Original Article

Development and Psychometric Properties of a Scale to Measure Hospital Organizational Culture for Cardiovascular Care

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Background—Because organizational culture is increasingly understood as fundamental to achieving high performance in hospital and other healthcare settings, the ability to measure this nuanced concept empirically has gained importance. Aside from measures of patient safety culture, no measure of organizational culture has been widely endorsed in the medical literature, limiting replication of previous findings and broader use in interventional studies.

Methods and Results—We sought to develop and assess the validity and reliability of a scale for assessing organizational culture in the context of hospitals' efforts to reducing 30-day risk-standardized mortality after acute myocardial infarction. The 31-item scale was completed by 147 individuals representing 10 hospitals during August and September 2014. The resulting organizational culture scale demonstrated high level of construct validity and internal consistency. Factor analyses indicated that the 31 items loaded well (loading values 0.48–0.90), supporting distinguishable domains of (1) learning environment, (2) psychological safety, (3) commitment to the organization, (4) senior management support, and (5) time for improvement efforts. Cronbach α coefficients were 0.94 for the scale and ranged from 0.77 to 0.88 for the subscales. The scale displayed reasonable convergent validity and statistically significant variability across hospitals, with hospital identity accounting for 11.3% of variance in culture scores across respondents.

Conclusions—We developed and validated a relatively easy-to-administer survey that was able to detect substantial variability in organizational culture across different hospitals and may be useful in measuring hospital culture and evaluating changes in culture over time as part performance improvement efforts. **(*Circ Cardiovasc Qual Outcomes*. 2017;10:e003422. DOI: 10.1161/CIRCOUTCOMES.116.003422.)**

Key Words: hospital ■ leadership ■ myocardial infarction ■ quality improvement

Organizational culture—the set of shared assumptions, values, and beliefs that govern how people behave in organizations[1]—is known to influence clinical performance of healthcare organizations.[2,3] Both qualitative and quantitative evidence have linked organizational culture with hospital performance[4–15]; however, reviews of this vast literature[3,16,17] have identified weaknesses in methodologies of studies, particularly with regard to the quantitative measurement of organizational culture, a highly complex phenomenon with multiple dimensions. Furthermore, the theoretical literature on culture and work[1,18–21] suggests that the features of organizational culture that influence staff experience likely vary by work activity, highlighting the importance of designing measurement scales that fit specific clinical contexts.

Despite the importance of tailoring the measurement of organizational culture to the clinical context, most validated scales[17,22,23] used in healthcare studies are general in nature and applied with mixed success in an array of healthcare contexts. One aspect of culture—patient safety culture—has been examined extensively with validated measures that have been associated with improvements in safety,[24–28] but the scale does not assess broader aspects of organizational culture. In the area of hospital-based cardiovascular and stroke care, although both qualitative and quantitative studies have found that hospital culture was associated with improved clinical care,[6,29–31] we could find no studies that have produced and validated a scale that measures of organizational culture pertinent to hospital improvement efforts in cardiovascular care.

Accordingly, we sought to propose and test a new scale for assessing organizational culture in the context of hospitals' efforts to reducing 30-day risk-standardized mortality after acute myocardial infarction (AMI). Fundamentally, we wanted to develop a scale of closed-ended items that was relatively easy to administer and valid in terms of its measurement of relevant content and constructs of organizational culture. We tested the scale as part of the LSL interventional study (Leadership Saves Lives) [32] with 147 individuals engaged in quality improvement efforts across 10 hospitals nationally from 2014 to 2016. Findings from this study can be used to support more rigorous measurement of organizational culture

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WHAT IS KNOWN

- Organizational culture, defined as the set of shared assumptions, values, and beliefs that govern how people behave in organizations, influences the clinical performance of healthcare organizations including hospitals.
- Although organizational culture has been found to be associated with better hospital performance, validated measures of hospital culture in the context of care for acute myocardial infarction are lacking.

WHAT THE STUDY ADDS

- Organizational culture in hospitals includes 5 distinguishable domains: (1) learning environment, (2) psychological safety, (3) commitment to the organization, (4) senior management support, and (5) time for improvement efforts.
- The measure demonstrates construct and convergent validity and internal consistency and is relatively easy to administer.
- The organizational culture scale may be used to assess organizational culture in the context of hospitals' efforts to improve care for patients with acute myocardial infarction.

in hospitals as a key ingredient to supporting efforts to improve hospital performance.

Methods

Scale

The scale was developed using an established methodology for survey development:[33–36] (1) define the type of information needed, (2) draft new questions and identify existing questions, (3) conduct cognitive interviews, (4) enlist expert panels to review, and (5) refine questions as indicated. In the first step, to define the type of information needed, we conducted a thorough review of existing literature in organizational culture—both theoretical literature and empirical studies from management, anthropology, sociology, occupational health and health psychology, medical, nursing, and public health literature—to catalogue the key content areas that would be critical to include in the scale.[16,18–25,37–45] This review revealed key conceptual domains of organizational culture and items or scales to measure aspects of culture. This review highlighted 5 key domains: (1) learning environment,[43,46,47] (2) psychological safety,[39,48] (3) commitment to the organization,[49–52] (4) senior leadership support,[6,13,17,22] and (5) time for improvement efforts.[53–55] As a second step, we identified from the existing medical literature items that had been used to measure these domains (focusing on validated items when available) and either modified them or drafted new items as needed to fit the context of hospital quality improvement efforts for patients with AMI, to produce a draft set of 26 items for pilot testing. Items were phrased as statements and response options for all items consisted of a 5-point Likert scale with options for strongly agree, agree, neutral, disagree, or strongly disagree. In the third and fourth steps, we conducted cognitive interviews[56] with 8 individuals working in hospitals in roles similar to our intended respondents and reviewed the scale with 3 expert panels of 6 to 8 individuals on each panel including physicians, nurses, and quality improvement staff. The cognitive interviews and feedback from the panels helped to identify words and phrases that were ambiguous or poorly comprehended, as well as concepts that may be important but inadequately addressed in the survey from the respondents' perspective. In the fifth and final step, based on the results of these interviews, we revised 2 items that were unclear, dropped 2 items that seemed redundant, and added one item. This process resulted in a 31-item scale, which was administered as an online survey with informed consent to participants in the LSL study.[32]

Testing the Scale

Study Design and Sample

As part of the larger Leadership Save Lives interventional study,[32] we conducted a cross-sectional validation study to test the validity and reliability of the scale to measure organizational culture, a primary outcome of the LSL study, which was still in progress. Thus, our sample comprised the 10 hospitals participating in the LSL study began in 2014. To attain this sample, we began with the a sampling frame of all hospitals that met the following 3 eligibility criteria: (1) membership in the Mayo Clinic Care Network, a national membership group of hospitals in 2014 that were geographically diverse and included academic medical centers, hospital systems, and individual hospitals, (2) having at least 200 AMI discharges per year in 2012 to 2014, and (3) having average or below average performance on 30-day risk-standardized mortality rate for AMI based on publicly available data from the Centers for Medicare and Medicaid Services Hospital Compare website in January 2014 (reflecting mortality data through June 30, 2012), in order to select hospitals that had room for improvement. For hospitals that were part of multihospital systems, only the largest hospital was included in the sampling frame. A total of 18 hospitals met the eligibility criteria and thus comprised the sampling frame.

From this list of 18 hospitals, we used random sampling with a purposeful component[57] to select 12 hospitals that were geographically diverse. Thus, if the random sampling procedure selected a second hospital that was located in the same state as one already in the sample, we skipped that selection and moved to the next hospital randomly selected from the sampling frame. We approached the 12 selected hospitals; 2 hospitals declined to participate, resulting in a sample of 10 hospitals and an 83% response rate. This sample size was sufficient to observe substantial variation at the hospital level while affording adequate resources to conduct the LSL intervention at each hospital. The 10 hospitals were diverse in geographical location, size, and teaching status. Hospitals reflected the geographic range of the Mayo Clinic Care Network, which includes the West, Midwest, South, and Northeast regions. Of the 10 hospitals, 9 were members of multihospital systems, hospital size ranged from <200 beds to >700 beds.

In each of the 10 hospitals, the first step of the LSL intervention was to establish a guiding coalition (comprised of a multidisciplinary group involved with cardiac care and ranging from 10 to 25 individuals per hospital). All members of the guiding coalition were asked to participate in survey of organizational culture. The survey was completed by a total of 147 individuals during August and September 2014. This sample size was consistent with recommended sample size guidelines[58] for exploratory factor analysis given the average communality of 0.6 in our data and an average of 6 items per factor. All research procedures were approved by the Institutional Review Board at Yale School of Medicine, and respondents provided informed consent according to guidelines.

Statistical Analysis

We described the sample of respondents using standard descriptive statistics and listed the participating hospitals by location and size. We also calculated descriptive statistics including the distribution of responses for each item and mean score for each item (numeric values were assigned to responses with agree=1 and strongly disagree=5).

Construct validity was assessed using exploratory factor analysis, which identified common factors that accounted for patterns of correlation among survey responses. We examined how the survey items loaded onto 5 factors, which we identified in the healthcare literature on organizational culture. We reverse-coded certain items so that the positive and negative directions were consistent (lower scores

indicating desirable direction). One item (I feel as if this hospital's problems are my own problems) was identified as having ambiguous interpretations after survey administration and was, therefore, dropped from analysis. With data from the survey responses, we performed the factor analysis assuming orthogonal factors using varimax rotation,[59] using 0.4 as the threshold for factor loading.[60] The last sharp drop-off in the scree plot occurred after 5 factors, and Eigen values of the sixth and seventh factors did not exceed 1; therefore, we determined that the 5 factor solution fit the data well. Because we recognized some factors may be related to each other, we re-estimated the model with oblique factors, and the results were largely unchanged.

Reliability was assessed using a measure of internal consistency for each of the 5 constructs using the Cronbach α coefficient.[61] On the basis of the number of items within each construct, we determined Cronbach α coefficients of ≥0.70 to be evidence of acceptable internal consistency, as is recommended by experts.[62]

To measure the comprehensiveness and strength of the factor pattern, the percent of total variance among the items that was explained by the factor pattern was assessed using standard techniques described by Rummel[63] and Fabrigar et al.[58] To describe how much of the variation in items accounted for by all the factors was attributable to each factor, we calculated the percent of common variance for each factor. For each of the 5 constructs identified through factor analysis, we calculated summary scores by averaging the 5-point responses to the items in each construct (range 1–5 with 1 being most positive). We estimated the overall population mean and SD for each construct, as well as hospital-specific means. We also computed a summary culture score, composed of the average of all 31 items. The internal consistency of the summary score was excellent, with a Cronbach α coefficient of 0.94.

To evaluate the scale's ability to measure cultural features that might be useful in classifying hospitals relative to each other, we examined the degree to which scores varied across hospitals. We used generalized linear modeling to test whether a categorical indicator for each hospital was significantly associated with culture scores and with construct-specific subscores. We also used generalized linear modeling to test whether categorical indicators of job categories or departments were significantly associated with culture scores and construct-specific subscores. If the culture measures were useful to measure an organizational feature, we hypothesized that they would be associated with the hospital and distinguish between hospitals but not be associated with job categories or departments within hospitals. We also hypothesized that the overall culture score would vary significantly across hospitals.

Last, we assessed convergent validity by examining the correlation between hospital culture scores (overall and subscales) and hospital-specific measures of quality of cardiovascular care, available on Hospital Compare for the 10 hospitals in our study.[64] We examined the following quality measures for the year immediately preceding survey administration (June 2013 to July 2014): use of statin at discharge, use of aspirin at discharge, percutaneous coronary intervention within 90 minutes of hospital arrival, and 30-day risk-standardized mortality rates for the 3-year period, 2011 to 2014.

Results

Characteristics of the Hospital and Respondent Samples

A total of 168 participants were invited to participate in the survey across the 10 hospitals and 147 responded to the survey for an overall response rate of 88%. An average of 15 people (range, 11–19 people) were interviewed at each hospital, and hospital-specific response rates varied from 65% to 100%. Respondents represented a range of roles and departments (Table 1). About 40% of respondents identified themselves as physicians or nurses, and ≈30% identified themselves as senior managers. Hospitals varied in size from <200 beds to ≈800 beds and reflected the geographical range of the Mayo Clinic Care Network across the United States (Table 2). The mean item score was 2.16 on the 5-point Likert scale (Table 3).

Table 1. Respondent Characteristics (n=147 Individuals)

Role	Frequency	%
Physician	28	19.0
Physician assistant	2	1.4
Advanced practice nurse	1	0.7
Nurse	31	21.1
Technician	1	0.7
Analyst	4	2.7
Senior management/leadership team	44	29.9
Other	36	24.5
Total	147	100.0
Department	**Frequency**	**%**
Cardiac catheterization laboratory	26	17.7
Quality improvement/management	25	17.0
Corporate suite	10	6.8
Emergency department	23	15.7
Step down or telemetry unit	13	8.8
Cardiac intensive care unit	5	3.4
Other	45	30.6
Total	147	100.0

Factor Analysis

The 5 factors had loading values between 0.48 and 0.85 (Table 4). The factor structure reflected the hypothesized factors of (1) learning environment, (2) psychological safety, (3) commitment to the organization, (4) senior management support, and (5) time for improvement efforts. A total of 6 items loaded on 2 factors, which suggests ways in which the factors may be related. We re-estimated the model restricting the analysis to a 6-factor solution. Items did not load meaningfully on the sixth factor; moreover, the scree plot indicated

Table 2. Hospital Characteristics (n=10 Hospitals)

Census Region	Frequency	%
South	3	30
Northeast	1	10
Midwest	4	40
West	2	20
Teaching status	**Frequency**	**%**
Teaching	2	20
Nonteaching	8	80
Size	**Frequency**	**%**
100–299	2	20
300–499	3	30
500+	5	50

Table 3. Items of Instrument With Means and SDs

Item	Statement*	Mean	SD
1	The clinicians who care for patients with AMI hold each other accountable for high quality care.	2.11	0.80
2	Our hospital has frequent interactions with outside organizations (eg, other hospitals and professional associations) to acquire new knowledge on how to improve AMI care.	2.24	0.86
3	There is good coordination among the different clinical units involved with the care of patients with AMI.	2.33	0.93
4	In this work environment, people are interested in better ways of doing things.	1.96	0.75
5	Despite the workload, people in this work environment find time to review how the work is going.	2.32	0.81
6	In this work environment, we rely on data to guide our improvement processes.	1.82	0.76
7	Clinicians in this work environment frequently seek new information that leads us to make important changes.	2.08	0.78
8	In this work environment, someone makes sure that we stop to reflect on the team's work process.	2.49	0.87
9	In this work environment, people value new ideas.	2.14	0.74
10	In this work environment, people often resist new approaches. (R)	2.84	0.70
11	If you make a mistake in this work environment, it is held against you. (R)	2.36	0.79
12	People in this work environment are able to bring up problems and tough issues.	2.07	0.76
13	In this work environment, someone would deliberately act to undermine my efforts. (R)	1.80	0.65
14	It is difficult to ask others in this work environment for help. (R)	1.99	0.73
15	In this work environment, people's unique skills and attributes are valued and utilized.	1.97	0.66
16	People in this work environment speak up to challenge assumptions.	2.40	0.75
17	I would be very happy to spend the rest of my career at this hospital.	1.78	0.83
18	I enjoy discussing my hospital with people outside of it.	1.73	0.75
19	I think I could easily become as attached to another hospital as I am to this one. (R)	2.78	0.85
20	I do not feel like "part of the family" at this hospital. (R)	1.97	0.80
21	I do not feel "emotionally attached" to this hospital. (R)	1.97	0.84
22	This hospital has a great deal of personal meaning to me.	1.89	0.79
23	I do not feel a strong sense of belonging to my hospital. (R)	2.02	0.86
24	The senior management at your hospital has set reducing 30-day mortality after AMI as a priority.	1.76	0.85
25	Opinion leaders at your hospital have indicated that your current practices for patients with AMI can be improved.	1.85	0.75
26	Opinion leaders at your hospital have encouraged changes in practices to improve AMI care.	1.93	0.77
27	In this hospital, the necessary financial resources for personnel and equipment are provided for the care of patients with AMI.	2.10	0.89
28	In this work environment, people caring for patients with AMI are overly stressed. (R)	2.93	0.74
29	In this work environment, the time pressure gets in the way of doing a good job. (R)	2.50	0.78
30	In this work environment, people are too busy to invest time in improvement. (R)	2.40	0.88
31	There is simply no time improvement efforts in this work environment. (R)	2.49	0.80
	Overall score	2.25	0.81

Items followed by (R) were reverse-coded to calculate item scores so that lower scores consistently indicate favorable responses. AMI indicates acute myocardial infarction.

*Response choices consisted of a 5-point Likert scale with options for strongly agree (1), agree (2), neutral (3), disagree (4), and strongly disagree (5).

that the 5-factor model was most appropriate. We also re-estimated the model after removing the 6 items that cross-loaded; the resulting model (with 25 items) produced 5-factor item loadings that were largely unchanged. In the reported model, we retained the items that cross-loaded as they represented theoretically important aspects of culture. The 5 factors together accounted for 60% of total variance, exceeding the recommended threshold that factors should explain 50% of total variance.[65]

Internal Consistency

The Cronbach α for the 31-item culture scale as a whole was 0.94, which substantially exceeds the threshold of acceptability.[62] The Cronbach α coefficients for the 5 factor subscales were 0.88 for learning environment, 0.87 for psychological safety, 0.82 for commitment to the organization, 0.77 for senior management support, and 0.84 for time for improvement efforts, all indicating strong internal consistency.

Table 4. Factor Analysis Loadings for Questionnaire Items*

Item	Statement	Learning Environment	Psychological Safety	Commitment to Organization	Senior Management Support	Time for Improvement Efforts
		Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
1	The clinicians who care for patients with AMI hold each other accountable for high quality care.	0.74				
2	Our hospital has frequent interactions with outside organizations (eg, other hospitals and professional associations) to acquire new knowledge on how to improve AMI care.	0.71				
3	There is good coordination among the different clinical units involved with the care of patients with AMI.	0.72				
4	In this work environment, people are interested in better ways of doing things.	0.52	0.49			
5	Despite the workload, people in this work environment find time to review how the work is going.	0.71				
6	In this work environment, we rely on data to guide our improvement processes.	0.63				
7	Clinicians in this work environment frequently seek new information that leads us to make important changes.	0.60				
8	In this work environment, someone makes sure that we stop to reflect on the team's work process.	0.55	0.45			
9	In this work environment, people value new ideas.	0.47	0.56			
10	In this work environment, people often resist new approaches. (R)		0.63			
11	If you make a mistake in this work environment, it is held against you. (R)		0.60			
12	People in this work environment are able to bring up problems and tough issues.		0.59			
13	In this work environment, someone would deliberately act to undermine my efforts. (R)		0.72			
14	It is difficult to ask others in this work environment for help. (R)		0.66			
15	In this work environment, people's unique skills and attributes are valued and utilized.		0.66			
16	People in this work environment speak up to challenge assumptions.	0.42	0.55			
17	I would be very happy to spend the rest of my career at this hospital.		0.46	0.53		
18	I enjoy discussing my hospital with people outside of it.			0.52		
19	I think I could easily become as attached to another hospital as I am to this one. (R)			0.61		
20	I do not feel like "part of the family" at this hospital. (R)			0.63		
21	I do not feel "emotionally attached" to this hospital. (R)			0.77		
22	This hospital has a great deal of personal meaning to me.			0.60		
23	I do not feel a strong sense of belonging to my hospital. (R)			0.71		
24	The senior management at your hospital has set reducing 30-day mortality after AMI as a priority.				0.68	
25	Opinion leaders at your hospital have indicated that your current practices for patients with AMI can be improved.				0.85	
26	Opinion leaders at your hospital have encouraged changes in practices to improve AMI care.				0.74	
27	In this hospital, the necessary financial resources for personnel and equipment are provided for the care of patients with AMI.				0.47	
28	In this work environment, people caring for patients with AMI are overly stressed. (R)					0.64
29	In this work environment, the time pressure gets in the way of doing a good job. (R)					0.69
30	In this work environment, people are too busy to invest time in improvement. (R)	0.41				0.61
31	There is simply no time for reflection in this work environment. (R)					0.66

Items followed by (R) were reverse-coded to calculate item scores so that lower scores consistently indicate favorable responses. AMI indicates acute myocardial infarction.

*Only factor loadings >0.40 are displayed in the table.

Variability and Convergent Validity

The 31-item culture scale as a whole displayed statistically significant variability across hospitals, with hospital identity accounting for 11.3% of variance in culture scores across respondents. The hospital where respondents worked also accounted for statistically significant proportions of variance in the commitment to organization subscale (17.7% of variance explained by hospital) and senior management subscale (16.0% of variance explained by hospital). In contrast, neither the respondent's job function nor department accounted for statistically significant variability in either the full culture score or any of the subscores ($P>0.11$). We also found the correlations between culture scores (overall and subscales) and quality-of-care measures were largely in the right direction (hospitals with better culture had higher quality scores, as anticipated), although few were statistically significant given the limited sample size of 10 hospitals.

Discussion

We developed and validated a relatively easy-to-administer survey to assess hospital organizational culture in the context of efforts to improve the quality of cardiovascular care. Because organizational culture is increasingly understood as fundamental to achieving high performance in hospital and other healthcare settings,[4–15] the ability to measure this nuanced concept empirically has gained importance. Our work identified 5 key domains of organizational culture and demonstrated both the construct validity and internal reliability of a 31-item questionnaire to rate organizational culture. The scale was able to detect substantial variability in culture across different hospitals and may be useful in establishing a baseline understanding of hospital culture, particularly because clinicians, researchers, and policymakers seek to intervene on hospital culture as a way to promote hospital performance improvement.

Our results should be interpreted in light of some limitations. First, our sample size was modest and selected from Mayo Clinic Care Network hospitals with worse than nationally average AMI mortality rates; although the sample was geographically diverse and included a range of clinical and administrative staff, results in other samples may differ. Second, we were unable to compute test–retest reliability, which would add to the breadth of psychometric testing support for the scale. We did, however, use factor analysis and Cronbach α coefficient analysis as rigorous statistical tests of construct validity and internal reliability. Third, we were unable to examine the use of the scale over time. We documented substantial variability based on hospital across the sample of 10 organizations, but future work is warranted to assess whether the scale may be useful in evaluating change over time in hospitals undergoing performance improvement initiatives, such as the LSL study[32] and various collaborative efforts. Last, although our results are promising, additional psychometric testing would be helpful to continue to refine this scale for use in studies of hospital culture change.

In summary, we have presented a practical, valid, and reliable approach to measuring hospital organizational culture relevant for cardiovascular care. Our findings support the future use of this measurement scale in studies that seek to understand hospital culture and its influence on clinical performance, as well as efforts to improve performance by enhancing organizational culture. Although organizational culture is a complex and nuanced concept, empirical measurement is possible and can enable novel approaches to improving the quality of hospital care.

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Disclosures

None.

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