Assessing Patient Safety Culture: A Review and Synthesis of the Measurement Tools

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Context: Interest in the measurement of organizational culture that supports patient safety has grown among health care providers.

Objective: To review available quantitative instruments for the assessment of patient safety culture.

Methods: Surveys were identified through a systematic review, which included a MEDLINE and internet search, expert input, and review of references from relevant articles. For each instrument, we examined target populations, number of questions, safety dimensions covered, reliability and validity testing, and ease of use.

Results: Our review yielded 13 instruments, covering a total of 23 individual dimensions of patient safety grouped into the broad categories of management/supervision, risk, work pressure, competence, rules, and miscellaneous. The instruments varied substantially in content (number of dimensions addressed), emphasis, and length. Although most of the surveys have substantial face validity, limited validation of the instruments by comparison with qualitative measures of patient safety culture, such as in-depth interviews or observation, has been done, and few data exist on their ability to predict other existing patient safety outcomes or indicators. Questions about how best to analyze and interpret the results remain.

Conclusions: The desire to address safety culture in the hope of improving patient safety will continue to motivate researchers and managers to make use of safety culture surveys. Choice of instruments will depend on the intended use, the target population, reliability, validity, and other considerations. An awareness of the differences between the instruments and their collective limitations should facilitate this endeavor.

Key Words: quantitative instruments, organizational culture

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In the 1999 Institute of Medicine Report, *To Err Is Human*, medical errors were highlighted as a major cause of morbidity and mortality in the U.S. health system, with 44,000 to 98,000 deaths per year.[1] In formulating a response to the problem of errors, the Institute of Medicine suggested that "errors are caused by faulty systems, processes, and conditions that lead people to make mistakes or fail to prevent them." The culture surrounding patient safety can be seen as one of the systems or conditions closely linked to the problem of errors in health care. Patient safety culture is increasingly viewed as central to moving toward making hospitals high-reliability organizations.[2] Recent legislation passed in the United States (S. 544/H.R. 3205) establishes a "confidential reporting structure in which physicians, hospitals, and other health care professionals and entities can voluntarily report information on errors to Patient Safety Organizations," which strives to enhance patient safety culture through measurement and appropriate interventions.[3]

Efforts to assess and improve safety culture and to better define its role in patient safety are facilitated by its measurement. By identifying attributes of an organization that are both malleable and potentially related to safety, managers can intervene to improve the quality of care. Existing patient safety culture measurement tools are numerous, whereas little information in the literature provides guidance to users or researchers in the selection of tools for research or safety improvement measurement initiatives. Prior reviews of culture instruments designed for health care have focused on organizational culture or have been inclusive of worker safety instruments, in addition to those that address patient safety culture.[4–6]

The goal of this research was to systematically review the available patient safety culture assessment surveys. We reviewed the literature to (1) identify the available patient safety instruments, (2) identify the dimensions of patient safety culture addressed in the instruments, and (3) evaluate surveys for their validity and usability.

METHODS

Identification and Selection of Surveys

We sought to identify peer-reviewed articles that described survey instruments for assessing patient safety culture in hospitals. We began by conducting a MEDLINE review of the published literature from 1966 to week 1 of April 2004. The term "safety" was used as a text search word without mapping to subject headings (which groups subject categories.) Separately, the terms "culture," "attitude," and "climate" were searched, without mapping to subject headings, except for "culture," which was mapped to "culture," "organizational culture," and "culture.mp" to avoid references to bacterial or cell culture. This list of the 3 terms

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(culture, attitude, climate) was combined using the "or" modifier. The search under "safety" was then crossed with these 3 terms (culture, attitude, climate) using the "and" modifier. This list was then crossed with the term "patient" using the "and" modifier, and when limited to English language, the records were reduced to 496.

The abstracts for these 496 references were reviewed, and the articles that were of relevance to patient safety culture were selected for a more detailed article review. Specifically, articles involving patient safety culture assessments, survey tools, or that suggested that a survey had been used in the study were selected.

In addition, an internet search using Google.com was conducted (February 10, 2004) with the terms "patient and safety and culture and survey," and 164,000 records were obtained and sorted in the order of highest to lowest relevance. The first 100 records were reviewed, and several survey instruments were identified in addition to the ones identified through MEDLINE, experts, and bibliographic references. We identified additional instruments by asking experts in safety culture if they were aware of additional survey instruments not already included on our list. The above strategy yielded a total of 45 health care–specific safety culture instruments.

From the list of 45 surveys, we excluded 32 survey instruments that were intended primarily for use within a single institution (e.g., internal use only), proprietary surveys that were not publicly available, surveys that did not quantitatively assess patient safety culture (e.g., structured interviews), and surveys that were adaptations or variations of preexisting instruments that were already on our list. The remaining 13 surveys were selected for detailed review, the results of which are presented later.

Identification of Safety Dimensions

Inasmuch as there is no universally agreed upon battery of safety questions, we assumed surveys would vary in what they covered.

How would we capture this variation across surveys in the dimensions of patient safety that they addressed? We found it impossible to simply record what the authors stated regarding the content of the survey instruments. First, not all of the authors explicitly identified or described the dimensions they covered. Second, the definitions of safety dimensions used by the authors who did state their dimensions varied from author to author. Finally, for some questions, there can be legitimate differences in judgment as to which dimension certain questions belonged to.

Therefore, the authors (A.S., B.K., and E.C.) developed by consensus a list of safety culture dimensions. We began with a list of safety culture dimensions that have been proposed in the literature and include (1) management and institutional commitment to safety, (2) overall perception of safety, (3) frequency of event reporting, (4) organizational learning, (5) teamwork, (6) communication openness, (7) feedback and communication about error, (8) nonpunitive response to error, (9) staffing, (10) management support for patient safety, (11) handoffs and transitions, (12) working conditions, (13) stress recognition, (14) job satisfaction, (15) hazard detection, and (16) measuring safety.[4–16] The terminology and scope of the dimensions cited in the literature varied (for example, some authors defined "teamwork" broadly and included within it questions that other authors placed in a separate dimension called "communication openness"). We chose labels for the dimensions that we felt readily communicated the safety area addressed. To facilitate comparisons of content in instruments, we tended to use narrowly rather than broadly encompassing dimensions. We created new dimensions to accomodate survey items that did not easily fit any of the dimensions described in the literature. For example, we added a dimension "reporting infrastructure" to accommodate items that asked about the existence of an adverse event reporting system. Certain dimensions were merged or deleted where appropriate. This process led to the final list of 23 dimensions, listed in Table 2. Although all of these can be construed as relevant to patient safety, not all of them are clearly related to safety culture.

We assigned each question from each survey to one of the dimensions identified previously based on a process of consensus of the study authors. In an attempt to examine the extent to which our categorization of items would be replicated by outside safety experts, we contacted 18 experts in patient safety and requested that they assign 26 questions (2 randomly selected questions drawn from each of the final 13 surveys) to the dimension that seemed to best fit each question. Nine experts responded, representing a response rate of 50%.

Evaluation of the Instruments

There are no published, widely accepted criteria for comparing and contrasting existing survey tools. Generally, we follow the approach taken by previous reviews of safety and organizational culture instruments.[4–6] We examined the characteristics of the surveys in terms of length and target audience, the rigor with which they were developed and field tested, their content, and their psychometric properties, including reliability and validity.

RESULTS

Survey Characteristics

The descriptive characteristics of the 13 survey tools are displayed in Table 1. All of the surveys were designed to be self-administered. All of the surveys used closed-ended, Likert response categories; some included 1 or more open-ended questions as well. They are grouped according to their intended sample population, that is, generalist versus specialist focus.

The surveys had an average of 51 questions; a survey of this length should take 10 to 15 minutes to complete. The shortest survey was the Safety Climate Scale with 10 questions, whereas the longest was the Veterans Health Administration survey with 112 questions.

Of the 13 surveys, 9 were designed for general administration to hospital personnel including physicians, nurses, pharmacists, and other caregivers. Four of the surveys

TABLE 1. Survey Instruments and Their Description

Survey Instrument	No. Items and Nature	Intended Sample Population	No. Dimensions (n = 23)	Generalist or Specialist
Safety Attitudes Questionnaire,* ICU version[17]	63 Closed-ended items; Likert Agree-disagree Scale	All hospital personnel	19	Generalist
Veteran Affairs Palo Alto/ Stanford Patient Safety Center for Inquiry[9]	(Long version) 89 closed-ended items; Likert Agree-disagree Scale	All hospital personnel	18	Generalist
Veterans Health Administration Patient Safety Questionnaire†	112 Closed items; Likert Agree-disagree Scale	All hospital personnel	18	Generalist
Hospital Safety Culture Questionnaire[19] (modified from Operating Room Management Attitudes Questionnaire [ORMAQ])	99 Closed- and open-ended items; Likert Agree-disagree Scale	Hospital personnel	14	Generalist
Agency for Healthcare Research and Quality Hospital Survey on Patient Safety[23]	44 Closed items; Likert Scales	Hospital personnel	14	Generalist
Safety Climate Survey[20]	21 Closed-ended items; Likert Agree-disagree Scale	Hospital personnel	11	Generalist
Allina Hospitals and Clinics‡	20 Closed and open items; Likert Agree-disagree Scale	Clinic and hospital personnel (2 versions)	8	Generalist
Culture of Safety Survey[21]	27 Closed items; Likert Agree-disagree Scales	Hospital personnel	8	Generalist
Teamwork and Patient Safety Attitudes Questionnaire[7]	24 Closed items; both agree-disagree and 5-point Likert Scale items	Hospital personnel	4	Generalist
Modified ORMAQ[12]	60 Closed-ended items; Likert Agree-disagree Scale	Operating room personnel	14	Specialist
Patient Safety Climate in Anesthesia§	54 Closed items; Likert Agree-disagree Scale	Anesthesiologists, Certified Registered Nurse Anesthetist, and anesthesia residents	13	Specialist
Trainee Supplemental Survey (Children's Hospital Boston)‖	41 Closed items; 6-point Likert Scale	Residency training programs	6	Specialist
Safety Climate Scale[8]	10 Closed items; 5-point Likert Agree-disagree Scale	Physicians, nurses, pharmacists	4	Specialist

*There exists 6 different versions of the SAQ based on the intended setting.
†Available at: www.va.gov/ncps/TIPS/Docs/TIPS_JulAug06.pdf.
‡A. Kaissi, personal communication, April 2004.
§J.B. Cooper, personal communication, April 2004.
‖G. Parry, personal communication, September 2006.

were designed for specific respondents: The Modified Operating Room Management Attitudes Questionnaire (ORMAQ)[12] was designed for operating room personnel, the Patient Safety Climate in Anesthesia for personnel in anesthesia, and the Trainee Survey from Children's Hospital Boston for resident physicians. The Safety Climate Scale was designed for general hospital personnel; however, its focus is primarily on management and institutional commitment to safety (70% of questions), therefore placing this in the specialist category. Although we classified the SAQ as a general focus survey, there exists several SAQ adaptations for a number of specific clinical areas.[14]

The surveys differed substantially from one another in material covered. No survey measured all 23 dimensions. Surveys had an average of 12 dimensions represented, with a range from 4 to 19 (Table 1). The SAQ[17] Intensive Care Unit (ICU) Version contained the most (19/23), and the Teamwork and Patient Safety Attitudes Questionnaire[7] (4/23) and the

Safety Climate Scale[8] (4/23) contained the least number of dimensions.

Dimensions of Patient Safety

The 13 surveys included a total of 657 questions. We categorized each question into 1 of 23 dimensions of patient safety culture (Table 3). We further grouped the dimensions for ease of discussion using the 6 groupings proposed by Flin et al[6] and Guldenmund[5] based on their review of the safety culture literature (Table 2). Examples of questions that were assigned to safety dimensions are listed in Table 4.

TABLE 2. Important Factors in Patient Safety Culture Assessment Tools

Category/Dimension	Definition
Management/supervision	
Management and institutional commitment to safety	Questions that assess respondent's beliefs, attitudes, and experiences regarding the institutional support for patient safety, including the balance sought between workload, profitability, and safety, and including leadership commitment to patient safety
Adequacy of training and supervision	Questions that assess respondent's beliefs and experiences regarding the adequacy of training and supervision of people within the institution or subunit
Institutional responses	Questions that assess respondent's knowledge of, beliefs, and attitudes about institutional responses to patient safety issues
Nonpunitive response to error	Questions that assess respondent's beliefs, attitudes, and experiences regarding the institution or subunit's response to error; that is, is it a blame and shame or nonpunitive response?
Safety system	
Detection infrastructure	Questions that assess the existence and effectiveness of mechanisms to detect error at the institution or subunit regarding patient safety
Handoffs and transitions and coordination of care	Questions that assess respondent's beliefs and experiences regarding patient safety that arise during handoffs and transition periods
Patient safety planning	Questions that assess respondent's beliefs and experiences regarding the activities focused on planning for patient safety within a department or subunit
Adequacy of staffing	Questions that assess respondent's beliefs and experiences regarding the adequacy of staffing
Adequacy of equipment, information, and processes	Questions that assess respondent's beliefs and experiences; the supply, accessibility, or working condition of equipment relevant to patient safety
Reporting infrastructure	Questions that assess respondent's knowledge, attitudes, and frequency of use of institutional reporting mechanisms
Risk	
Risk taking	Questions that assess respondent's beliefs and experiences regarding risk taking behaviors performed by oneself or others within a department or subunit
Willingness to ask for help	Questions that assess respondent's beliefs and experiences regarding the attitudes toward asking for help when needed within a department or subunit
Work pressure	
Work pressure	Questions that assess respondent's beliefs and experiences regarding the degree of work pressure or production pressure within a department or subunit
Competence	
Adequacy of crisis management	Questions that assess respondent's beliefs and experiences regarding patient safety in emergency situations
Procedures/rules	
What should be reported and to whom	Questions that assess respondent's beliefs and experiences regarding the types of events that should be reported within a department or subunit and/or to whom they should be reported
Compliance with rules and procedures	Questions that assess respondent's beliefs and experiences regarding compliance with policies, rules, and procedures that are in effect within a department or subunit
Additional dimensions	
Teamwork	Questions that assess respondent's beliefs and experiences regarding the degree of collaboration within the institution or subunit
Communication openness	Questions that assess respondent's beliefs and experiences about the degree of openness of communication about patient care issues within the institution or subunit (peers, nonpeers, and patients)
Organizational learning	Questions that assess respondent's beliefs and experiences about the institution or subunit's ability to adapt and learn from its patient safety issues
Feedback and communication	Questions that assess respondent's knowledge of and experiences with receiving feedback regarding patient safety issues
Beliefs about causes of errors and adverse events	Questions that assess respondent's beliefs and experiences regarding the impact of human factors such as stress and fatigue on patient safety
Job satisfaction	Questions that assess respondent's beliefs and experiences regarding happiness and satisfaction regarding work experiences
Overall perception of safety	Survey items that assess beliefs of overall safety of care in an institution or subunit

TABLE 3. Number of Survey Items Across Various Factors/Dimensions

	Name of Author With or Without Survey Name or Survey Name Alone													
	Sexton, SAQ	Sexton, SCS	Flin et al	Trainee Supplement Survey	Patient Safety Climate in Anesthesia	AHRQ	Singer et al, Gaba et al	Allina	Kaissi et al	Weingart et al	VHA	Itoh et al	Pronovost, SCS	Total
Management/supervision														
Management and institutional commitment to safety	5	10	1	0	11	7	21	1	0	1	24	1	7	89
Adequacy of training and supervision	2	0	1	9	1	0	6	0	0	0	5	0	0	24
Institutional responses	2	1	1	0	0	1	1	1	0	0	0	1	0	8
Nonpunitive response to error	1	0	1	0	9	3	8	4	0	9	11	9	0	55
Safety System														
Detection infrastructure	0	0	0	0	2	0	5	0	0	0	3	0	0	10
Handoffs and transitions and coordination of care	2	0	1	4	0	6	0	0	0	0	1	0	0	14
Patient safety planning	2	2	3	0	0	0	0	0	2	0	0	2	0	11
Adequacy of staffing	2	0	0	0	0	2	1	0	0	0	1	0	0	6
Adequacy of equipment, information, and processes	4	0	0	0	0	1	4	2	0	0	2	0	0	13
Reporting infrastructure	4	1	0	1	0	1	0	1	0	0	0	2	1	11
Risk														
Risk taking	0	0	0	0	0	0	0	0	0	0	3	0	0	3
Willingness to ask for help	0	0	1	0	5	0	4	0	0	0	1	0	0	11
Work Pressure														
Work pressure	1	0	0	0	5	3	7	1	0	0	5	1	0	23
Competence														
Adequacy of crisis management	2	0	0	3	5	0	2	0	0	0	0	2	0	14
Procedures/rules														
What should be reported and to whom	0	1	1	0	2	3	1	0	0	8	10	30	1	57
Compliance with rules and procedures	1	1	2	0	0	0	5	0	0	0	2	0	0	11
Additional dimensions														
Teamwork	6	1	13	0	2	6	1	0	5	0	1	16	0	51
Communication openness	8	0	13	22	2	3	4	1	15	1	8	13	0	90
Organizational learning	2	1	0	0	0	3	0	0	0	2	2	1	0	11
Feedback and communication	1	1	1	1	5	2	3	0	0	2	0	2	0	18
Beliefs about causes of errors and adverse events	10	1	13	0	1	0	5	1	2	1	9	10	1	54
Job satisfaction	4	0	3	0	0	0	1	0	0	0	2	4	0	14
Overall perception of safety	4	1	0	0	3	3	8	0	0	2	13	0	0	34
Unable to classify/not PSC	0	0	5	1	1	0	2	1	0	1	9	5	0	25
Total questions*	63	21	60	41	54	44	89	13	24	27	112	99	10	657

*Demographic questions excluded from this number.
VHA indicates Veterans Health Administration Patient Safety Questionnaire.

None of the dimensions was addressed by all 13 of the surveys. Three of the dimensions, however, were addressed in 11 of 13 surveys. These were (1) management and institutional commitment to safety, (2) communication openness, and (3) beliefs about causes of errors and adverse events. Among the 10 surveys that we considered to have a general focus for administration, 3 dimensions (management and institutional commitment to safety, communication openness, and teamwork) were covered by all of the instruments. Notably, risk taking, a commonly measured

safety culture dimension in outside industries, was only covered on 1 survey instrument. A list of all the 23 dimensions and their frequency of appearance in the surveys is given in Table 5.

We attempted to validate our categorization process by randomly selecting 2 questions from each survey and by asking experts in patient safety to classify these into our list of dimensions (Table 5). Nine of 18 experts participated, representing a response rate of 50%. The expert agreement (with the study authors' selections) ranged from 0% to 100%, with an average, median, and mode agreement of 56%, 59%, and 56% for each question that was randomly selected (Table 6).

Individual Instruments

The Safety Attitudes Questionnaire (SAQ) (ICU version) contains 60 questions and covers 19 dimensions, the most of any survey in our review.[17,18] It was derived from the Flight Management Attitudes Questionnaire (FMAQ) developed by Helmreich, with new items generated by focus groups of health care providers, review of the literature, and discussions with safety experts. Although we reviewed in detail only the ICU

TABLE 4. Sample Questions From Surveys Reviewed and Their Classification Into Dimensions

Category	Author or Survey Name (Question No.)	Question
Management/supervision		
Management and institutional commitment to safety	Patient Safety Climate in Anesthesia (6)	This facility has a reputation for high quality performance
Adequacy of training and supervision	Trainee Supplement Survey (20)	New clinical personnel are adequately oriented to patient care protocols
Institutional responses	Flin et al (41)	Mistakes are handled appropriately in this hospital
Nonpunitive response to error	Weingart et al (12a)	Employees who injure patients by making mistakes should be disciplined
Safety system		
Detection infrastructure	Singer et al (59)	Implementing a system to report close calls or near misses would improve patient safety
Handoffs and transitions and coordination of care	AHRQ (F5)	Important patient care information is often lost during shift changes
Patient safety planning	Sexton, SCS (12)	Briefing personnel before the start a shift (i.e., to plan for possible contingencies) is an important part of safety
Adequacy of staffing	AHRQ (A2)	We have enough staff to handle the workload
Adequacy of equipment, information, and processes	Sexton, SAQ (7)	All the necessary information for diagnostic and therapeutic decisions is routinely available to me
Reporting infrastructure	Itoh et al, part 3 (2d)	I do not know who is responsible for bringing up adverse events/errors
Risk		
Risk taking	VHA (101)	I am asked to cut corners to get the job done
Willingness to ask for help	Patient Safety Climate in Anesthesia (44)	If I need help, I feel comfortable asking for it
Work pressure		
Work pressure	Singer et al (82)	I have enough time to complete patient care tasks safely
Competence		
Adequacy of crisis management	Patient Safety Climate in Anesthesia (48)	I feel confident about my skills in managing a clinical crisis
Procedures/rules		
What should be reported and to whom	Weingart et al (13e)	If you knew that an error occurred because of something you did, would you complete a hospital incident report?
Compliance with rules and procedures	Singer et al (6)	In my department, disregarding policy and procedures is rare
Additional dimensions		
Teamwork	Kaissi et al (5)	My department/unit encourages teamwork and cooperation among its members
Communication openness	Kaissi et al (8)	When a patient safety issue is recognized, I have some reservations of raising the issue with the patient care team leader
Organizational learning	Allina (11)	My clinic views every accident as an opportunity to improve safety
Feedback and communication	Flin et al (2)	The department provides adequate, timely information about events in the hospital which might affect my work
Beliefs about causes of errors and adverse events	Patient Safety Climate in Anesthesia (7)	Errors are a sign of incompetence
Job satisfaction	VHA (17)	I am proud to work for this facility
Overall perception of safety	Sexton, SAQ (4)	I would feel safe being treated here as a patient

AHRQ, Agency for Healthcare Research and Quality; VHA, Veterans Health Administration Patient Safety Questionnaire.

TABLE 5. Frequency of Dimensions Across the 13 Survey Instruments

Dimension (n = 23)	No. Surveys With Dimension
Management and institutional commitment to safety	11 (85%)
Communication openness	11 (85%)
Beliefs about causes of errors and adverse events	11 (85%)
Nonpunitive response to error	9 (69%)
What should be reported and to whom	9 (69%)
Teamwork	9 (69%)
Feedback and communication	9 (69%)
Institutional responses	7 (54%)
Reporting infrastructure	7 (54%)
Work pressure	7 (54%)
Overall perception of safety	7 (54%)
Adequacy of training and supervision	6 (46%)
Organizational learning	6 (46%)
Handoffs and transitions and coordination of care	5 (38%)
Patient safety planning	5 (38%)
Adequacy of equipment, information, and processes	5 (38%)
Adequacy of crisis management	5 (38%)
Compliance with rules and procedures	5 (38%)
Job satisfaction	5 (38%)
Adequacy of staffing	4 (31%)
Willingness to ask for help	4 (31%)
Detection infrastructure	3 (23%)
Risk taking	1 (8%)

Values are expressed as no. (%).

version, there are 6 different versions with slight modifications of its questions targeted to specific audiences, including a general inpatient version.[14] Psychometric testing of the SAQ is reported to have identified 6 factors (i.e., dimensions): teamwork, safety climate, perceptions of management, job satisfaction, stress recognition, and working conditions.[17,18] Internal consistency by Cronbach alpha was listed as 0.74 to 0.93.[18] In our view, it emphasizes management and institutional commitment to safety, teamwork, communication openness, and beliefs about causes of errors and adverse events. The SAQ is a refinement of the ICU Management Attitudes Questionnaire and ORMAQ.[13,15] The use of the SAQ has not been reported in literature, but the results of a 7-item teamwork scale from the ICU Management Attitudes Questionnaire have been reported.[13]

The Veteran Affairs (VA) Palo Alto/Stanford PSCI contains 89 questions and covers 18 dimensions. The authors report that it was developed from 5 different survey instruments, including the ORMAQ. Psychometric testing is reported to have identified 5 factors, organization, department, production, reporting/seeking help, and shame/self-awareness.[9] In our view, it emphasizes management commitment, nonpunitive response, overall perception of safety, work pressure, detection infrastructure, human factors, and compliance with rules and procedures. It was used in 15 hospitals in California, and the results were reported in literature.[9] The authors have developed a revised, 45-item version of the instrument called Patient Safety Climate in Healthcare Organizations (PSCHO) (S. Singer, personal communication, August 2006).

The Veterans Health Administration Patient Safety Questionnaire consists of 112 questions across 18 dimensions. Reportedly, it was developed from existing instruments, review of the literature, and discussions with safety experts. The emphasis is on management commitment, overall perceptions, nonpunitive response, reporting, human factors, and communication openness. No psychometric testing has been reported, and its use has not been formally reported in the medical literature.

The Hospital Safety Culture Questionnaire by Itoh et al[19] consists of 99 questions and covers 14 dimensions. Many of its questions are the same as those in the ORMAQ, on which it was based; adaptations include the addition of case studies. Its authors note that it was designed primarily for use in Japanese hospitals. The authors state that the instrument measures 9 factors: power distance, communication, teamwork, own performance under high stress, stress management for team member, morale and motivation, satisfaction with management, recognition of human error, and awareness of competence. In our view, its emphasis includes nonpunitive response to error, what should be reported and to whom, teamwork, communication openness, and beliefs about causes of errors and adverse events. No psychometric properties have been reported, and the results

TABLE 6. Randomly Selected Questions for Expert Review and Percent Agreement With Authors

Question (n = 26)	Agreement With Authors (%)
1	75
2	56
3	25
4	56
5	0
6	0
7	44
8	78
9	38
10	56
11	100
12	11
13	89
14	88
15	63
16	100
17	88
18	44
19	78
20	0
21	63
22	67
23	25
24	63
25	100
26	56
Mean	56

from administration in several Japanese hospitals have been reported in the literature.

The AHRQ Hospital Survey on Patient Safety (AHRQ HSOPS) consists of 44 questions and measures 14 dimensions. It was developed by Westat under contract with AHRQ,[16] with questions derived from a review of existing safety culture literature and instruments, including the Veterans Health Administration Patient Safety Questionnaire and the Medical Event Reporting System for Transfusion Medicine, a safety culture instrument developed for use in transfusion medicine. The AHRQ instrument was piloted in 20 hospitals, and the results were used to generate a list of 14 factors, which all displayed high internal consistency by factor analysis (0.63 to 0.84).[16] In our view, its emphases include management and institutional commitment to safety, handoffs and transitions, and teamwork. At the current time, the results of survey assessments using the instrument have not been reported in literature. A summary of the technical issues related to the instrument's development and average responses from a pilot of the survey in U.S. hospitals is available (http://www.ahrq.gov/qual/hospculture).

The Safety Climate Survey consists of 21 questions across 11 dimensions.[20] It is based on the SAQ and is a shortened version of this survey.[17,18] It primarily measures management and institutional commitment to safety. The Institute for Healthcare Improvement (IHI) tool, available online (http://www.qualityhealthcare.org/IHI/Topics/PatientSafety/SafetyGeneral), allows categorization of answers and allows for some basic analysis of responses. The Safety Climate Survey reported has test-retest reliability of 0.85–0.90 and internal consistency measured by Cronbach alpha values of 0.75–0.88.[22]

The Allina Hospitals and Clinics survey consists of 13 questions and measures 8 dimensions. It primarily measures nonpunitive response to error. It has both outpatient and inpatient versions. No psychometric analysis has been reported, and its use has not been reported in literature.

The Culture of Safety Survey consists of 27 questions and across 8 dimensions.[21] It was developed by Weingart et al[21] to measure leadership, salience, nonpunitive environment, and reporting and communication. In our view, it primarily measures nonpunitive response to error and what should be reported and to whom. No psychometric properties have been reported. It was used in 4 hospitals, and the results were reported in literature.[21]

The Teamwork and Patient Safety Attitudes Survey contains 24 questions across 4 dimensions.[7] Psychometric testing revealed 4 factors in their analysis: (1) perceived effect of teamwork (alpha = 0.76), (2) support for team communication and decision making (alpha = 0.70), (3) level of teamwork in my department/unit (alpha = 0.62), and (4) leadership and assertiveness (alpha = 0.87).[7] In our view, the survey focuses primarily on communication openness and teamwork. It was used in 4 hospitals, and the results were reported in literature.[7]

The Modified ORMAQ contains 60 questions and covers 14 dimensions. It was developed by Flin et al[12] and was based on the ORMAQ and modified to measure safety attitudes for operating room personnel in the United Kingdom. The survey emphasizes teamwork, communication openness, and beliefs about causes of errors and adverse events. A reliability analysis was conducted on a proposed factor structure (leadership, confidence-assertion, information sharing, stress and fatigue, teamwork, work values, error/procedural compliance, and organizational climate), but the values for internal reliability were reported to be low ($r = 0.18$ to 0.54).[12] It was used in 11 Scottish hospitals, and the results were reported in medical literature.[12]

The Patient Safety Climate in Anesthesia consists of 54 questions across 13 dimensions. It was developed by Cooper for use by anesthesia personnel and was based on several surveys, including the VA Palo Alto/Stanford PSCI. It primarily measures management and institutional commitment to safety, nonpunitive response to error, willingness to ask for help, work pressure, adequacy of crisis management, and feedback and communication. It has been used in 6 hospitals and has been subjected to a psychometric analysis. The results of the survey will be published in medical literature in the future.

The Trainee Supplemental Survey, developed by the Children's Hospital in Boston, consists of 41 questions across 6 dimensions. It focuses primarily on communication openness and adequacy of training and supervision, is intended for use in resident trainees in academic hospitals, and is designed as a supplement to the SAQ. No psychometric analysis has been reported, and its use has not been reported in literature.

The Safety Climate Scale consists of 10 questions across 4 dimensions. It was adapted from the FMAQ, and the authors state that it evaluates perceptions of a strong and proactive organizational commitment to patient safety.[8] It primarily measures management and institutional commitment to safety.[8] No psychometric properties or analysis has been reported. It has been used at the Johns Hopkins Hospital, and the results were reported in literature.[8]

DISCUSSION

We identified a number of surveys designed to assess patient safety culture. All have important similarities. They are all designed to assess culture in individual units in inpatient, acute-care settings (although adaptations exist for outpatient settings). They are intended for respondents who work on the front lines in health care—the physicians, nurses, pharmacists, and other health care workers who spend substantial time in the clinical areas of interest.

All primarily use 4- or 5-point Likert-type response categories in their assessment of attitudes. For each of the surveys, the aggregation of these individual attitudes is believed to give a sense of the overall safety culture. At present, this aggregation of responses primarily consists of reporting the proportion of respondents who responded in a particular way; for example, the proportion of respondents who indicated that they agree with a particular statement. None of the surveys allows the user to report results in the form of validated, numeric scores for overall safety or safety culture subscales such as teamwork or communication, although 2 of the surveys, the SAQ and AHRQ instruments, have done some work in this arena.

Despite these similarities, the surveys differ from one another in significant ways. Several of the surveys reviewed are "specialists" with a focus on a certain clinical area, certain types of respondents, or specific aspects of culture. For example, the Trainee Supplemental Survey is designed to delve more deeply into issues of particular relevance to trainees; it focuses on attitudes about the adequacy of training and supervision and on communication. The Safety Climate Scale, which was derived from the FMAQ, differs from the SAQ and other more general instruments in its focus on leadership support for safety and overall perceptions of safety; and in contrast to the SAQ, the Safety Climate Scale has no questions on human factors and only a few questions on error reporting.

Most of the surveys reviewed are, however, "generalist" in their focus, which means that they were designed to address a broad array of safety culture issues in a variety of areas within the hospital. All of general focus surveys address certain dimensions that might be considered core dimensions of patient safety culture: communication, teamwork, and leadership support for patient safety. As a means of gaining objective information on these safety issues, each of these should be able to provide insights.

The general focus surveys differed from one another, however, in the areas of safety addressed beyond these core dimensions. Some included a number of questions on human factors, whereas others included none. Variation exists in the extent to which surveys covered other topics, such as job satisfaction, the adequacy of handoffs and transitions, and the use of briefings. Thus, whereas any of the general focus surveys will address certain topics, the particular survey one chooses has implications for the other material on which the survey will provide data.

How important are these differences? For example, what is lost by excluding questions on human factors or job satisfaction, which some of the surveys do, or gained by assessing in some detail the perceived safety of handoffs, or the actions of supervisors relevant to safety? It is difficult to be definitive in this regard because our understanding of the elements of a safe climate, and their relative importance, is limited. None of the surveys themselves provides extensive justification of the variable elements—elements beyond the core dimensions of communication, teamwork, and leadership support that they chose to include or exclude. As the field of safety science within health care matures, data that provide a clearer understanding of the key elements of patient safety culture should facilitate the further development and comparison of assessment tools.

Another area of uncertainty about content is whether any of the surveys appropriately address all relevant aspects of culture. Might they have left out attitudes important to safety? For example, a physician's commitment to the welfare of individual patients, often cloaked in the general term professionalism, has, in the minds of many, been an important key to the safety of patients. Indeed, a physician's willingness to stay late in the office or at the hospital, review a critical test result personally rather than simply accepting the report of another when there is the possibility of misinterpretation, and spend personal time remaining up-to-date on innovations in care have, arguably, been a critical safety net in a health care system riddled with systemic safety issues. It is clear that reliance on individual performance of this sort is inadequate to ensure safety, and that the systems to support these individuals need to be changed (e.g., staffing support to help reduce the need for extended shifts, more reliable methods of information transfer, and improved access to real-time decision support). Yet, many argue that although these system issues are addressed, it is especially critical that the profession not lose its professionalism. At the same time, there is worry that the skilled, committed, and conscientious caregiver has been devalued. None of the surveys explicitly address professionalism.

One commonality to all of the surveys is that limited data exist with regard to both their accuracy and use. Whereas all should provide assistance in the identification of culture problems, how accurately a survey's handful of questions on teamwork describe the state of teamwork within a given area is largely unclear. The face validity of the questions reassures us that we stand to learn something, and the developers of the SAQ report that in the airline industry observational studies of culture correlated reasonably well with the findings of safety attitude surveys completed by airline crews with respect to teamwork and other factors.[15] Moreover, studies which document attitudinal differences, as assessed by survey, between health care respondents and those in high-reliability organizations indicate that safety culture surveys are capable of identifying potentially relevant variation in culture.[22] Still, much of the content covered in patient safety surveys is unique to the health care setting, and we are unaware of any objective comparison of patient safety surveys with other methods of safety culture assessment, such as observations or in-depth interviews.

What is the use of safety culture assessment? Again, it seems intuitive that the use of an assessment tool that provides insights into problematic attitudes or practices will help in the improvement of the culture of safety. Moreover, measurement of culture is believed to facilitate the identification of high-risk situations—cultures that place a unit or hospital at an increased risk for errors or adverse events. Experiences in naval and commercial aviation suggest that culture surveys can be useful components of efforts to improve culture, and that culture assessments are predictors of safety events.[15,17,22] Data demonstrating the use of safety culture assessment in health care as a tool for either predicting adverse events or improving safety culture are, as of yet, limited. We expect that further research will help elucidate the role of safety culture assessment in both regard.

How might one choose a survey? At present, no expert panel recommendations exists to help in the selection of a survey. Moreover, because of content differences between the instruments, no one survey is perfectly suited to all applications. One option is to individualize the choice to the particular situation, guided in part by the purpose of the survey effort, intended respondents, and the desire for benchmarking.

Only 2 of the instruments, the AHRQ HSOPS and the SAQ either currently provide or have plans to provide users

with extensive comparative data that might be used to benchmark safety culture against other units or hospitals. Both of these instruments are general in their focus, and, as such, both address core dimensions of safety including communication, teamwork, and leadership support. Differences between these surveys include the SAQ's questions on human factors and job satisfaction, and the HSOPS culture questions on handoffs and supervisor's role in promoting patient safety. Users with a particular interest in one of these areas might pick a survey accordingly. Alternatively, users with a particular interest in trainee issues might find the questions in the Trainee Supplemental Survey useful, perhaps, as the title of the instrument implies, as a supplement to one of the general instruments. Several of the survey instruments, including the AHRQ HSOPS, the SAQ, and the VA Palo Alto/Stanford PSCI instrument, report the results of psychometric analyses. Psychometric analysis is concerned with statistical techniques that help address the validity and reliability of survey items, and, through use of correlation analyses, the identification of underlying dimensions. Yet, although this form of testing is desirable, it does not, by itself, give a full characterization of instruments. Other forms of item analysis, such as cognitive testing, provide additional information. Thus, while useful, the use of psychometric techniques to shape an instrument does insure the potential user that the instrument will be a good predictor of safety events or that it will provide actionable information.

If none of the instruments seem to adequately fit the setting or intended respondents, one might consider adaptations of previously published instruments. One could add individual questions that reflect input from locally held focus groups with health care professionals or that are derived from other instruments. Obviously, alterations in an instrument, through the addition or elimination of questions, will impact on the ability to benchmark results against those from other institutions.

LIMITATIONS

There are several limitations to our review. First, although efforts were made to find and include all widely available or used patient safety culture instruments, we have clearly not included all existing instruments. We believe, however, that we have included the most widely used instruments, and that those included are representative of the currently available instruments.

Second, because there is no established process for the selection and review of survey instruments, the methods of this review reflect the opinions of the authors as to which items to address and emphasize. Our review should be viewed simply as a guide, and decisions about which instrument to use will need to be made by the reader.

Third, we provided no formal evaluation of the quality of individual questions in the surveys we reviewed. Although we looked at the quality of individual questions with regards to ambiguity, poor wording, and double-barreled inquiries, we did not exclude or grade surveys on the basis of these criteria.

Finally, we compared the content of surveys by assigning each question in each survey to the domain that we thought the question represented. The process was somewhat subjective, and there may be some disagreement over whether particular surveys addressed particular domains. Indeed, when we compared our categorization of items to the assignments made by outside experts whom we surveyed, we found that overall agreement was only modest (an additional limitation is that the response rate of experts to our survey was also modest, at 50%; although this raises the possibility of bias, the rate exceeds that of many published surveys). We believe, however, that there was no useful alternative because few of the surveys identified the dimensions covered in their surveys and because definitions of dimensions varied. And because we used the same approach for the categorization of items in each of the surveys, we believe that the comparison of instruments on dimensions included is still valid. Our process facilitated the identification of similarities and differences between the surveys. Still, given the subjective nature of the process, our categorization should be considered exploratory and should only be used as a guide.

CONCLUSIONS

We have identified and described a number of currently available safety culture instruments. The instruments vary substantially from one another in content, emphasis, overall length, the amount of field experience with the instruments, and the rigor and transparency of the survey development process.

All of the instruments have limitations. Although they have considerable face validity, none of the patient safety instruments has been well validated as measures of patient safety culture by comparison with other measures of patient safety culture, such as in-depth interviews or observation. Limited data exist regarding the extent to which they predict actual patient safety outcomes, and questions about how best to analyze and interpret the results remain.

Despite these limitations, the desire to address safety culture in the hope of improving patient safety will continue to motivate researchers and managers to make use of safety culture instruments. We hope that an awareness of some of the differences between the instruments and their collective limitations will facilitate the endeavor.

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