety of staff (nursing staff, medical staff, management and administrative staff, other) in 45 hospitals in the Netherlands, 622 in the U.S., and 74 in Taiwan (non-teaching and teaching hospitals) considered. • Comparing the results with U.S., and Taiwan	U.S. Response rate was 52%	• Handoffs and transitions required improvement in all three countries. • Respondents in U.S. hospitals reported higher levels of PSC than the Taiwanese and Dutch. • Differences in responses were evident in hospitals in each country. • Overall perceptions of patient safety in the Netherlands, Taiwan, and the U.S. were 49%, 52%, and 64%, respectively. • Frequency of events reported in the Netherlands, Taiwan, and the U.S. were 36%, 31%, and 60%, respectively.	24
HSPSC, Pakistan, **(Jafree et al., 2017)**	Present descriptive statistics for patient safety standards	•	Only two public hospitals considered. Response rate was 38.4%	• 80% of respondents indicated there was no response to reported errors in their wards. • For respondents that reported errors, an accusatory culture existed in the ward. • 70% of respondents reported a lack of support. • Feedback from respondents indicated that error reporting and patient safety standards were not favorable.	21
HSPSC, Japan, **(Ito et al., 2011)**	Examine the validity and applicability of the HSPSC in Japan and compare the factor structure to the original U.S. study	• Variety of healthcare workers (nurses, administrative workers, physicians, technicians, dieticians, pharmacists, therapists, janitors, other) in 13 acute care general hospitals (1 university hospital and 12 teaching hospitals) considered. • HSPSC Japanese version used.		• The AHRQ's 12-factor model provides the best fit to the Japanese HSPSC data for acute care hospital staff compared with two 11-factor models proposed in previous studies. • The Japanese HSPSC had acceptable internal consistency for the subscales.	31
HSPSC, Croatia, **(Brborović et al., 2013)**	Determine whether all 12 dimensions of the U.S. HSPSC are applicable, valid, and reliable for Croatian healthcare workers	• Considering variety of healthcare workers (doctors and nurses). • comparing the results with U.S	Only four Croatian hospitals considered. Response rate was 32.69%	• Organizational learning/continuous improvement and staffing had low positive feedback. • Confirmatory factor analysis confirmed a good fit to the original U.S. model. • Overall perception of patient safety was 57%.	33
HSPSC, Sri Lanka, **(Amarapathy et al., 2013)**	Assess the current PSC in a tertiary care hospital	• Considering variety of healthcare workers (administrators, consultants, postgraduate trainees, medical officers, house officers, and nursing officers)	Considering only one tertiary care hospital. No Response rate reported	• Organizational learning/continuous improvement and teamwork within units had high positive scores. • Staffing and workload had low scores. • Patient safety overall perception was 81.3%. • Frequency of event reporting was 36.3%.	28
HSPSC, China, **(Feng et al., 2012)**	Explore nurses' perceptions of PSC and factors associated with those perceptions	•	Considering only nurses in one university teaching hospital. No Response ratereported	• Organizational learning/continuous improvement and teamwork within units had the highest scores. • Low response rates were evident in perceived trustworthiness of managers, non-punitive response to errors, managers, organizational safety prioritization, managers' safety commitment, and nurses' years of experience in their units, which had strong correlations with PSC	30

				• Overall percentage of positive responses regarding patient safety culture was 61.3%.	
HSPSC, China, (Nie et al., 2013)	Explore the attitudes and perceptions of PSC for healthcare workers in China and compare the psychometric properties of an adapted translation of the HSPSC in Chinese hospitals with those of the U.S.	• Considering variety of health professionals (physicians [surgical clinicians and internal clinicians] and nurses in 32 hospitals. • Comparing the results with U.S. • HSPSC Chinese version used.		• The staffing dimension had the lowest score. • Organizational learning/continuous development and teamwork within units had the highest scores. • Overall perception of patient safety was 55%.	30
HSPSC, Slovenia, (Robida, 2013)	Study the psychometric properties of a translated version of the HSPSC in a Slovenian setting	• Considering variety of health professionals (clinical and non-clinical staff) • Comparing the results with other studies • HSPSC Slovene version used.	Considering only three acute general hospitals. Response rate was 55%	• Units had a greater positive patient safety perception compared with hospital level. • The dimensions of teamwork across units, hospital management support for patient safety, staffing, and non-punitive response to errors required improvement. • Overall perception of safety was 56%. • Frequency of events reported was 69%.	28
HSPSC, Belgium, (Hellings et al., 2010)	Describe a PSC improvement approach in five Belgian hospitals	• 3940 and 3626 staff (nurses, head nurses, nurse assistants, physicians, head physicians, junior physicians, pharmacists, pharmacy assistants, middle management, technicians, paramedical staff, other) considered. • Response rates were 77% and 68%.	Five Belgian acute hospitals (three private hospitals and one public hospital)	• Hospital management support for patient safety needed the most improvement. • Progress was observed for supervisor expectations and actions promoting safety. • Teamwork within units had the highest scores. • Staffing, non-punitive response to errors, and hospital transfers and transitions received the lowest scores and did not show signs of improvement.	31
HSPSC, Norway, (Olsen, 2018)	Explore organizational factors influencing patient safety and safety behavior among nurses and other hospital staff	• Considering 3475 health professionals [nurses (n = 750), other personnel (n = 953)] • Studying PSC relationships with safety behavior. • HSPSC Norwegian version used.	Considering only one university hospital. Response rate was 49%	• Higher values on hospital-level dimensions positively influenced safety leadership and safety climate at the unit level. • The organizational factors correlate with the dimensions and illustrate structural relationships that are relevant for variations in the perception of patient safety and safety behavior.	34
HSPSC, Taiwan, (Chen and Li, 2010)	Assess the PSC in Taiwan and attempt to provide an explanation for some of the phenomena that are unique in Taiwan	• Considering 1000 health professionals (physicians, nurses, and non-clinical staff) 42 teaching hospitals. • Response rate was 78.8% • Comparing the results with U.S. • HSPSC Chinese version used.		• Staffing had the lowest positive feedback. • Teamwork within units had the highest score. • Statistical examination presented differences between the U.S. and Taiwan in the dimensions of frequency of event reporting, feedback and communication about errors, and communication openness. • Overall perception of safety was 65%. • Frequency of event reporting was 57%.	35
HSPSC, U.S., (Sorra and Dyer, 2010)	Examine the multilevel psychometric properties of the survey	• Considering variety of staff (clinical and non-clinical) in 331 U.S. hospitals. • Examine the validity and reliability of the instruments.	Response rate was 55%	• Overall, the survey items and dimensions are psychometrically sound at the individual, unit, and hospital levels of analysis and can be used by researchers and hospitals for assessing PSC. • A strong correlation existed between patient safety grade and overall perceptions of patient safety and management support for patient safety. • Correlation between frequency of event reporting and non-punitive response to errors was poor.	33
MSI-2006, Canada, (Zaheer et al., 2015)	Examine in detail how ease of reporting, unit norms of openness, and participative leadership influence front-line staff perceptions of PSC within healthcare organizations	• Considering variety of health professionals (nurses, physicians, and pharmacists) in 13 hospitals. • Response rate was 17%. • Studying PSC relationships with using different outcomes.		• Staff perception of patient safety climate was positively correlated to participative leadership, ease of reporting, and unit norms of openness. • Demographic factors such as education level and age influenced perceptions of patient safety climate.	35
SHSQ, Scotland, (Agnew and Flin , 2013)	Obtain a measure of hospital safety climate from a sample of National Health Service (NHS)	• Considering 8113 NHS clinical staff. • Examining the validity and reliability of the instruments.	Considering only six acute hospitals in Scotland. Response rate was 23%	• Patient and worker injury measures and workers' safety behavior had a significant influence on hospital safety climate scores.	27

	acute hospitals in Scotland and determine whether these scores are associated with worker safety behaviors and patient and worker injuries	• Studying PSC relationships with using different outcomes.		• Generic safety climate items and patient-specific items had strong impacts on safety outcome measures. • Overall perception of safety was 56%. • Frequency of incident reporting was 56%.	
HSPSC, Philippines, (Ramos and Calidgid, 2018)	Assess PSC among nurses at a government hospital	• Response rate was 86.65%.	Only nurses in one tertiary government hospital considered	• Organizational learning and teamwork within units received the highest scores. • Non-punitive response to errors had the lowest positive feedback. • Overall perception of safety was 50.78%. • Frequency of events reported was 54.12%.	29
HSPSC, Italy, (Bagnasco et al., 2011)	Determine the level of awareness regarding PSC among health professionals working at a hospital in northern Italy	• Respondents consisting of five professional groups (directors/coordinators, physicians, nurses/midwives, physiotherapists, and technicians). • HSPSC Italian version used.	Only one hospital in northern Italy considered.	• Teamwork within units and organizational learning/continuous improvement received the highest scores. • Non-punitive response to errors received the lowest score. • Overall perception of patient safety was 64%. • Frequency of event reporting was 59%.	22
HSPSC, South Korea (Cho and Choi, 2018)	Investigate the relationships between registered nurses' perceptions of PSC in their workplace and their patient safety competency—attitudes, skills, and knowledge	• Response rate was 79.7%. • Studying PSC relationships with using different outcomes their workplace and their patient safety competency—attitudes, skills, and knowledge. • Using HSPSC Korean version and the Patient Safety Competency Self-Evaluation (PSCSE)	Considering only nurses in in one university hospital	• A strong correlation existed between teamwork within units and overall safety competency. • Attitudes had a strong correlation to teamwork across and within units, and supervisor or manager expectations. • Skills had a strong correlation to learning and teamwork within units. • Knowledge had a strong correlation to organizational learning.	28
HSPSC, Finland, (Turunen et al., 2013)	Explore and compare nurse managers' s' and registered nurses views on PSC to discover whether there are differences between their views	• HSPSC Finnish version used.	Considering only nurses in four acute care hospitals. Response rate was 17%	• A lack of feedback was evidenced by reporting and communication errors. • Expectations and actions of nurse managers at the unit level supporting patient safety had the best positive response from both groups of respondents. • Nurse managers at the unit level considered suggestions from staff on how to improve patient safety. • Feedback from the survey indicated inadequate hospital-level management support for patient safety.	27
HSPSC, India, (Rajalatchumi et al., 2018)	Assess the perceptions of PSC among healthcare providers at a public sector tertiary care hospital in South India	• Considering variety of health professionals (doctors, nurses, other technical staff, pharmacists, lab technicians, dialysis technicians, operation theater technicians, and dressing technicians). • Response rate was 91.7%	Considering only one tertiary government hospital	• Organizational learning/continuous improvement, teamwork within units, and supervisor or officer-in-charge expectations received the highest positive responses while handoffs and transitions, communication openness, and frequency of event reporting received the lowest scores. • Overall general perception was 60.8%. • Frequency of events reported was 41.2%. • Overall general perception among doctors, nurses, and technical staff was 51.6%, 52.8%, and 66.1%, respectively. • Frequency of events reported among doctors, nurses, and technical staff was 31.5%, 36.7%, and 46%, respectively.	28
HSPSC, China, (Zhao et al., 2017)	Use the HSPSC to survey PSC in a county hospital in Beijing to determine the strengths and weaknesses of PSC in this hospital	• Considering variety of staff (physicians, nurses, and allied health professionals). • HSPSC Chinese version used.	Considering only one county hospital.	• Frequency of event reporting, communication openness, staffing, and overall perception of patient safety needed potential improvement. • Teamwork across units received a high level of positive feedback. • Physicians indicated low scores for the majority of the dimensions. • Overall perception of safety was 45.0%. • Frequency of event reporting was 43.0%.	30
PSCHO, China, (Zhou et al., 2015)	Describe staff's perceptions of PSC in public hospitals and determine how perceptions of PSC differ between different types of workers in the U.S. and China	• Considering variety of staff (managers in administrative offices and clinical departments, non-management physicians, non-management nurses, and others, including medical technicians and others with non-management		• Overall perception of patient safety was positive for most dimensions. • Hospital managers in both China and the U.S. reported a better patient safety climate than other staff. • Scales of fear of shame and blame had the highest response for hospital workers in China. • Fear of shame received the lowest feedback among hospital workers in the U.S.	26

		positions) in six secondary, general public hospitals			
HSPSC, Portugal, (Eiras et al., 2014)	Determine the validity and reliability of the AHRQ Hospital Survey on Patient Safety Culture (HSPSC) Portuguese version	• Considering variety of hospital staff. • HSPSC Portuguese version used.	Response rate was 21.8%	• Non-punitive response to errors, management support for patient safety, and staffing had the lowest positive scores. • Teamwork within units had the highest score. • Overall perception of patient safety was 54%. • Frequency of events reported was 40%.	24
HSPSC, Jordan, (Abualrub and Abu Alhijaa, 2014)	Examine the impact of patient safety educational interventions among senior nurses on their perceptions of safety culture and the rate of reported adverse events, pressure ulcers, and patient falls	• Studying PSC relationships with using patient safety educational interventions	Considering only nurses in one specialized hospital. Response rate was 57%	• Improvements identified by senior nurses included non-punitive response to errors and frequency of event reporting. • A reduction in the rate of adverse effects was noted. • Pre-education perceptions of safety stood at 51.5% while the post-education perception stood at 60.6%. • Frequency of event reporting was 54.2% pre-education and 64.3% post-education.	34
HSPSC, Jordan, (Saleh et al., 2015)	Examine nurses' perceptions of the hospital safety culture in Jordan and identify the relationships between aspects of hospital safety culture and selected safety outcomes	•	Considering only nurses in five Jordanian hospitals. Response rate was 61%	• Teamwork within units received the highest response • Staffing and non-punitive response to errors had the lowest scores • Overall perception of patient safety was 43.3% • Frequency of event reporting was 37%	30
SAQ, Denmark, (Kristensen et al., 2015)	Describe and analyze the patient safety climate in 15 Danish hospital units	• Considering variety of staff (doctors, nurses, nursing assist- ants/similar, physiotherapists, occupational therapists, administrative staff, and hospital porters)	Considering only five hospitals	• No differences in positive percentage rates were found between nurses and doctors across age, gender, or work experience. • Significant differences were noted between front-line staff and leaders. • Individuals within a given unit had varied perceptions compared to units within the hospital.	26
HSPSC, Belgium, (Vlayen et al., 2015)	Measure differences in safety culture perceptions within Belgian acute hospitals and examine variability based on language, work area, staff position, and work experience	• Considering variety of staff (nurses; patient care assistants/hospital aides/care partners; physicians; pharmacists; dieticians; unit assistants/clerks/secretaries; respiratory therapists; physical, occupational, or speech therapists; technicians [EKG, lab, radiology], administration/management) in 89 acute Dutch- and French-speaking hospitals. • Studying PSC relationships with using different outcomes • using HSPSC Belgian version	Response rate was 51.7%	• Staffing, handoffs and transitions, and management support for patient safety were noted as significant problem areas. • Overall, Dutch-speaking hospitals had more positive perceptions of PSC than French-speaking hospitals. • Respondents working in rehabilitation, pediatrics, and psychiatry gave more positive feedback on PSC. • Staffs working in the emergency department, multiple hospital units, and operating theater had lower positive feedback.	30
HSPSC, Algeria, (Boughaba et al., 2019)	Measure safety culture dimensions in order to improve and promote healthcare in Algeria	• Considering variety of staff (nursing assistants, nurses, doctors, administrative staff, other)	Considering only one General hospital. No Response rate reported	• Organization learning/continuous learning and teamwork within units had the highest scores. • Communication openness and staffing had the lowest scores. • Overall patient safety perception was 76.3%. • Frequency of events reported was 56.1%.	25
HSPSC, U.S., (Blegen et al., 2009)	Analyze the psychometric properties of the Agency for Healthcare Research and Quality Hospital Survey on Patient Safety Culture (HSPSC)	• Considering variety of staff (included nurses, physicians, pharmacists, and other hospital staff members) • Response rate was 96%. • Examining the validity and reliability of the instruments.	Only three hospitals (an academic teaching hospital, a managed care organization hospital, and a private not-for-profit community hospital) considered	• Interitem consistency reliability was not less than 0.7 for 5 subscales; the least reliability coefficients were demonstrated by the staffing subscale. • The intraclass correlation coefficients were within normal ranges. • Similar patterns of high and low scores across the subscales of the HSPSC were noted and compared to the sample from Pacific region hospitals conveyed by the Agency for Healthcare Research and Quality and corresponded to the proportion of items in each subscale that are reverse scored. • Most of the unit and hospital dimensions revealed a positive relationship with the Safety Grade outcome measure.	32

HSPSC and SAQ, U.S., (Etchegaray and Thomas, 2012)	Examine the reliability and predictive validity of two patient safety culture surveys- Safety Attitudes Questionnaire (SAQ) and Hospital Survey on Patient Safety Culture (HSPSC)-when administered to the same participants. Additionally, to determine the ability to convert HSOPS scores to SAQ scores.	• Variety of non-physician employees considered. • Examining the validity and reliability of the instruments • using HSPSC and SAQ. • Considering intensive care units (ICUs) in 12 hospitals within a large hospital system in the southern United States	Response rate was 54%. Only non-physician employees considered.	• Frequency of event reporting, perception of general patient safety, and general patient safety grade had a significant relationship with SAQ and HSPSC at individual level, with correlations of r=0.41 to 0.65 for SAQ and from r=0.22 to 0.72 for HSOPS. • Neither SAQ nor HSPSC predicted the fourth HSOPS outcome, i.e., the number of events reported within the last year. • Analyses on regression revealed that HSPSC safety culture dimensions had the best ability to predict frequency of event reporting and general perceptions of patient safety while SAQ and HSPSC dimensions predicted patient safety grade only.	34
HSPSC, U.S., (Mardon et al., 2010)	Examine relationships between the Agency for Healthcare Research and Quality's (AHRQ) Hospital Survey of Patient Safety Culture and rates of in-hospital complications and adverse events as measured by the AHRQ Patient Safety Indicators (PSIs)	• 56,480 staff from 179 hospitals considered. • Studying PSC relationships with using PSI data.		• Exploratory analysis done showed that hospitals which scored higher on patient safety culture had fewer reported adverse events, after controlling for hospital bed size, teaching status, and ownership. • There was a significant correlation between hospital bed size, teaching status, and ownership and the PSI composite. Larger and private hospitals had higher PSI rates. • Almost all tested relationships were aligning to the hypothesis (negative), and 7 of the 15 relationships were statistically significant and HSPSC composite average (47%). • All significant relationships had standardized regression coefficients between −0.15 and −0.41, denoting that hospitals with higher positive PSC scores experienced less in-hospital complications/adverse events as measured by PSIs.	28
HSPSC, U.S., (Lee et al., 2016)	Analyze how different elements of patient safety culture is associated with clinical handoffs and perceptions of patient safety	• 885 hospitals considered for collecting data		• Positive patient safety perceptions were influenced by effective information handoff, responsibility, and accountability. • There was positive correlation between feedback and communication of errors and conveying of patient information. • Teamwork within units and the frequency of events documented had positive correlation to the transference of personal responsibility when changing shifts. •	35
HSPSC, U.S., (McFadden et al., 2009)	Investigate the existence of a patient safety chain for hospitals	• 371 hospitals considered	Response rate was 59.3%.	• TFL has a role in creating a PSC through the actual PSI execution. • TFL has an indirect relationship with the implementation of initiatives, and ultimately improved PSO. • The characteristics of inspirational leaders are linked with the creation and promotion of a safety culture, making safety a priority and investing resources to PSI to realize maximal improvements in PSO.	26
SAQ, U.S., UK, and NZ, (Sexton et al., 2006)	Describe the survey's background, psychometric characteristics, provide benchmarking data, discuss how the survey can be used, and note emerging areas of research	• 203 sites were considered. • Examining the validity and reliability of the instruments.		• A six-factor model used at both the clinical area and respondent nested within clinical area levels generated attitudes. • The factors were: Teamwork Climate, Safety Climate, Perceptions of Management, Job Satisfaction, Working Conditions, and Stress Recognition. • With a scale reliability of 0.9, provider attitudes varied significantly within and among organizations. • Using SAQ to measure climate in clinical areas permits comparisons between hospitals, patient care areas, and types of caregivers, and tracking of change over time.	30
PSCHO, U.S., (Singer et al., 2007)	Describe the development of an instrument for assessing workforce perceptions of hospital safety culture and to assess its reliability and validity	• 100 Hospitals considered. • Examining the validity and reliability of the instruments	response rate was 51%	• Nine constructs were acknowledged: three organizational factors, two unit factors, three individual factors, and one additional factor. • Constructs showed significant convergent and discriminant validity in the MTA. Cronbach's a coefficient ranged from 0.50 to 0.89.	29
PSCHO, U.S., (Singer et al., 2009)	Examine the relationship between measures of hospital safety climate and hospital performance on selected Patient Safety Indicators (PSIs).	• 91 hospitals considered. • Examining the validity and reliability of the instruments. • Studying PSC relationships with PSIs.	Response rate was 52%.	• Hospitals showing better safety climate had lower relative incidence of PSIs. • Those with higher scores on safety climate dimensions determining interpersonal beliefs regarding shame and blame.	31

				• Frontline worker's perceived lower risk of experiencing PSIs related to better safety climate, however, senior managers did not agree on this.	
PSCHO, U. S., (Hansen et al., 2011)	Define the relationship between hospital patient safety climate (a measure of hospitals' organizational culture as related to patient safety) and hospitals' rates of rehospitalization within 30 days of discharge	• 67 hospitals considered. • Examining the validity and reliability of the instruments. • Studying PSC relationships with rates of rehospitalization.	Response rate was 38.5 %	• There was a noteworthy positive correlation between lower safety climate and higher rates of readmission among AMI (acute myocardial infarction) and HF (heart failure) (p 0.05 for both models). • Frontline workers perceptions of safety climate were linked to readmission rates (p 0.01), however, the management's perceptions contradicted this. • The results demonstrate that hospital patient safety climate has a connection with readmission outcomes patients with AMI and HF. The associations were specific to management and leadership.	24
PSCHO, U.S., (Singer et al., 2008)	Determine whether frontline workers and supervisors perceive a more negative patient safety climate than senior managers in their institutions.	• 92 US Hospitals considered. • Examining the validity and reliability of the instruments.		• Frontline personnel's safety climate perceptions were 4.8, percentage points (1.4 times) more problematic than senior managers', and supervisors' perceptions were 3.1 percentage points (1.25 times) more problematic than senior managers'. • Discipline had an impact on the differences at management level: senior managers had less differences than frontline workers. Additionally, the differences were more pronounced for nurses than physicians and other disciplines.	34

APPENDIX D: WESTAT® DE-IDENTIFIED DATA RELEASE FORM

Agency for Healthcare Research and Quality (AHRQ)
SOPS® Database
De-Identified Data Research Abstract Form

Instructions

Please use this form to describe the research for which you request AHRQ Surveys on Patient Safety Culture™ (SOPS®) de-identified data. Save this completed form with your last name in the file name (e.g., "Smith SOPS De-identified Research Abstract.doc") and submit to SOPSResearchData@westat.com (Subject line: SOPS De-identified Data Request).

> **Notes**: Because participating organizations (i.e., hospitals, medical offices, nursing homes, community pharmacies, and ambulatory surgery centers) voluntarily submit data to the SOPS Database, the data do not constitute a nationally representative sample. Replication of statistics published in the Surveys on Patient Safety Culture Database Reports may not be possible due to post-hoc cleaning and because some sites did not authorize the inclusion of their data in these de-identified files. Documentation of cleaning is provided with the data files.

Date Requested

08/20/2020

Project Title [100 characters max.]

Exploring Relationships Between Patient Safety Culture Subdimensions, Respondent and Hospital Characteristics

Purpose

The purpose of this study is to 1) evaluate the measurement structure of the 12 areas of patient safety culture assessed in the SOPS Hospital Survey, and 2) examine the associations between respondent and hospital characteristics and patient safety culture.

Hypotheses

Hypothesis1: Patient Safety Culture subdimensions share in common a second order factor (overall Patient Safety Culture).

Hypothesis2: Respondent Characteristics have a significant impact on Patient Safety Culture.

Hypothesis3: Hospital Characteristics have a significant impact on Patient Safety Culture.

Methodology [Specify SOPS measures to be used and proposed analyses]

In this research individual level of analysis will be used. The statistical analysis will comprise confirmatory factor analysis (CFA) and covariance structural equation modeling (SEM). CFA will be used to confirm the measurement structure of the 12 areas of patient safety culture, including the validity and reliability of a second level factor (Patient Safety Culture). Next, SEM will be used to examine the associations between respondent and hospital characteristics and Patient Safety Culture.

Measures:

All 12 dimensions of patient safety culture.

Hospital Characteristics: Bed size, Teaching status and Geographic region.

Respondent Characteristics: Work area/unit, Staff position, Interaction with patients, and Tenure in current work area/unit

Expected Project Timeline

8/30/2020 to 8/30/2021

Expected Outcomes of the Research/How Results will be Presented

The respondent and hospital characteristics have a significant impact on Patient Safety Culture. The results will be published in a peer-reviewed journal. This research is for PhD dissertation.

Funding Sources [Include grant or contract number.]

N/A

Survey and Database Year(s) Needed for Analyses Outlined Above

Database Report Year	Hospital	Medical Office	Ambulatory Surgery Center	Nursing Home	Community Pharmacy
2012	☐				
2013					
2014	☐	☐			
2015					☐
2016	☐	☐		☐	
2017					
2018	☒	☐			
2019				☐	☐
2020		☐	☐		

Contact Information

If Primary Contact is a student, please also provide your supervisor in Other Contact/Supervisor Information below.

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If there are more individuals who will be working with the data on this project, please provide their contact information as well.

APPENDIX E: IRB

Institutional Review Board
FWA00000351
IRB00001138, IRB00012110
Office of Research
12201 Research Parkway
Orlando, FL 32826-3246

UNIVERSITY OF CENTRAL FLORIDA

NOT HUMAN RESEARCH DETERMINATION

July 28, 2020

Dear Abdulmajeed Azyabi:

On 7/28/2020, the IRB reviewed the following protocol:

Type of Review:	Initial Study
Title of Study:	Exploring Relationship Between Patient Safety Culture and Hospital Characteristics and Efficiency
Investigator:	Abdulmajeed Azyabi
IRB ID:	STUDY00001923
Funding:	None
Grant ID:	None
Documents Reviewed:	• hospital-identifiablesopsdata-confidentialityagreement.pdf, Category: Certificate of Confidentiality; • HRP-250-FORM- Request for NHSR 1.docx, Category: IRB Protocol; • HSOPS.pdf, Category: Survey / Questionnaire;

The IRB determined that the proposed activity is not research involving human subjects as defined by DHHS and FDA regulations.

IRB review and approval by this organization is not required. This determination applies only to the activities described in the IRB submission and does not apply should any changes be made. If changes are made and there are questions about whether these activities are research involving human in which the organization is engaged, please submit a new request to the IRB for a determination. You can create a modification by clicking **Create Modification / CR** within the study.

If you have any questions, please contact the UCF IRB at 407-823-2901 or irb@ucf.edu. Please include your project title and IRB number in all correspondence with this office.

Sincerely,

Adrienne Showman
Designated Reviewer

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