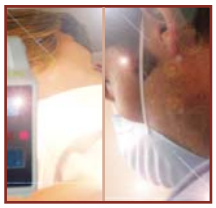

Safety Culture in Australian Intensive Care Units: Establishing a Baseline for Quality Improvement

By Wendy Chaboyer, RN, PhD, Di Chamberlain, RN, CCRN, MPH, PhD, Karena Hewson-Conroy, BSocSci (Hons), Bernadette Grealy, RN, RM, CCRN, BN, MN, Tania Elderkin, RN, BAppSc (Adv Nu), GDCCN, MHSc, Maureen Brittin, RN, RM, BN, CCRN, MHM, Catherine McCutcheon, RN, BHSN, GCCC, MHSN, MNNP, NP, Paula Longbottom, RN, GDCCN, BPsych(Hons), and Lukman Thalib, BSc, PhD (Biostatistics)

Background Workplace safety culture is a crucial ingredient in patients' outcomes and is increasingly being explored as a guide for quality improvement efforts.
Objectives To establish a baseline understanding of the safety culture in Australian intensive care units.
Methods In a nationwide study of physicians and nurses in 10 Australian intensive care units, the Safety Attitudes Questionnaire intensive care unit version was used to measure safety culture. Descriptive statistics were used to summarize the mean scores for the 6 subscales of the questionnaire, and generalized-estimation-equations models were used to test the hypotheses that safety culture differed between physicians and nurses and between nurse leaders and bedside nurses.
Results A total of 672 responses (50.6% response rate) were received: 513 (76.3%) from nurses, 89 (13.2%) from physicians, and 70 (10.4%) from respondents who did not specify their professional group. Ratings were highest for teamwork climate and lowest for perceptions of hospital management and working conditions. Four subscales, job satisfaction, teamwork climate, safety climate, and working conditions, were rated significantly higher by physicians than by nurses. Two subscales, working conditions and perceptions of hospital management, were rated significantly lower by nurse leaders than by bedside nurses.
Conclusions Measuring the baseline safety culture of an intensive care unit allows leaders to implement targeted strategies to improve specific dimensions of safety culture. These strategies ultimately may improve the working conditions of staff and the care that patients receive. (*American Journal of Critical Care.* 2013;22:93-103)

CNE 1.5 Hours

Notice to CNE enrollees:
A closed-book, multiple-choice examination following this article tests your understanding of the following objectives:

1. Identify the importance of and interest in safety culture in the health care system.
2. Describe how workplace safety culture contributes to patient outcomes.
3. Define strategies that may improve safety and patient outcomes.

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This article is followed by an *AJCC* Patient Care Page on page 104.

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Quality of care and patient safety have received unprecedented attention since the US Institute of Medicine published the seminal report *To Err Is Human*.[1] Nonetheless, injury of the public remains a perennial concern,[2,3] particularly in critical care, where the complexity of care and severity of illnesses make the health care system vulnerable to error.[4] Recently, workplace safety culture has gained prominence as a crucial ingredient in patients' outcomes and is increasingly being explored as a guide for quality improvement efforts.[2,5,6]

Safety culture has been defined as "the product of individual and group values, attitudes, perceptions, competencies, and patterns of behavior that determine the commitment to, and the style and proficiency of, an organization's health and safety management."[7]

Workplace safety culture has gained prominence as a crucial element in patients' outcomes.

Carney et al[8] described safety culture as "a professional culture that promotes effective and efficient communication among clinicians that is not hampered by hierarchical status or personality differences." Organizations with a positive safety culture are characterized by communications founded on mutual trust, by shared perceptions of the importance of safety, and by confidence in the efficacy of preventive measures.[9] As Davies et al[10] remarked, culture is "the way we do things around here."

About the Authors

Wendy Chaboyer is a faculty member and director of the National Health and Medical Research Council Centre of Research Excellence in Nursing Interventions for Hospitalised Patients, Research Centre for Clinical and Community Practice Innovation, Griffith Health Institute, Griffith University, Queensland, Australia. **Di Chamberlain** is a senior lecturer and coordinator of critical care studies, Flinders University, Adelaide, South Australia. **Karena Hewson-Conroy** is research and quality manager, New South Wales Intensive Care Coordination and Monitoring Unit, and honorary associate, Faculty of Nursing, Midwifery and Health, University of Technology, Sydney, Australia. **Bernadette Grealy** is a clinical nurse manager in the intensive care department, Queen Elizabeth Hospital, Adelaide, South Australia. **Tania Elderkin** is a clinical nurse educator and a clinical research nurse in the intensive care unit, Barwon Health, Victoria, Australia. **Maureen Brittin** is codirector of maternal and child health, Royal Darwin Hospital, Darwin, Northern Territory, Australia. **Catherine McCutcheon** is an intensive care liaison nurse practitioner, Calvary Health Care, Canberra, Australia. **Paula Longbottom** is a research assistant, Research Centre for Clinical and Community Practice Innovation, Griffith University. **Lukman Thalib** is an associate professor in the Faculty of Medicine, University of Kuwait, Safat, Kuwait.

Corresponding author: Wendy Chaboyer, RN, PhD, Griffith University, Gold Coast Campus, Queensland, Australia, 4222 (e-mail: W.Chaboyer@griffith.edu.au).

The increasing interest in safety culture in health care stems from evidence from a range of industries (eg, aviation, chemical and nuclear processing, construction) that a relationship exists between safety culture and injury involvement[11-13] and that employees who perceive a positive safety culture in the workplace are more likely to engage in safety-related behaviors than are personnel who perceive a negative culture.[14] In health care, safety culture has been linked to safety performance, described as both safety compliance (eg, following rules and regulations, wearing protective clothing, and avoiding risky practices), and as safety participation, which reflects workers' active involvement and commitment to safety.[11] Safety culture has also been associated with safe work practices,[15] injuries in nurses,[16] workplace accidents,[14] adverse events such as medication errors,[17] and pressure ulcers and falls.[16]

Several investigators have measured safety culture in intensive care units (ICUs). In a survey of 179 ICUs representing 7846 staff members in 3 countries (United States, United Kingdom, and New Zealand), Sexton et al[18] found significant variation among clinical areas in responses to 6 safety factors: teamwork climate, safety climate, perceptions of management, job satisfaction, working conditions, and stress recognition. These findings were supported by a more recent study[19] of 30 ICUs in the United States. Also, Huang et al[12] reported varied perceptions between ICUs within a single health care facility in the United States and noted that ICU nursing directors tended to overestimate the attitudes of staff members, particularly for teamwork. Significant variations in attitudes between nurses and physicians[11,20] and between different levels of staff (ie, frontline staff and management staff) have also been reported, particularly in the organizational culture factors of perceived working conditions and teamwork. Differences between nurses and physicians have also been reported in other clinical areas, such as the operating room.[8]

In Australia, Hewson[21] used the Safety Attitudes Questionnaire[18] to measure the perceptions of ICU

nursing, medical, and other staff members in 6 safety dimensions. Among nurses, mean scores were highest for job satisfaction and teamwork climate and lowest for perceptions of management; findings were similar among medical staff. Panozzo[22] used the Hospital Survey on Patient Safety Culture[7] to investigate the patient safety culture in a single ICU in South Australia. Although the survey results revealed that teamwork within the ICU was considered a strength, clinical incident reporting and clinical handovers (also termed handoffs) between care providers were identified as areas that needed improvement.

To date, understanding of the safety culture within Australian ICUs is limited. Studying the safety culture of an organization is one way to gain insight into patient safety and can provide the foundation for the development of appropriate interventions to improve patients' safety if required. Thus, the aim of this study was to establish a baseline understanding of the safety culture that exists in a sample of Australian ICUs. On the basis of previous literature, we hypothesized that nursing and medical staff differ in the perceptions of the safety culture and that nurses in leadership positions (eg, managers, educators) and bedside nursing staff differ in the perceptions of the safety culture.

Method

For this descriptive, multisite, nationwide cross-sectional study, a paper-based self-administered survey of physicians and nurses was used. The study was approved by the human research ethics committee at Griffith University, Queensland, Australia, and by the respective ethics committees at the participating hospitals. Consent was implied by return of the surveys.

Sample and Sampling Procedure

The Australia and New Zealand Intensive Care Society Centre for Outcome and Resource Evaluation (CORE) database was used to generate a random sample of 10 (of 79 eligible units) Australian ICUs with 10 or more beds. A total of 10 different hospitals were invited to participate in the study. The CORE database is a voluntary national registry of ICU patients. At the time of the study, 167 of 186 critical care units in Australia and New Zealand contributed data to CORE. When 4 of the randomly selected ICUs declined to participate, 4 other units in 4 other hospitals were chosen purposively, to achieve geographic diversity in sampling. Initial contact with the units was made via e-mail to nurse managers and medical directors, and letters and telephone calls were used for follow-up. All nursing and medical staff working in the chosen units were invited to participate in the study if they were working full- or part-time, so long as they had worked in the unit for at least 2 shifts or a mean of 15 h/wk per the SAQ recommendations.[23] Staff members who had worked in the ICU less than 1 month were excluded because limited exposure to the culture of the unit would preclude them from responding adequately to the survey.[20]

Data Collection

Data collection took place April through July 2009. The collection procedure was based on the guidelines for administration of the SAQ.[23] Members of the research team were assigned to liaise with 1 to 2 local coordinators at each site who were nominated by the participating unit. The site coordinators were responsible for hand delivering the survey package to staff and for collecting the completed questionnaires. Sealed envelopes (containing the surveys whether completed or not) were returned; therefore, respondents remained anonymous. Site coordinators either collected the sealed envelopes from staff members individually or had a central box for return envelopes. Each survey package contained a cover letter, the survey, and an envelope for the completed survey. Two weeks after distribution of the survey, the site coordinator reminded staff members of the study and asked them to complete the survey if they had not yet done so. One month after initial distribution of the survey, the site coordinator placed the envelopes into a larger overnight mail pouch and mailed them to a member of the research team (W. C.).

> Studying the safety culture of an organization can provide insight into patient safety and appropriate interventions to improve it.

Instrument

The ICU version of the SAQ[20] was used, with permission, to measure safety climate. The SAQ is a rigorous modification and refinement of the Flight Management Attitudes Questionnaire, which has been used extensively in aviation research.[18] The SAQ was chosen on the basis of its sound psychometric properties and its previous use in establishing benchmark safety culture data in a range of ICUs.[12,18] The ICU version contains 30 items for measuring 6 domains (scales) of safety culture: teamwork climate (6 items), safety climate (7 items), job satisfaction (5 items), stress recognition (4 items), perceptions of hospital management (4 items), and working conditions (4 items). Items for the various scales include the following[18]:

• Teamwork climate: Our physicians and nurses work together as a well-coordinated team.

• Job satisfaction: This hospital is a good place to work.

• Perception of hospital management: Hospital management supports my daily efforts in the ICU.

• Safety climate: ICU personnel frequently disregard rules or guidelines developed for our ICU.

• Working conditions: Our levels of staff are sufficient to handle the number of patients.

• Stress recognition: When my workload becomes excessive, my performance is impaired.

Responses were rated by using a 5-point Likert scale (1 = strongly disagree; 5 = strongly agree). Higher scale scores indicate more positive attitudes toward the particular safety domain. Reliability of the SAQ was assessed by using the Raykov ρ coefficient, and multilevel confirmatory factor analysis indicated good psychometric properties[18]; however, results of factor analysis were not reported.[20] The SAQ has been adapted for use in a wide array of clinical settings. Although the item content is similar in all versions, slight modifications have been made to tailor the survey to the workplace under study with regard to the name of the unit and differences in job designations.

The Safety Attitudes Questionnaire was chosen due to its sound psychometric properties and previous use in benchmarking safety culture data in intensive care units.

Demographic questions and 1 open-ended question about patient safety were also part of the questionnaire. In accordance with the SAQ guidelines,[20] the actual survey was 2 pages long and was presented in a physical format that allowed optical scanning for electronic data entry into a tab-delimited ASCII file.

Data Analysis

The SAQ was not designed to provide a total SAQ scale score. Subscale scores were calculated and transformed to a scale of 0 to 100 (0 = disagree strongly, 25 = disagree slightly, 50 = neutral, 75 = agree slightly, and 100 = agree strongly). The number and proportion of respondents who scored positively, defined as 75 or greater, for each subscale (equivalent to agree slightly or agree strongly) were calculated as done previously.[12,20] Cronbach α was used to measure the internal consistency reliabilities of each SAQ subscale. A χ^2 test was used to examine variation in subscale scores across sites. Safety subscale scores were compared between professional groups (physicians vs nurses and nurse leaders vs bedside nurses) by using generalized-estimating-equations models to account for the clustered nature of the data. Classical generalized linear models and traditional regression models could not be used because they assume independence between observations. But, because individual responses from 1 ICU will not be "independent" of each other, some statistical correlation is expected. Adjustments for clustering effects are important when there is a correlation within a cluster. The variances of between-cluster comparisons may be significantly underestimated, a situation that may affect the results of hypothesis tests.

In order to calculate the mean scores for each role category, the responses were assumed to be normally distributed, and an identity link function was specified. These generalized-estimating-equations models provided adjusted means and standard errors, and *P* values (obtained by using the Wald statistic), which were used to compare the differences between groups. The differences between professional groups were further evaluated after adjustments were made for potential confounders such as age, sex, and years of work experience. Subcategories of nurses were further collapsed to compare nurse leaders (nurse educators, nurse managers, clinical nurse consultants, charge nurses, and liaison nurses) with bedside nurses (both registered nurses and enrolled nurses, whose role is similar to that of licensed practical nurses in North America). The α level was set at 0.05. Content analysis was used to summarize the findings from the single open-ended question.

Results

In total, 10 ICUs from 4 of the 5 Australian states and 1 Australian territory were represented in the sample. A total of 672 responses (50.6% response rate) were received: 513 (76.3%) from nurses, 89 (13.2%) from physicians, and 70 (10.4%) from staff members who did not specify their professional group. The response rate varied widely by site, from a low of 27.5% to a high of 87.3%. The mean ages of the physicians and nurses were 35.1 years (SD, 8.1) and 35.8 years (SD, 8.6), respectively. Of the 563 respondents who reported their sex, 425 (75.5%) were female: 398 (83.3%) of the 478 nurses and 27 (31.8%) of the 85 physicians. Of the 548 respondents who reported their work status, 348 (63.5%) worked full time: 271 (58.5%) of the 463 nurses and 77 (90.6%) of the 85 physicians.

Table 1 displays the Cronbach α and mean subscale scores. Cronbach α reliabilities varied from 0.65 to 0.81. The number and proportion of responses that were positive (ie, scores ≥ 75) for each subscale were also computed (Table 2) and showed that the proportion of respondents who were positive was

Table 1
Safety Attitudes Questionnaire subscale results

Subscale	Cronbach α	Score, mean (SD)										
		Whole sample (N = 672)	Site 1 (n = 62)	Site 2 (n = 78)	Site 3 (n = 65)	Site 4 (n = 48)	Site 5 (n = 34)	Site 6 (n = 149)	Site 7 (n = 88)	Site 8 (n = 70)	Site 9 (n = 40)	Site 10 (n = 38)
Job satisfaction	0.81	68.6 (19.2)	75.4 (18.7)	75.3 (17.4)	65.0 (15.6)	63.9 (20.4)	68.5 (19.7)	65.7 (19.1)	67.3 (20.2)	66.1 (19.7)	71.8 (18.7)	69.2 (17.1)
Teamwork climate	0.74	69.8 (16.2)	77.1 (16.2)	75.9 (13.1)	68.6 (16.1)	65.2 (17.5)	70.5 (15.3)	66.9 (14.1)	66.6 (16.6)	66.1 (18.8)	75.6 (14.7)	70.0 (15.3)
Safety climate	0.71	68.5 (14.9)	71.5 (15.7)	72.8 (13.7)	66.9 (14.4)	65.7 (14.4)	72.0 (13.9)	66.0 (14.7)	68.5 (15.2)	65.9 (17.0)	72.9 (14.7)	66.3 (11.3)
Working conditions	0.65	59.1 (18.9)	64.5 (19.5)	64.6 (13.8)	53.1 (18.8)	51.3 (17.9)	56.6 (22.6)	57.9 (19.0)	59.9 (18.3)	57.7 (20.5)	64.6 (16.2)	61.3 (15.7)
Perceptions of hospital management	0.68	54.3 (20.2)	60.1 (20.5)	58.0 (18.8)	50.3 (18.4)	46.6 (21.9)	50.0 (23.2)	48.9 (18.7)	61.7 (15.9)	50.8 (21.5)	60.5 (21.1)	57.9 (17.7)
Stress recognition	0.69	68.6 (20.9)	63.9 (25.2)	69.4 (17.7)	69.1 (21.3)	73.8 (20.0)	60.1 (22.1)	70.2 (20.9)	67.1 (19.8)	70.5 (20.2)	67.0 (18.5)	70.9 (21.6)

Table 2
Number and proportion of respondents who scored positively (score ≥ 75) on the Safety Attitudes Questionnaire

Subscale	No. (%) of respondents											
	Whole sample (N = 672)	Site 1 (n = 62)	Site 2 (n = 78)	Site 3 (n = 65)	Site 4 (n = 48)	Site 5 (n = 34)	Site 6 (n = 149)	Site 7 (n = 88)	Site 8 (n = 70)	Site 9 (n = 40)	Site 10 (n = 38)	*P* [a]
Job satisfaction	305 (45.4)	41 (66.1)	51 (65.4)	21 (32.3)	19 (39.6)	12 (35.3)	57 (38.3)	41 (46.6)	30 (42.9)	19 (47.5)	14 (36.8)	<.001
Teamwork climate	303 (45.1)	43 (69.4)	51 (65.4)	25 (38.5)	15 (31.2)	16 (47.1)	55 (36.9)	32 (36.4)	26 (37.1)	24 (60.0)	16 (42.1)	<.001
Safety climate	262 (39.0)	31 (50.0)	43 (55.1)	19 (29.2)	17 (35.4)	18 (52.9)	42 (28.2)	36 (40.9)	21 (30.0)	24 (60.0)	11 (28.9)	<.001
Working conditions	167 (24.9)	26 (41.9)	26 (33.3)	11 (16.9)	4 (8.3)	7 (20.6)	40 (26.8)	19 (21.6)	13 (18.6)	12 (30.0)	9 (23.7)	.003
Perceptions of hospital management	126 (18.8)	19 (30.6)	16 (20.5)	8 (12.3)	5 (10.4)	6 (17.6)	16 (10.7)	21 (23.9)	13 (18.6)	13 (32.5)	9 (23.7)	.006
Stress recognition	323 (48.1)	25 (40.3)	38 (48.7)	33 (50.8)	27 (56.2)	9 (26.5)	77 (51.7)	39 (44.3)	38 (54.3)	15 (37.5)	22 (57.9)	.09

[a] From χ^2 test.

low, ranging from 18.8% to 48.1% for various subscales. An examination of the subscale scores from the 6 hospitals with the 3 highest and the 3 lowest response rates did not indicate any patterns of response. Perceptions of hospital management were ranked the lowest by 9 of the 10 sites. Working conditions were also ranked low consistently. Overall, teamwork climate had the highest rating, indicating that respondents were more positive toward the quality of collaboration between personnel than toward other domains. The χ^2 tests showed significant differences between sites for all scales except stress recognition (Table 2).

Table 3 displays response comparisons between physicians and nurses and between nurse leaders and bedside nurses. Four subscales, job satisfaction, teamwork climate, safety climate, and working conditions, were scored significantly higher by physicians than by nurses. These differences remained significant even after adjustments were made for potential

Table 3
Comparison of subscales of the Safety Attitudes Questionnaire by using generalized-estimation-equations (GEE) models

	Score,[a] mean (SD)					
	Job satisfaction	Teamwork climate	Safety climate	Working condition	Perceptions hospital management	Stress recognition
Physicians	77.1 (2.2)	79.9 (1.9)	75.2 (1.7)	67.9 (2.2)	53.3 (2.7)	72.2 (2.2)
Nurses	67.6 (1.3)	68.8 (1.2)	67.8 (0.9)	57.6 (1.3)	54.5 (1.9)	68.6 (0.9)
P[a]	<.001	<.001	<.001	<.001	.59	.12
Adjusted *P*[b]	<.001	<.001	<.001	<.001	.39	.10
Nurses						
Leaders	66.7 (1.9)	68.8 (1.6)	67.9 (1.4)	56.1 (1.9)	52.0 (2.4)	68.6 (1.6)
Bedside	69.4 (1.6)	69.6 (1.4)	68.5 (1.2)	59.8 (1.6)	55.9 (2.2)	68.7 (1.1)
P[a]	.13	.60	.68	.04	.04	.96
Adjusted *P*[b]	.10	.49	.62	.009	.01	.89

[a] GEE adjusted.
[b] GEE adjusted for age, sex, and work experience.

Table 4
Participants' recommendations to improve patient safety

Recommendation	Response frequency (N = 895)	Verbatim responses
Communication and teamwork	317 (35%)	Foster better communication between doctors and nurses Promote standardization and adherence to protocols Provide better handovers
Staffing	235 (26%)	Improve staffing levels Consider skill mix, experience, and required expertise Better rostering practices to support staff circumstances
Education and training	222 (25%)	Offer formal (classroom) educational opportunities Provide clinical (bedside) training to both new and experienced staff Better learning from clinical incidents Clinical nurse educator positions needed
Physical resources	51 (6%)	Ensure needed equipment is available Maintain/service equipment Redesign bed space to improve the safety of the environment

confounders such as age, sex, and experience. Two subscales, working conditions and perceptions of hospital management were scored significantly lower by nurse leaders than by bedside nurses. These differences also remained significant after adjustments for potential confounders.

Table 4 provides a summary of the findings from the open-ended question. The most frequently mentioned recommendations to improve patient safety were related to communication and teamwork, staffing, education and training, and physical resources.

Discussion

This study was the first multisite study to determine perceptions of safety culture within ICUs in Australia. Although we found some intersite variation, scores generally were 50 to 75 (neutral to agree slightly) for most subscales. This finding is similar to the results of the large international study undertaken a few years earlier by Thomas et al,[20] who used the SAQ and reported on mean subscale scores for ICUs in the United States, the United Kingdom, and New Zealand. For example, variations in the mean scores for the 2 subscales safety climate and working conditions were 6 or less (of 100 possible), suggesting that in the 4 countries, ICU medical and nursing staff have consistent perceptions about these aspects of safety culture. Unfortunately, the mean scores on these subscales were less than a score of 75, which equates to agree slightly. Perhaps these findings indicate that some aspects of ICU culture cross geographic and cultural boundaries and can be improved on. Because of the proximity of Australia and New Zealand, the Australian and New Zealand Intensive Care Society, and joint ICU conferences, the responses to teamwork climate and stress recognition in our study were similar to the responses of the New Zealand sample in the study by Thomas et al.[20] However, we found almost 10-point differences for the subscales job satisfaction and perceptions of management; scores in our sample were more positive than those in the New Zealand sample. Of interest, the results from our study of 10 Australian ICUs were most similar to those of the 53 ICUs in the United States in the study by Thomas et al.[20] The reason for this finding is unknown but may reflect an influence of US ICUs and organizations such as the Society of Critical Care Medicine on the Australian ICU culture.

Importantly, overall, the proportion of respondents who rated the various subscales positively (ie, scores ≥ 75) was less than 50%. According to high-reliability organization theory, achieving high reliability requires a safety culture that is highly uniform in both safety attitudes and experiences.[24] In other words, having many people strongly support safety principles and engage in the appropriate behaviors is not enough—almost everyone must do so almost all the time.[25] Our findings suggest that improvements in safety culture in Australian ICUs may be warranted if a goal is to achieve high uniformity and reliability.

Overall, teamwork climate, job satisfaction, and stress recognition were the 3 most highly rated subscales in our study. These findings are similar to those of previous single-site ICU studies in Australia.[21,22] The importance of teamwork in a critical care setting should not be underestimated. Teamwork behaviors, including communication, leadership, coordination, and decision making, are crucial for providing optimal patient care in an ICU.[26] If the teamwork domain requires improvement, several programs, such as TeamSTEPPS[27] and the Anaesthetists' Non-Technical Skills,[28] are available to provide training in this area.

The subscale hospital management consistently received the lowest score, indicating that respondents were least positive toward managerial action at the level of hospital administration. This finding is consistent with the results of previous research,[18,23] suggesting that hospital management is viewed as a problem in many ICUs and may be associated with poorer outcomes for patients.[19] In an Australian study of frontline ICU nurses (ie, nurses working in direct patient care),[29] leading by example, effective communication, ability to think outside the management square, knowing your staff, and stepping up in times of crisis were perceived as characteristics of strong leaders. Most likely, close contact between frontline staff and senior leaders opens lines of communication and provides leaders with an opportunity to demonstrate their commitment to creating a culture of safety. One way to obtain this close contact is by instituting executive walk rounds in which hospital executives circulate throughout inpatient care areas to declare the executives' commitment to open communication and safety and to obtain direct feedback from frontline personnel. The benefits of executive walk rounds were demonstrated in a study by Thomas et al[30]; after such rounds were started, a number of safety issues were addressed. Plausibly, in that study, ICU nurse leaders' lower perceptions of management signaled a need for increased support from higher levels of hospital administration in fulfilling the leaders' role in quality-improvement efforts. Because of the shortage of nurses, efforts to create and maintain a work milieu conducive to increasing nurses' satisfaction may be beneficial.[31,32]

We found differences in attitudes between physicians and nurses: physicians scored 4 safety domains significantly higher than did nurses. These findings are consistent with the results of 2 previous US studies.[12,19] Conceivably, the differences may reflect a need to target safety culture interventions slightly differently for different professional groups, as suggested by Carney et al,[8] who recommended that safety interventions explicitly address profession-based differences. Although much remains unknown about the cause of differences between physicians and nurses and whether or not these differences have an impact, research[33,34] in other areas of health care has shown that lower-status persons are less likely than persons of higher status to speak up about areas of concern. Thomas et al[20] note the fundamental differences between physicians and nurses, including status and authority, sex, training, and patient care responsibilities, and suggest that training in conflict resolution, effective methods of opinion and knowledge assertion, listening skills, and conducting collaborative rounds might be beneficial.

Having many people strongly support safety principles and behave appropriately is not enough—almost everyone must do so almost all the time.

In our study, nurse leaders and bedside nurses were similar in their perceptions of the safety culture. Nurse leaders did rate perceptions of hospital management lower (less positively) than did bedside nurses. Other investigators[12,35] have reported significant differences between ICU leaders and bedside staff, a finding that may reflect the tendency of leaders to have more direct contact with senior hospital managers. However, contrary to our results, in other studies,[12,35] nurse leaders perceived safety climate more positively than did bedside staff, a finding that might reflect the leaders' active involvement in quality improvement and patient safety initiatives.

Finally, the qualitative, open-ended question allowed respondents to share their thoughts and recommendations. The in-depth feedback and recommendations provided by frontline staff should be regarded as key information in the development of safety action plans. Consistent with this idea of obtaining both qualitative and quantitative data on

safety culture, Allen et al[36] advocate adding in-depth qualitative interviews to quantitative surveys of safety culture. A mixed-method approach has numerous benefits, such as the ability to answer a broader range of research questions and the ability to overcome the weaknesses in a particular method by using the strengths of another. However, resources such as funding, time, expertise, and the methods used to combine results must also be considered when mixed-methods research is done.[37]

Of note, the key areas for improvement (ie, communication and teamwork, staffing, education and training, and physical resources) identified by staff in our study were identified by respondents in all 10 ICUs. This finding is consistent with the results of Huang et al[12] and Panozzo,[22] who also reported similar categories. Importantly, in many organizations, medical and nursing leaders can adopt or adapt some of the recommendations made by our study respondents to improve patients' safety. Previous research[29] also suggests that good communication with staff is a characteristic of strong leaders. Strategies such as including nurses in patient management decisions,[31] creating a learning environment with emphasis on orientation and continuing education,[31] and using collaborative communication interventions[38] may have beneficial effects.

Nurse leaders and bedside nurses were similar in their perceptions of the safety culture.

Once a safety culture baseline is established, strategies can be initiated to improve the culture if required. For example, a US study[18] of almost 150 ICUs indicated that a hospital-wide, unit-based patient safety program was associated with improvements in safety climate. That safety program included "steps to identify hazards, partner with senior executive to fix hazards, learn from defects, and implement communication and teamwork tools."[39] In recent study of 71 ICUs, Sexton et al[40] also noted a significant improvement in SAQ scores after ICU personnel participated in a patient safety program designed to improve teamwork and culture. Along with other research that shows that a positive safety culture has beneficial effects on both patients[16,17] and staff,[14,16] this emerging evidence on interventions to improve safety culture suggests that a focus on safety culture may be a useful way to improve health services.

The importance of a positive working environment and safety culture has been linked to both patient and staff outcomes. For example, in a study[41] of more than 1100 medical surgical nurses in 42 US hospitals, job satisfaction was associated with safety climate. In addition, the results of a study[42] of more than 2300 nurses working in critical care units showed an association between organizational climate and nurses' intention to leave their jobs. More recently, Vigorito et al[43] found that an SAQ action plan was associated with a decrease in catheter-associated bloodstream infections and a trend toward better job satisfaction for staff. Finally, in their review and proposed model of teamwork, one aspect of safety culture, Reader et al[26] identified beneficial outcomes for staff, such as job satisfaction and morale. Although these benefits are beginning to emerge, more work is required to demonstrate these benefits more clearly.

Limitations

Our study had several limitations. First, because we did not know which sites had declined to participate in the study, we could not contact them to find out their reasons for not participating. Thus, we could not determine if the sites that declined to participate differed from the sites that agreed to participate. Second, only 89 physicians responded to the survey, a relatively small sample. Third, the response rates from some sites were low, even though the surveys were hand delivered as recommended by the SAQ administering guidelines. Although the guidelines suggest that response rates of 60% to 80% can be achieved by using hand delivery, our response rate was 50%. And, because the surveys were anonymous, we had no way to follow up nonresponders. Our overall response rate was slightly higher than the rates of Huang et al[19] and Singer et al[24] but less than the rate of Sexton et al.[40] Although the generalizability of the research to other settings may be limited by the response rate, of note, the pattern of results was similar to the pattern of other international studies.[18,20] Fourth, the reliability of 3 scales—working conditions, perceptions of hospital management, and stress recognition—was less than 0.70; thus, our results should be interpreted cautiously. These subscale reliabilities are somewhat lower than those of Huang et al,[19] who reported results of 0.67 to 0.73 for the same 3 subscales. Of interest, Blegen et al[44] also found low reliability scores for another validated safety culture survey. Perhaps, the measurement of safety culture requires refinement in particular settings. Finally, cross-sectional analysis does not allow any insights into whether ICU culture is stable over time or changes along with transitions in the workforce.

We have several recommendations for future research. First, research into both the reasons behind the differences in nurses' and physicians' attitudes

and the significance of the differences may help inform future patient safety initiatives. Second, longitudinal studies to evaluate the effects of safety activities over time may be beneficial. In a recent study of 71 ICUs in the United States, Sexton et al[40] found that patient safety programs influenced perceived safety climate. Future studies might also investigate the associations between safety culture and patient outcomes, as Huang et al[19] did recently, as well as patient satisfaction, staff satisfaction and retention, and other clinical outcomes such as adverse events.

In conclusion, in this study, less than half of the respondents identified the safety culture in 10 Australian ICUs as positive. Differences between physicians and nurses and between nurse leaders and bedside nurses suggest that initiatives to improve safety culture may require tailoring the programs to particular subgroups within the unit. Importantly, measuring an ICU's baseline safety culture allows leaders to implement targeted strategies to improve specific dimensions of safety culture, improvements that may ultimately improve the working conditions of staff and the care patients receive.

FINANCIAL DISCLOSURES
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For more about safety culture, visit the *Critical Care Nurse* Web site, **www.ccnonline.org**, and read the article by Southworth et al, "The Journey to Zero Central Catheter–Associated Bloodstream Infections: Culture Change in an Intensive Care Unit." (April 2012).

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CNE Test

Test ID A13222: Safety Culture in Australian Intensive Care Units: Establishing a Baseline for Quality Improvement

Learning objectives: 1. Identify the importance of and interest in safety culture in the health care system. 2. Describe how workplace safety culture contributes to patient outcomes. 3. Define strategies that may improve safety and patient outcomes.

1. Quality of care and patient safety have received unprecedented attention since which of the following occurred?
a. Organizations began monitoring quality of care and patient safety
b. *To Err Is Human* was published by the US Institute of Medicine
c. Investigators began measuring safety culture
d. Reimbursement became based on patient outcomes

2. Which of the following groups below tended to overestimate the attitudes of staff members, particularly for teamwork?
a. Intensive care unit (ICU) nursing directors
b. Hospital administrators
c. Medical directors
d. Educators

3. The Hospital Survey on Patient Safety Culture identified which of the following areas as needing improvement?
a. Job satisfaction
b. Teamwork climate
c. Working conditions
d. Clinical handovers between care providers

4. Nursing and medical staff were invited to participate in the study if they worked in the unit for at least how long?
a. 1 month
b. 6 months
c. 12 months
d. 24 months

5. The ICU version of the Safety Attitudes Questionnaire (SAQ) was used after modification and refinement of a questionnaire from which of the following industries' research?
a. Healthcare
b. Chemical and nuclear processing
c. Aviation
d. Construction

6. The differences between professional groups were further evaluated after adjustments were made for potential confounders, except which of the following?
a. Age
b. Sex
c. Race
d. Years of work experience

7. Which of the following dimensions did the participants rank as lowest at 9 of the 10 sites?
a. Perceptions of hospital management
b. Teamwork climate
c. Job satisfaction
d. Safety climate

8. This study indicates that which of the following dimensions should not be underestimated in a critical care setting?
a. Working conditions
b. Job satisfaction
c. Teamwork climate
d. Safety climate

9. Which of the following was suggested to be a characteristic of strong leaders?
a. Management skills
b. Organizational ability
c. Teamwork
d. Communication with staff

10. In a study of medical surgical nurses in US hospitals, safety climate was associated with which of the following?
a. Job satisfaction
b. Stress recognition
c. Safety climate
d. Working conditions

11. The questionnaire had 1 open-ended question about patient safety. Which of the following is an advantage of this?
a. It allowed respondents to share their thoughts and recommendations.
b. It collected quantitative data.
c. It decreased time for interpretation of the study.
d. It reduced study bias.

12. Patient and staff outcomes have been linked to which of the following dimensions?
a. Job satisfaction
b. Positive working environment
c. Stress recognition
d. Teamwork climate

Test ID: A13222 Contact hours: 1.5; pharma 0.0 Form expires: March 1, 2016. **Test Answers:** Mark only one box for your answer to each question.

1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.
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❑b	❑b	❑b	❑b	❑b	❑b	❑b	❑b	❑b	❑b	❑b	❑b
❑c	❑c	❑c	❑c	❑c	❑c	❑c	❑c	❑c	❑c	❑c	❑c
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