The Relationship Between Patient Safety Culture and Patient Outcomes

Author(s): Margaret Hardt DiCuccio

Source: *Journal of Patient Safety*, September 2015, Vol. 11, No. 3 (September 2015), pp. 135-142

Published by: Lippincott Williams & Wilkins

Stable URL: https://www.jstor.org/stable/10.2307/26633090

The Relationship Between Patient Safety Culture and Patient Outcomes: A Systematic Review

Margaret Hardt DiCuccio, RN, MSN

Context: In the past 13 years since the Institute of Medicine report, *To Err is Human*, was published, considerable attention was placed on the relationship between patient safety culture and patient outcomes. Research to understand this relationship has been conducted; however, now, it is important to systematically review these studies to determine if there are tools, levels of measure and outcomes that have been shown to result in significant correlations.

Objective: The purpose of this review is to evaluate the state of research connecting patient safety culture and patient outcomes to determine nurse-sensitive patient outcomes that have been significantly correlated to culture of safety and commonly used tools to measure culture of safety in the studies with significant correlations.

Data Sources: Published English only research articles were considered for the review. Only studies that directly measured patient outcomes in relationship to patient safety culture in hospitals involving registered nurses as a participant were included.

Results: Evidence of relationships between patient safety culture and patient outcomes exist at the hospital and nursing unit level of analysis; however, the number of studies finding statistically significant correlations particularly using nurse-sensitive outcomes is limited.

Conclusions: The findings from this review suggest that there are emerging trends indicating that the specific patient safety culture measurement tools, the level of analysis, and selection of outcome measures are important considerations in study design. More research is needed to determine interventions that improve patient safety culture and outcomes.

Key Words: safety culture, safety climate, patient outcomes

(*J Patient Saf* 2015;11: 135–142)

It has been over a decade since *To Err Is Human*[1] was published by the Institute of Medicine (IOM). This groundbreaking report emphasized the responsibility of health-care providers to examine flawed systems within their organizations with the aim to improve the clinical outcomes of patients. Also included was the need to develop a culture that encourages all staff members to raise concerns regarding practices that place patients at risk, or said a different way, to engage in advocacy activities to keep patients safe. To promote staff engagement in patient advocacy, there is a need to improve psychological safety. Psychological safety is defined as a staff member's comfort level to challenge someone more powerful and know that there will be no retribution.[2] The impetus for improving hospital systems and psychological safety is the unnecessary patient deaths resulting from preventable errors. Nurses have patient advocacy as one of their core responsibilities[3] yet all too often they do not feel safe and culturally supported to speak up when a patient is at risk.[2]

Since the time of the original IOM report, there has been significant attention given to the following activities:

- defining the terms patient safety culture and climate,
- developing tools to measure these concepts, and
- conducting research to establish the relationship between safety culture/climate and patient outcomes.

The purpose of this review is to evaluate the state of research connecting patient safety culture and nurse-sensitive patient outcomes. The review includes study designs, measurement tools, and an examination of outcomes that did and did not have significant correlations to patient safety culture. Gaps in knowledge and next steps for research on this topic are noted.

STATE OF RESEARCH

The inclusion criteria for selection of the research articles will be outlined as well as search strategies used to find the data sources. The measurement of patient safety culture and patient outcomes in the studies will be described. Also, the current state of research outlining the relationship between patient safety culture and patient outcomes is examined.

Inclusion Criteria

In this review, patient safety culture is defined as "the values shared among organization members about what is important, their beliefs about how things operate in the organization, and the interaction of these with work unit and organizational structures and systems, which together produce behavioral norms in the organization that promote safety"[4 (p.400)]. Colla et al[5] defines patient safety climate as the measureable components of patient safety culture. Therefore, for the purpose of this review, the term *patient safety culture* will refer to both culture and climate as it is all encompassing.

Studies measuring patient/family satisfaction or direct patient outcome measures (falls, hospital-acquired conditions, readmission rates, hospital compliance to best practice guidelines, medication errors, and mortality) were included in this review. Studies using health-care professional's perceptions of patient safety outcomes were not included because of the indirect nature of these measures.

The electronic databases used to locate the research articles were EBSCO host for Hospitals and Medical Institutions, OVID, and ProQuest. These hosts include multiple data sources such as CINAHL, MEDLINE, psychology, sociology, health-care leadership databases, and dissertation abstracts. A manual search of references from the selected studies was also conducted. The Boolean search mode was used to ensure maximal capture. Concepts searched included safety climate, safety culture, safety environment, patient outcomes, nurse sensitive outcomes, treatment outcomes, and outcomes research.

A total of 17 research studies were identified that connected the concept of patient safety culture to nurse-sensitive patient outcomes as defined previously. Many of these studies

From the University of Pittsburgh Medical Center Mercy, Pittsburgh, Pennsylvania.

Correspondence: Margaret Hardt DiCuccio, RN, MSN, University of Pittsburgh Medical Center Mercy, 1400 Locust St. Pittsburgh PA 15219 (email: dicucciome@upmc.edu).

The author discloses no conflict of interest.

TABLE 1. Research Summary Including Patient Safety and Patient Outcome Studies by Date of the Study

Reference Newer Studies Reported First	Sampling, Response Rate and Setting	Design and Level of Analysis	Variables and (Measurement Tools)	Study Findings
Dodek et al[10]	Sample: 2374 ICU staff members. 1381 family members of ICU patients. 54% and 64% response rates.	Design: cross-sectional survey	Safety culture (AHRQ HSOPSC) Family satisfaction with ICU (tool developed for a previous study)	Positive relationship between safety culture and family satisfaction of nonsurvivor patients who were in the ICU for ≥to 14 days ($P \leq 0.01$).
Peer reviewed article	Setting: 23 ICUs in Canada.	Level of analysis: nursing unit		
Sorra et al[13]	Sample: 73 hospital submitting data to the HCAPS and Hospital SOPS comparative data bases in 2008.	Design: cross-sectional	Safety culture (AHRQ HSOPSC) and patient satisfaction HCAPS.	Positive correlation between subscales of HSOPSC and nurse driven and composite HCAPS measures.
Peer-reviewed article		Level of analysis: hospital		
Chang and Mark[17]	Sample: 4954 RNs from medical-surgical units from 146 hospitals. Response rate of 75%.	Design: Cross-sectional descriptive	Medication errors (incident reporting data)	Negative correlation between medication errors and perceived learning climate ($P < 0.01$). A correlation between %RNs on unit and less medication errors when learning climate is poor ($P < 0.05$).
Peer-reviewed article		Level of analysis: nursing unit	Learning climate (Error Orientation Scale)	
Curry et al[22]	Sample: 11 hospitals that ranked in either the top 5% or bottom 5% of performance for MI mortality rates.	Design: qualitative, descriptive	The selection criterion was mortality %of AMI patients within the first 30 days post event in CMS database.	Six domains were identified post theme analysis. Three were related to patient safety culture, problem solving and learning, communication at transitions, and organizational values and goals.
Peer-reviewed article		Level of analysis: hospital		
Hanson et al[16]	Sample: 36,375 employees within 67 hospitals. A response rate of 38.5%.	Design: cross-sectional	Hospital Safety Climate (PSCHO). Readmission rates for heart failure, myocardial infarction and pneumonia (abstracted from Medicare data).	A negative correlation between hospital safety climate and readmission rate for heart failure ($P \leq 0.05$). Front line staff members' perception of patient safety climate are more highly correlated to readmission rates than senior leaders ($P \leq 0.01$)
Peer-reviewed article		Level of analysis: hospital		
Huang et al[8]	Sampling: 4394 staff members from a convenience sample of 30 ICUs. 47.9% response rate.	Design: cross-sectional	Safety culture (SAQ-ICU version). ICU LOS and patient mortality (multisite clinical database).	A negative correlation between perception of management and patient mortality ($P = 0.02$). A negative correlation between safety climate and LOS ($P = 0.03$).

Peer-reviewed article		Level of analysis: nursing unit.		
Mardon et al[12]	Sampling: 56,480 staff members from a convenience sample of 179 hospitals in the AHRQ's database.	Design: cross-sectional descriptive	Hospital safety culture (AHRQ HSOPSC). Patient safety (8 measures from the AHRQ's PSIs in total).	The HSOPSC composite score was negatively correlated with composite PSI scores ($P < 0.001$).
Peer-reviewed article		Level of analysis: hospital		
Olds[23] Dissertation	Sampling: 21,730 nurses, 1,010,298 patients (mortality, LOS), 3,473,127 patients (HAPU, post op PE/VTE) from 688 hospitals	Design: cross-sectional Level of analysis: hospital	Hospital safety culture (AHRQ HSOPSC). Patient outcomes (State level data base reported at the hospital level)	Safety grade and positive safety score was negatively correlated to mortality ($P < 0.01$).
Thompson[14] Dissertation	Sampling: convenience sample of 34 unit directors and their 711 staff members in a large academic medical center. Response rate was 90%	Design: descriptive, multi-level cross-sectional Level of analysis: nursing unit.	Hospital safety culture (AHRQ HSOPSC). Patient outcomes, CAUTI, CLABSI, SSI, HAPU, falls and failure to rescue (hospital data collection systems).	No significant relationship between patient safety culture and patient outcomes.
Kemper[20] Dissertation	Sampling: a convenience sample of 97 hospitals that participated in the NDNQI RN survey in 2005.	Design: cross-sectional Level of analysis: hospital	Culture of safety (NDNQI RN survey subscales classified into organizational support (OS) and work unit support (WS). Patient outcomes (PSI rates, HAPU, failure to rescue, HAI, VTE rates)	An unexpected positive correlation was noted between Organizational support (OS) and PSI ($P = 0.03$).
Obrien[6] Dissertation	Sampling: 6697 health-care staff members from a convenience sample of 59 units in 10 community hospitals.	Design: cross-sectional, descriptive, model testing Level of analysis: hospital and unit	Patient safety culture (SAQ), fall and HAPU rates (NDNQI database) Hospital failure rate (CMS sponsored data collection-including community-acquired pneumonia CAP)	No significant relationship between patient safety climate and falls or HAPUs. A negative relationship was noted between staff perception of support of manager and failure rate for the CAP performance measure.
Gearhart[11] Dissertation	Sampling: 287 nursing staff and 216 patients on 3 hospital units in 3 San Francisco Bay hospitals.	Design: Cross-sectional, descriptive, correlational Level of analysis: nursing unit	Patient safety culture (HSOPSC) Patient experience (Consumers Assessment of Healthcare Providers and Systems-Hospital version HCAPHS)	Positive correlations were found on several subscales of the HSOPSC with 5/6 measures on the HCAPHS ($P < 0.001$).
Mark et al[21] Peer-reviewed article	Sampling: random sample of 278 nursing units in 143 hospitals. 4911 RNs (response rate 75% and 2720 patients.	Design: longitudinal cross-sectional Level of analysis: nursing unit	Safety climate (Error Orientation Scale and Zohar Safety Climate Scale) Organizational effectiveness (medication error rates and falls)	A positive correlation was found between medication error rate and safety climate with the interaction effect higher %RNs with BSN and % RNs (P =0.01). A positive correlation between %RNs and RNs with BSNs and falls at high levels of safety climate.

(Continued on next page)

TABLE 1. *(Continued)*

Reference Newer Studies Reported First	Sampling, Response Rate and Setting	Design and Level of Analysis	Variables and (Measurement Tools)	Study Findings
Taylor[7] Dissertation	Sampling: a convenience sample of nurses working on 29 units (with >60% response rate to the SAQ in one large academic medical center and 28,260 discharged patients' data.	Design: Cross-sectional Level of analysis: nursing unit	Organizational Culture (SAQ) Patient outcomes, falls and medication errors (occurrence reporting system), PE/DVT and HAPU (hospital discharge data)	One subscale of the SAQ, increasing stress recognition was positively correlated to patient falls ($P = 0.000$). Safety climate subscale was negatively correlated to HAPU ($P = 0.000$).
Singer et al[4] Peer-reviewed article	Sampling: Convenience sample of 42 hospitals that participated in both the AHRQ's data base in 2002 and the PSCHO survey in 2004.	Design: cross-sectional Level of analysis: hospital	Hospital safety culture (PSCHO) Patient outcomes (14 PSIs from AHRQ data base combined into 3 groups, postoperative complications, nurse sensitive, technical difficulty with procedures.)	Fear of blame was positively correlated to performance on all PSI's, postoperative complications ($P < 0.01$) and nurse sensitive outcomes ($P < 0.05$). Fear of shame positively correlated to technical difficulty ($P < 0.05$).
Hofmann and Mark[18] Peer-reviewed article	Sampling: 42 randomly selected hospitals. Use of 81 nursing units and 1127 nurses within the hospitals.	Design: cross-sectional Level of analysis: nursing unit	Perception of safety climate (Zohar's measure of safety climate and The Error Orientation Scale) Medication errors and UTIs (hospital data base) Patient satisfaction and perception of responsiveness (researcher developed tool)	Safety climate was negatively correlated to medication errors and UTIs ($P < 0.05$) and positively correlated to patient satisfaction and perception of nurse responsiveness ($P < 0.01$).
Sexton[9] Dissertation	Sampling: a convenience sample of 118 ICUs in the United Kingdom enrolled in a prior study that collected APACHE II data. 45% met inclusion criteria (18,089 ICU patients). 5540 healthcare professionals at 68% participation.	Design: cross-sectional Level of analysis: nursing unit	Risk-adjusted mortality (APACHE II data base) Staff perception of safety climate (SAQ revised by researcher to be ICU specific).	Two subscales of the SAQ, safety climate ($P \leq 0.005$) and perception of management ($P \leq 0.006$) were negatively correlated to risk-adjusted ICU mortality. The same findings were noted in the RN only analysis of data.
Total	17			

considered both nurse and patient outcomes. Nurse outcomes such as turnover, injury rates, and RN satisfaction are not discussed in this review as the focus is on patient outcomes only. This represents 10 peer-reviewed articles[4,8,10,12,13,16,17,18,21,22] and 7 dissertations.[6,7,9,11,14,20,23] A summary of these studies is provided in Table 1.

Study Design

The majority of the studies (16) used a cross-sectional descriptive design, with 1 study[22] using a qualitative design. The cross-sectional design used in these studies often involves secondary analysis of previously collected data at a specific point in time, when the culture of safety tool was administered, and then linking these results to various patient outcome measures collected from the participating health-care facilities. Several of the studies used large convenience databases made available by a government source (state and federal databases) or by an organization (Agency for Healthcare Research and Quality (AHRQ) database or hospital system) and involved large samples sizes. This design allows the researcher to interpret extensive datasets with the use of regression analysis.

The authors of the qualitative study selected 11 hospitals in the United States that either ranked in the top 5% or bottom 5% in performance for acute myocardial infarction (AMI) mortality rates. After participant interviews and a theme analysis, it was found that the organizations with lower mortality emphasized problem solving and learning, communication at transitions, and organizational values and goals that related to a positive patient safety culture as compared with those organizations with higher mortality rates. There was no common protocol regarding the care of the AMI patient indicating that the positive outcome went beyond protocols and into the culture of the organization. The results lend credence to the effect of patient safety culture on patient outcomes, in this case, patient mortality, and the importance of senior leadership engagement to improve the culture.

Measurement of Patient Safety Culture

Patient safety culture was measured using 8 different tools. The 2 most frequently used scales were the Safety Attitudes Questionnaire (SAQ) Hospital[6,7] Intensive Care Unit[8,9] and the AHRQ Hospital Survey on Patient Safety Culture (HSOPSC).[10–14,23] The SAQ has 63 items divided into 6 subscales with a Cronbach alpha between 0.68 and 0.81.[9] The HSOPSC has 42 items, 12 subscales with Cronbach alpha between 0.62 and 0.85.[15]

Both of these tools are well designed and have large comparative databases for hospital data. The AHRQ tool is nonproprietary and, therefore in most cases, more economical to administer. The other 6 measurement tools also reported acceptable reliability ratings, however, are less widely utilized and do

TABLE 2. Summary of Patient Outcomes

Patient Outcome	Source	Study Findings		Level of Analysis
		Significant	Nonsignificant	
Family satisfaction	Dodek et al[10]	X		Nursing unit ICU
Patient satisfaction	Gearhart[11]	X		Nursing unit med/surg
	Hofmann and Mark[18]	X		Nursing unit med/surg
	Sorra et al[13]	X		Hospital
Medication errors	Chang and Mark[17]	X		Nursing unit med/surg
	Mark et al[21]	X		Nursing unit med/surg
	Taylor[7]	X		Nursing unit mixed
	Hofmann and Mark[18]	X		Nursing unit med/surg
Mortality	Huang et al[8]	X		Nursing unit ICU
	Sexton[9]	X		Nursing unit ICU
	Olds[23]	X		Hospital
Readmission	Hanson et al[16]	X		Hospital
PSI composite*	Mardon et al[12]	X		Hospital
	Singer et al[4]	X		Hospital
PSI nurse† sensitive	Thompson[14]		X	Nursing unit mixed
	Kemper[20‡]	X		Hospital
	Obrien[6§]		X	Nursing unit mixed
	Mark et al[21‡]	X		Nursing unit med/surg
	Taylor[7]	X		Nursing unit mixed
	Hofmann and Mark[18]	X		Nursing unit med/surg
	Olds[23]		X	Hospital
Failure rate AMI/HF	Obrien[6§]		X	Hospital
Failure rate CAP	Obrien[6§]	X		Hospital

*Score represents measures both related to nursing care and others.

†Includes indicators such as falls, HAPU, PE/DVT, and HAI.

‡Study yielded results that, although significant, were not in the expected direction.

§Study considered both hospital and unit level analysis.

not have extensive nationwide comparative databases. These findings are consistent with a previous comprehensive review of patient safety culture surveys conducted by Colla et al.[5]

Patient Outcomes Correlating to Culture of Safety

The choice of patient outcomes for the most part was driven by the level of analysis, hospital or nursing unit, and the type of nursing units included in the study. A summary of patient outcomes and significance of findings is available in Table 2.

If the analysis is at the hospital level, then more global measures such as composite score for AHRQ patient safety indicators (PSI), mortality, and readmission rates have been found to yield statistically significant results in the studies.[4,6,12,16] In an additional study, measuring outcomes at the overall hospital level of analysis patient safety culture and patient experience were significantly correlated.[13]

When the analysis is at the nursing unit level, those patient outcomes that are predominately nurse driven, such as hospital-acquired pressure ulcers (HAPUs), family satisfaction, and patient satisfaction, have been seen to yield statistically significant results.[7,10,11] When studies are conducted in the intensive care setting, the relationship between patient safety culture and patient mortality has also been a statistically significant finding.[8,9] Previous research has been found that improved teamwork and communication among members of the care team has significantly correlated with decreased ICU patient mortality.[19] A summary diagram linking tool selection with level of analysis and significant results is presented in Figure 1.

Studies With Nonsignificant or Unexpected Results

Much can be learned from studies that found either nonsignificant or unexpected results. It is suspected that additional studies have been conducted that fall in this category, but the researchers may not have sought publication. In total, 5 studies were noted to fall in this category. Table 3 is a summary of the limitations of the studies that most likely contributed to the results.

There were 2 studies that reported unexpected significant results. The first reported that at the hospital level, the PSI nurse indicators (falls, HAPU, and infection rates) increased as patient safety culture improved.[20] This finding is most likely the result of the tool used to measure patient safety culture, the National Database of Nursing Quality Indicators Registered Nurse survey (NDNQI RN). The second reported that a more positive patient safety culture was related to increases in medication errors.[21] This finding could be related to willingness to report errors if the culture is supportive of patient advocacy.

ANALYSIS AND NEXT STEPS

Overall, the 17 studies conducted examining the relationship between patient safety culture and patient outcomes were well designed, used instruments with adequate psychometric properties, and had large sample sizes. Many of the studies also examined nurse outcome variables with significant findings.

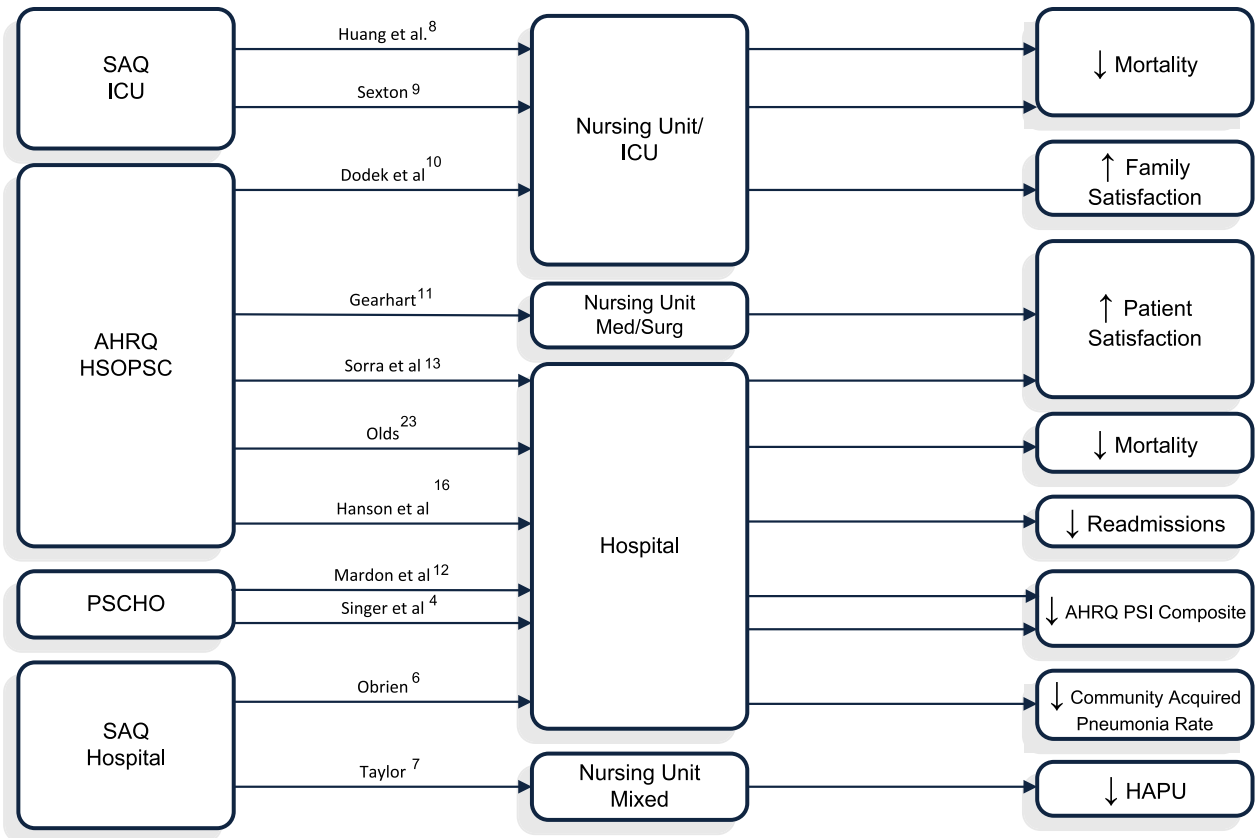

FIGURE 1. Analysis of significant patient outcome results in expected direction.

TABLE 3. Nonsignificant/Unexpected Results Relating Patient Safety Culture to Outcomes

Source	Study Findings Nonsignificant/Unexpected	Level of Analysis
Obrien[6]	AMI/HF at the hospital level non-significant	Post hoc power analysis indicated insufficient number of hospitals
	HAPU/Falls at unit level non-significant	Data were nurse reported with few events reported leading to a heavily skewed distribution
Thompson[14]	PSI Nurse sensitive nonsignificant	Low reported number of adverse events per unit leading to a negatively skewed distribution of patient outcome variables
Kemper[20]	PSI nurse sensitive/unexpected result	The measurement tool chosen for culture of safety was an RN satisfaction survey with no demonstrated validity to measure culture of safety.
Mark et al[21]	Medication errors/unexpected result	Positive patient safety culture was found to increase medication errors potentially because of the perception of psychological safety.
Olds[23]	Falls/HAPU (AHRQ-PSI) nonsignificant	The AHRQ PSI data are abstracted from closed medical records. The methodology removes reporting bias however results in small numbers of events and skewed data distribution. Nursing unit hospital

The patient outcomes that are least consistently reported to be significant are those considered nurse sensitive such as medication errors, HAPU, falls, and infections. Of the 7 studies reporting nurse-sensitive outcomes, 2 had findings that were opposite the hypothesis,[20,21] and 3 had nonsignificant findings.[6,14,23] Evidence from these studies suggests that the number of adverse events is so small that variation in the dataset is inadequate to detect a significant correlation. In addition, the use of medication errors as an outcome variable has the confounding effect of psychological safety and therefore has not been shown to be consistently effective.

If the researcher is studying patient safety culture at the hospital level, readmission rates, AHRQ composite rates, mortality, and patient satisfaction were significantly correlated. When studying patient safety culture at the ICU level, mortality and family satisfaction had significant correlations. Finally, if the med/surg unit or mixed units is the level of analysis, then patient satisfaction and HAPUs have been significantly correlated.

There are trends emerging related to connections between patient safety culture and specific patient outcomes. This information could guide researchers in study construction or administrators in validating the importance of a positive patient safety culture. The results that yielded a significant relationship between patient safety culture and patient outcomes are outlined in Table 4.

The AHRQ HSOPSC and the SAQ are the 2 dominant tools used in these studies to measure patient safety culture. Given the credible psychometric characteristics and nationwide data bases associated with each tool, it guides the researcher

TABLE 4. Summary of Significant Study Outcomes: Relationship Between Safety Culture and Patient Outcomes

Culture Tool	Source	Patient Outcome	Significant Studies	Level of Measure
AHRQ	Dodek et al[10]	Family satisfaction	Positive correlation	Nursing unit ICU
HSOPSC	Sorra et al[13]	Patient experience	Positive correlation	Hospital
	Mardon et al[12]	AHRQ PSIs (composite)	Negative correlation	Hospital
	Gearhart[11]	Patient experience	Positive correlation	Nursing unit med/surg
	Olds[23]	Mortality	Negative correlation	Hospital
Error Orientation Scale	Chang and Mark[17]	Medication errors	Negative correlation	Nursing unit med/surg
PSCHO	Hanson et al[16]	Readmission	Negative correlation	Hospital
	Singer et al[4]	AHRQ PSIs (composite)	Positive correlation	Hospital
NDNQI RN Survey	Kemper[20]	PSI nurse indicators	Unexpected positive	Hospital
SAQ ICU	Huang et al[8]	Patient mortality	Negative correlation	Nursing unit ICU
	Sexton[9]	Patient mortality	Negative correlation	Nursing unit ICU
SAQ Hospital	Obrien[6]	Community-acquired pneumonia	Negative correlation	Hospital
	Taylor[7]	HAPU	Negative correlation	Nursing unit mixed
Zohar Safety Climate Scale	Mark et al[21]	Medication errors	Unexpected positive	Nursing unit
	Hofmann and Mark[18]	Medication errors and UTI	Negative correlation	Med/surg
		Patient satisfaction	Positive correlation	Nursing unit med/surg

in the direction of one of these tools versus the others that were used in the reviewed studies.

Now that these associations have been demonstrated the following next steps are recommended:

- Continue to refine the research connecting patient safety culture and patient outcomes both in conducting research using the current design (cross sectional) and through meta-analysis of the available studies to strengthen the connection between specific patient outcomes and patient safety culture.
- Conduct intervention research to determine the most effective means to improve patient safety culture and therefore improve patient outcomes.
- Conduct research that connects patient safety culture and other culturally sensitive variables, such as propensity for patient advocacy, to guide administrators to avenues for improving the culture of hospitals.

CONCLUSIONS

The research studies available have been conducted in the last 10 years demonstrating that the study of the relationship between patient safety culture and patient outcomes has occurred after the IOM report in 1998. There are multiple well-designed cross-sectional studies to document the significance of the relationship; however, no intervention studies have been published to date. A foundation has been laid for interventional research, which would enhance the available research and provide direction for health-care administrators as they continue to improve the patient safety culture of their organizations.

This review serves to assist future patient safety culture researchers in study design in the areas of tools, level of analysis, and outcome selection. Research correlating these variables has been progressing over the last 10 years; however, additional research is needed to understand the existing correlations and to determine interventions that improve the patient safety culture in hospitals.

Health-care administrators today more than ever are being held accountable, financially and socially, for adverse events that occur within their health-care organizations as well as the overall patient experience. The federal government and general public sentiment has changed from accepting human error as inevitable to challenging organizational leadership to improve health-care systems that result in error and/or a negative patient experience. These changes have made understanding patient safety culture and its effect on patient outcomes imperative; however, as seen in this review, there is work to be done concerning the study of patient safety culture and its connection to patient outcomes.

REFERENCES

1. Kohn L, Corrigan JM, Donaldson MS, eds. *To Err is Human*. Washington, DC: National Academics Press, Institute of Medicine; 2000.
2. Leonard MW, Frankel AS. Role of effective teamwork and communication in delivering safe, high-quality care. *Mount Sinai School Med*. 2011;78:820–826.
3. American Nurses Association, Code of Ethics [ANA Web site]. 2001. Available at: http://www.nursingworld.org/codeofethics. Accessed January 13, 2013.
4. Singer S, Lin S, Falwell A, et al. Relationship of safety climate and safety performance in hospitals. *Health Serv Res*. 2009; 44:399–421.
5. Colla JB, Bracken AC, Kinney LM, et al. Measuring patient safety climate: a review of surveys. *Qual Saf Health Care*. 2005;14:364–366.
6. Obrien RL. *Keeping Patients Safe: The Relationship Between Patient Safety Climate and Patient Outcomes* [dissertation]. University of California, San Francisco; 2009.
7. Taylor JA. *Utility of Patient Safety Case Finding Methods and Associations Among Organizational Safety Climate, Nurse Injuries, and Errors* [dissertation]. Johns Hopkins University; 2008.
8. Huang DT, Clermont G, Kong L, et al. Intensive care unit safety culture and outcomes: a US multicenter study. *Int J Qual Health Care*. 2010;22:151–161.
9. Sexton JB. *A Matter of Life or Death: Social Psychological and Organizational Factors Related to Patient Outcomes in the Intensive Care Unit* [dissertation]. University of Texas, Austin; 2002.
10. Dodek PM, Wong H, Heyland DK, et al. The relationship between organizational culture and family satisfaction in critical care. *Crit Care Med*. 2012;40:1506–1512.
11. Gearhart SF. *The Relationship Between Care Provider Perceptions of Safety Culture and Patient Perceptions of Care on Three Hospital Units* [dissertation]. University of California, San Francisco; 2008.
12. Mardon RE, Khanna K, Sorra J, et al. Exploring relationships between hospital patient safety culture and adverse events. *J Patient Saf*. 2010;6:226–232.
13. Sorra JK, Kabir D, Naomi M, et al. Exploring relationships between patient safety culture and patients' assessments of hospital care. *J Patient Saf*. 2012;8:131–139.
14. Thompson DN. *A Multi-level Study of Nurse Leaders, Safety Climate and Care Outcomes* [dissertation]. University of Pittsburgh; 2010.
15. Sorra JS, Dyer N. Multilevel psychometric properties of the AHRQ hospital survey on patient safety culture. *BMC Health Serv Res*. 2010;10:199–212.
16. Hansen LO, Williams MV, Singer SJ. Perceptions of hospital safety climate and incidence of readmission. *Health Serv Res*. 2011;46:596–616.
17. Chang Y, Mark B. Effects of learning climate and registered nurse staffing on medication errors. *J Nurs Admin*. 2011;60:32–39.
18. Hofmann DA, Mark B. An investigation of the relationship between safety climate and medication errors as well as other nurse and patient outcomes. *Personnel Psychol*. 2006;59:847–869.
19. Shortell SM, Zimmerman JE, Rousseau DM, et al. The performance of intensive care units: does good management make a difference? *Med Care*. 1994;32:508–525.
20. Kemper CA. *The Impact of Work Unit and Organization System on Hospital Patient Safety [dissertation]*. University of Kansas; 2009.
21. Mark BA, Hughes LC, Belyea M, et al. Exploring organizational context and structure as predictors of medication errors and patient falls. *J Patient Saf*. 2008;4:66–77.
22. Curry LA, Spatz E, Cherlin E, et al. What distinguishes top-performing hospitals in acute myocardial infarction mortality rates? *Ann Intern Med*. 2011;154:384–390.
23. Olds DM. *Safety Culture and Nurse Sensitive Outcomes [dissertation]*. University of Pennsylvania; 2010.