

Workforce perceptions of hospital safety culture: case of Iran teaching hospitals

ABSTRACT

Background: One of the main determinants of safety and quality of care in hospitals is institutionalization of safety culture among their employees. This study aimed to assesses patient safety culture in Iran teaching hospitals.

Methods: Four Iran provinces were selected purposefully, one hospital from each was entered the study randomly, and proportional with hospital size, 500 employees were selected. The data were collected using standard questionnaire of Hospital Survey on Patient Safety Culture (HSPSC) and analyzed using Excel and SPSS 22.

Results: Patient safety dimensions with highest positive score were organizational learning and continuous improvement (77%), management support for patient safety (68%) and supervisor/manager expectations and actions promoting patient safety (61%) and dimensions with the lowest patient safety score were non-punitive response to error (20%), communication openness (28%), frequency of events reported (32%), staffing (37%), teamwork across and within hospital units (71%). Although 48% of the participants have not reported any event during 12 past months, but 64.6% scored patient safety excellent/ very good.

Conclusions: There are punishment and blame culture, non-openness in communication channels and low reporting of events in Iran hospitals. It is necessary for hospital management to design error and accident reporting system and reinforce non-punitive culture to increase error reporting.

Keywords: Patient safety culture, Teaching hospitals, Iran

1. INTRODUCTION

Institute of Medicine has defined patient safety as “the freedom from accidental injury due to medical care or medical errors”. Human interaction and use of complicated technologies and new treatments have created unwanted damages to patients such as injuries resulting from wrong diagnosis and treatment, delay in treatment, medication errors and hospital infections. By avoiding these errors, patient security is provided and prevent from psychological pressure and financial burden on families and health system [1].

Studies in different countries have indicated that 3-16% of admitted patients in hospitals have injured from medical accidents and 30-70% of these accidents have created from medical errors. Medical errors are 8th cause of death in US and it is estimated that these errors impose \$17 billion on US health system in a year [2]. The importance of decrease in medical errors have been emphasized in the developing countries located at East Mediterranean Region Office (EMRO) of World health organization (WHO) such as Iran. So

29 that it is estimated that 4.4 million unwanted error happen annually in the health care
30 organizations of EMRO countries [3].

31 Improving patient safety culture requires understanding attitudes, beliefs and behaviors
32 related to patient safety which organizations support and reward them [4]. So, the first step
33 in designing hospital safety program is assessment of current hospital patient safety culture
34 [5]. Numerous studies around the world have assessed patient safety culture in hospitals.
35 One study in hospitals affiliated with Kerman University of Medical Sciences indicated that
36 employees' assessment of all 10 patient safety dimensions and 2 outcome safety culture
37 dimensions are lower than the average [6]. Study on Kermanshah hospitals indicated that
38 half of hospitals have favorite situation and half other don't have favorite situation in
39 establishment of patient safety culture [7]. Another study on 32 hospitals in China showed
40 that employees have positive attitude toward patient safety culture [8]. In another study on
41 Belgium hospitals, although patient safety culture score in long term and psychiatry hospitals
42 was higher than acute hospitals, but employees understanding from safety culture was low
43 [9].

44 Healthcare Research and Quality Agency has developed a useful tool entitled Hospital
45 Survey on Patient Safety Culture (HSOPSC) to assess patient safety culture in healthcare
46 organizations [10]. This tool has been used in many countries health system [11-14]. So, this
47 study using this tool assesses workforce perceptions of Iran teaching hospitals regarding
48 hospital safety culture.

49

50 **2. MATERIAL AND METHODS**

51

52 **2.1 Study Design and Participants**

53 In this analytical-cross-sectional study, teaching public hospitals, because of vast coverage
54 of services, less financial burden to the people and most refer to them, were considered as
55 the population of the study. Purposive sampling method used for sampling, so that at the first
56 step, 4 provinces of Kermanshah, Arak, Kerman and Mashhad selected purposefully. High
57 number of population coverage by teaching hospitals of these cities which present a more
58 realistic view of Iran societies and better access to these provinces by researchers were
59 among main causes of these sampling. At the second step, one hospital from each province
60 was entered the study, randomly. Finally, by referring to the human resource unit of these
61 hospitals, total number of clinical and non-clinical employees with direct contact with patients
62 including physicians and nurses and also employees without direct contact with patients but
63 their work had direct effect on patient care including paramedical and supportive employees,
64 managers and supervisors were obtained. In this way, the number of the study population
65 included 4100 persons.

66 By specifying total population of the study, Cochran formula used for sampling. In order to
67 obtain the highest number of samples, we assumed that the frequency ratio of the study
68 traits (i.e. the dimensions of organizational culture) is 0.5, and also we assumed 5% margin
69 of error from the actual value among the employees and 95% confidence level. Accordingly,
70 and by adding 20% for design effect and 15% for people who leave the study or present
71 incomplete and imperfect information, the sample size estimated 500 people. Proportional
72 classified sampling method was used to extract these 500 samples from the mentioned
73 hospitals' job groups.

$$n = \frac{\frac{z^2 pq}{d^2}}{1 + \frac{1}{N} \left(\frac{z^2 pq}{d^2} - 1 \right)}$$

2.2 Procedures and Variables Assessments

The data were collected using standard questionnaire of Hospital Survey on Patient Safety Culture (HSPSC) in 2016. HSOPSC questionnaire includes 42 questions which assesses patient safety culture in 12 main dimensions and is scored based on 5 parts Likert spectrum. HSOPSC user guide used to analysis data to allow for benchmarking the results [15]. Positive responses to the questions with positive wording were: “agree/strongly agree” or “most of the time/always”. Negative responses to the questions with negative wording were: “disagree/strongly disagree” or “never/rarely”. So the strength point is when each question receives 75% positive response of the respondents or when 75% of them to be against reversed questions. Improvable areas were considered questions which 50% or more of the respondents responded to them using “disagree/strongly disagree” or “never/rarely” responses. The results were arranged in descending order in relation to received positive responses (Table 1).

Table 1. Cronbach’s α coefficient and percent mean of positive responses to the dimensions of patient safety culture

Dimensions and survey questions	Percent mean of Positive responses
Teamwork within units (Cronbach’s $\alpha = 0.59$)	40
People support one another in this unit	42
When a lot of work needs to be done quickly, we work together as a team to get the work done	41
In this unit, people treat each other with respect	40
When one area in this unit gets really busy, others help out	39
Organizational learning—continuous improvement (Cronbach’s $\alpha = 0.84$)	77
We are actively doing things to improve patient safety	84
Mistakes have led to positive changes here	76
After we make changes to improve patient safety, we evaluate their effectiveness	70
Supervisor/manager expectations and actions promoting patient safety (Cronbach’s $\alpha = 0.44$)	61
Manager says a good word when he/she sees a job done according to established patient safety procedures	60
Manager seriously considers staff suggestions for improving patient safety	58
Whenever pressure builds up, my manager wants us to work faster, even if it means taking shortcuts (R)	64
My manager overlooks patient safety problems that happen over and over (R)	61
Hospital handoffs and transitions (Cronbach’s $\alpha = 0.70$)	48
Things ‘fall between the cracks’ when transferring patients from one unit to another (R)	46
Important patient care information is often lost during shift changes (R)	60

Problems often occur in the exchange of information across hospital units (R)	35
Shift changes are problematic for patients in this hospital (R)	53
Feedback and communication about error (Cronbach's $\alpha = 0.39$)	46
We are given feedback about changes put into place based on event reports	30
We are informed about errors that happen in this unit	52
In this unit, we discuss ways to prevent errors from happening again	56
Teamwork across hospital units (Cronbach's $\alpha = 0.59$)	40
There is good cooperation among hospital units that need to work together	43
Hospital units work well together to provide the best care for patients (R)	38
Hospital units do not coordinate well with each other (R)	46
It is often unpleasant to work with staff from other hospital units	34
Overall perceptions of safety (Cronbach's $\alpha = 0.71$)	43
Patient safety is never sacrificed to get more work done	59
Our procedures and systems are good at preventing errors from happening	44
It is just by chance that more serious mistakes do not happen around here	38
We have patient safety problems in this unit	31
Staffing (Cronbach's $\alpha = 0.58$)	37
We have enough staff to handle the workload	34
Staff in this unit work longer hours than is best for patient care	46
We use more agency/temporary staff than is best for patient care	31
We work in 'crisis mode' trying to do too much, too quickly (R)	36
Hospital management support for patient safety (Cronbach's $\alpha = 0.63$)	68
Hospital management provides a work climate that promotes patient safety	69
The actions of hospital management show that patient safety is a top priority	67
Hospital management seems interested in patient safety only after an adverse event happens	68
Communication openness (Cronbach's $\alpha = 0.52$)	28
Staff will freely speak up, if they see something that may negatively affect patient care	42
Staff feel free to question the decisions or actions of those with more authority	38
Staff are afraid to ask questions when something does not seem right	24
Frequency of events reported (Cronbach's $\alpha = 0.50$)	32
When a mistake is made, but is caught and corrected before affecting the patient, how often is this reported?	32
When a mistake is made, but has no potential to harm the patient, how often is this reported?	30
When a mistake is made that could harm the patient, but does not, how often is this reported?	34
Non-punitive response to error (Cronbach's $\alpha = 0.66$)	20
Staff feel like their mistakes are held against them (R)	17
When an event is reported, it feels like the person is being written up, not the problem	24
Staff worry that mistakes they make are kept in their personnel file	20

91 Measurement of internal consistency of the questionnaire using Cronbach's alpha
 92 coefficients indicated that the highest value was for organizational learning-continuous
 93 improvement (0.84) and lowest value was for feedback and communication about error
 94 (0.39) (Table 1).

95 Content validity, experts' opinions, and literature review were used to confirm the
 96 questionnaire validity. Test-retest method was used to confirm reliability, so that 10
 97 participants were selected and the questionnaires were presented to them. After 15 days,
 98 the questionnaires were presented to them, again. The calculated Cronbach's alpha
 99 coefficient was 74%; so, the questionnaire reliability was confirmed.

100 2.3 Statistical Analysis

101 Descriptive statistics used to analyze participant's characteristics. Analysis of variance used
 102 to study difference in patient safety culture dimensions between different hospitals and work
 103 position of participants. Chi-square test used to assess relation between measures of patient
 104 safety outcome, selected hospital and participant's characteristics. Finally, univariate
 105 analysis of linear model used to study the effect of different hospitals and patient's
 106 characteristics on patient safety score. This model uses total patient safety score as
 107 dependent variable and work unit or place, contact with patients, professional experience
 108 and work hours in week as independent variables. Data were analyzed using Excel and
 109 SPSS 22. $P \leq 0.05$ considered as significant value. Before collecting the data, the written
 110 permission was collected from the participants.

111 3. RESULTS

112 Most of the participants were working in medical (28.2%) and surgery (18.6%) units.
 113 Nurses/midwives were majority of the participants (63.8%). Most of the participants had more
 114 than 1-year experience working in this job (81.2%) or this hospital (95.8%) and finally most
 115 of the employees (54.8%) were working more than usual working hours in a week (40 h) and
 116 16.6% more than 60 h in a week (Table 2).
 117
 118

119 **Table 2. Participants characteristics**

		Number	Percent
Hospital work unit	Medical	141	28.2
	Surgery (including operation room and anesthesia)	93	18.6
	Administration/supportive	85	17
	Diagnostic (laboratory, radiology)	60	12
	Emergency	36	7.2
	Different units	49	9.8
	Intensive care	20	4
	Pharmacy	16	3.2
Employee work position	Nurse/midwife	233	46.6
	Physician	86	17.2
	Other health professionals	64	12.8
	Management	55	11
	Support services	48	9.6
	Pharmacist	14	2.8
Interaction/contact with patients	Yes, with direct contact with patient	466	93.2
	No, without direct contact with patient	34	6.8
Experience in this job	Lower than 1 year	21	4.2

	1 to 5 years	148	29.6
	6 to 10 years	155	31
	11 to 15 years	107	21.4
	16 to 20 years	45	9
	21 years and more	24	4.8
Experience in this hospital	Lower than 1 year	94	18.8
	1 to 5 years	163	32.6
	6 to 10 years	111	22.2
	11 to 15 years	62	12.4
	16 to 20 years	41	8.2
	21 years and more	29	5.8
Work hour in a week	Lower than 20 hours	18	3.6
	20-39 hours	208	41.6
	40-59 hour	191	38.2
	60-79 hours	63	12.6
	80 hours and more	20	4

120

121 Scores of patient safety culture dimensions and comparison with 3 other countries are
 122 presented in Table 1 [16-20]. Patient safety dimensions with highest positive score were
 123 organizational learning-continuous improvement (77%), hospital management support for
 124 patient safety (68%) and supervisor/manager expectations and actions promoting patient
 125 safety (61%). Amongst these 3 dimensions, only organizational learning-continuous
 126 improvement had reached 75% threshold of positive score as strength point. The lowest
 127 scores belonged to non-punitive response to error (20%), communication openness (28%),
 128 frequency reported events (32%), staffing (37%), teamwork across hospital units (40%),
 129 teamwork within units (40%), overall perception of safety (43%), feedback and
 130 communication about error (43%) and hospital handoffs and transitions (48%).

131 On the basis of table 3, 64.6% of the participants scored patient safety excellent/very good,
 132 20.8% acceptable and 12.2% poor/failing. 48% of the participants stated that have not
 133 reported any event during past 12 months, 22.6% 1 to 2 events, 14.8% 3 to 5 and 13.8%
 134 more than 5 event. Highest number of events have reported by managers, so that only
 135 36.4% of them have not reported an event during last 12 months. Lowest number of events
 136 have been reported by pharmacists and other health professionals, so that 57.1% and
 137 54.7% of them don't have reported any event during past 12 months. Meanwhile, there was
 138 no significant difference between the number of reported events during past 12 months in
 139 terms of employees' experience in the hospital.

140 **Table 3. Patient safety outcome variables by selected hospitals and respondent**
 141 **characteristics**

	Patient safety grade						Events reported in the past 12 months							
	Excellent/very good		Acceptable		Poor/failing		No events		1-2 events		3-5 events		+5 events	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Nurses	1	70	4	20	2	9	1	48	5	21	3	16	3	13
	6	.4	8	6	1	0	1	.5	0	.4	9	.7	1	.3
Staff categories	4						3							
	4	47	2	26	2	25	4	46	1	22	9	10	1	20
	1	.8	3	7	2	.6	0	.5	9			.5	8	.9

	Pharmacist	1	78	2	14.	1	7.	8	57	4	28	2	14	1	7.
		1	.6		3		1		.1		.5		.3		1
	Other health professionals	4	70	1	18.	7	10	3	54	1	21	9	14	6	9.
		5	.3	2	7		.9	5	.7	4	.9		.1		3
	Administration/management	3	54	1	34.	6	10	2	36	1	23	9	16	1	23
		0	.5	9	5		.9	0	.4	3	.6		.4	3	.6
	Support services	3	66	1	25.	4	8.	2	50	1	27	6	12	5	10
		2	.6	2	0		3	4	.0	3	.1		.5		.4
		Chi-square =63.141, P-value < 0.001				Chi-square =58.495, P-value < 0.001									
	Less than 1 year	5	53	2	28.	1	18	5	61	1	19	6	6.	1	12
		0	.2	7	7		.1	8	.7	8	.1		38	2	.7
Experience at hospital	1–5 years	9	58	4	25.	2	16	9	58	3	22	1	11	1	7.
		5	.3	1	1		.5	5	.3	7	.7	8	.0	3	8
	6–10 years	7	64	2	26.	1	9.	6	54	2	21	1	13	1	10
		2	.8	9	1		0	0	.0	4	.6	5	.5	2	.8
	11–15 years	3	56	1	27.	1	16	2	38	1	22	9	14	1	11
		5	.4	7	4		.1	4	.7	4	.6		.5	5	.7
	16–20 years	2	58	1	31.	4	9.	2	48	1	24	4	9.	7	17
		4	.5	3	7		7	0	.8	0	.4		7		.0
	21 years or more	2	68	7	24.	2	6.	1	48	5	17	6	20	4	13
		0	.9		1		9	4	.3		.2		.7		.8
		Chi-square =8.149, P-value = 0.614				Chi-square =21.004, P-value =0.137									

142

143 Pharmacists rated most positive score to the patient safety, so that 78.6% rated their
 144 hospital patient safety as excellent/very good and only 7.1% rated poor/failing. Physicians
 145 rated lowest positive score, so that 47.8% rated patient safety as excellent/very good and
 146 25.6% as poor/failing (P = 0.001).

147 Regression analysis showed that participants with direct contact with patients had higher
 148 score (B = 82.324, SE = 35.741 and P = 0.021). All of the participants with 40 or more
 149 working hours had patient safety score higher than part-time workers (lower than 40 h)
 150 (Table 4).

151 **Table 4. Factors associated with patient safety culture score**

	Parameter	B	Standard error	t-test	P-value
	Less than 1 year	Reference group			
Experience in profession	1–5 years	5.546	10.126	0.548	0.584
	6–10 years	9.441	39.449	0.239	0.811
	11–15 years	-32.156	26.315	-1.222	0.222
	16–20 years	62.306	50.645	1.230	0.219
	More than 20 years	-22.076	28.637	-0.771	0.441
Direct contact with patients	No	Reference group			
	Yes	82.324	35.741	2.303	0.021
Working hours per week	Less than 40 h	Reference group			
	40 h per week	90.904	36.099	2.518	0.012
	41–59 h	128.424	33.990	3.778	<0.001
	60–79 h	174.192	43.143	4.038	<0.001
Work	80 h and more	180.153	37.517	4.802	<0.001
	Different units	Reference group			

area/hospital unit	Medical	98.128	47.983	2.045	0.041
	Surgical	122.188	51.801	2.359	0.019
	Intensive care	36.095	22.210	1.625	0.104
	Diagnostics (laboratory/radiology)	-14.081	34.531	-0.408	0.684
	Pharmacy	38.853	44.776	0.868	0.386
	Administrative/support	169.903	37.827	4.492	<0.001
	Emergency	44.108	20.755	2.125	0.034

152

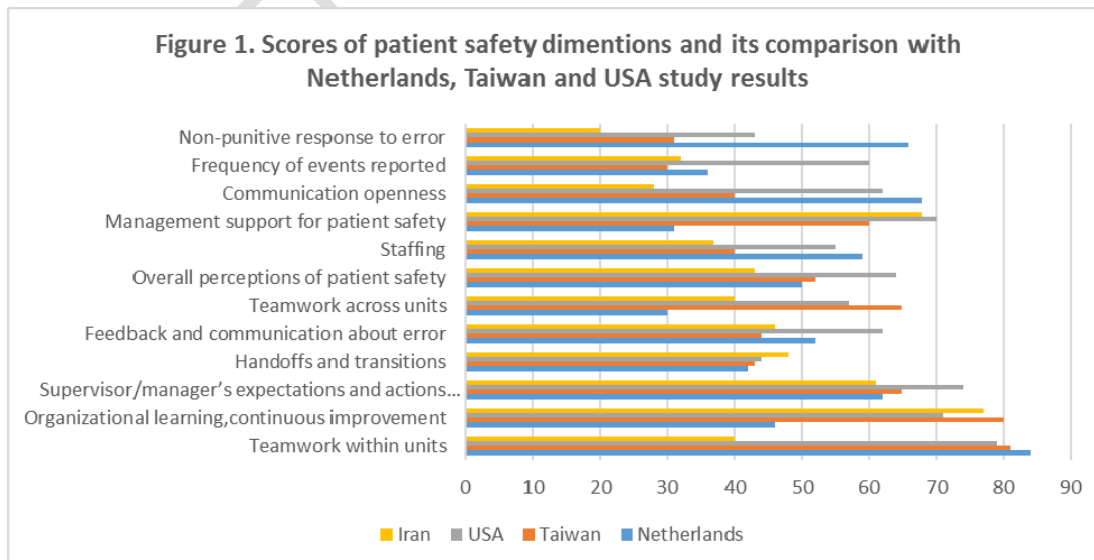
153 Moreover, there had been higher patient safety score for participants who worked in medical
 154 (B = 98.128, SE = 47.983 and P = 0.041), surgery (B = 122.188, SE = 51.801 and P =
 155 0.019), emergency (B = 44.108, SE = 20.755 and P = 0.034) and supportive/administration
 156 units (B = 169.903, SE = 37.827 and P < 0.001). The model explained 5.7% of the variation
 157 in the aggregate patient safety score as explained by the adjusted overall R2 (0.057).

158 4. DISCUSSION

159

160 In order to study Iran place in patient safety culture, the study results were compared and
 161 assessed with other countries results. For this purpose, the countries were selected
 162 randomly from Asia, Europe and America continents (subject to availability of information).
 163 So U.S., Thailand and Netherlands were studied.

164 As the results indicated, the most difference between the 3 mentioned countries and this
 165 study was related to dimensions of teamwork within units and management support for
 166 patient safety. So that in these two dimensions, 3 mentioned countries had better situation,
 167 significantly (p<0.05). However, Iran has a better situation in frequency of reported events
 168 than Taiwan (32% vs. 30%), management support for patient safety than Taiwan and
 169 Netherlands (68% vs. 60% and 31%, respectively), teamwork within units than Thailand
 170 (40% vs. 30%), feedback and communication about error then Thailand (46% vs. 44%),
 171 hospital handoffs and transitions than U.S., Taiwan and Netherlands (48% vs. 44%, 43%
 172 and 42%, respectively) and organizational learning and continuous improvement than U.S.
 173 and Netherlands (77% vs. 71% and 46%, respectively)(Figure 1).



174 **Fig. 1. Scores of patient safety dimensions and its comparison with Netherlands,**
175 **Taiwan and USA study results**
176

177 Management commitment to the patient safety, and in this regard, providing needed
178 sources, educational programs and other sources are necessary for patient safety success
179 [21, 22]. However, in current study, management support for patient safety has no better
180 situation than 3 studied countries which require good governance and adequate human
181 sources. Error reporting is a very important issue for patient safety improvement in different
182 countries [23-25]. Error reporting make learning from errors and implementing changes in
183 system to reduce probabilities of future patient injuries [26]. Current study indicated that 48%
184 of the participants have not reported any event in the past 12 months. This implies that
185 errors which have potential to harm patients are reported low.

186 Other finding indicated that most number of hospital errors are reported by managers and
187 then physicians. So that, during one past year, only 36% of managers and 46% of
188 physicians have not reported any event. One of the most probable reason behind this is that
189 managers and physicians have more dominance and receive more support than other
190 groups and have lower vulnerability to state errors.

191 Employee's willingness to report errors depends on non-punitive response to error and
192 blame culture (which is 20% in current study). Employees worry about their errors to be kept
193 in personal records (20%) and use against them (17%) and also when happen an error, it
194 feels like the person is being written up, not the problem (Table 1). Moreover, inadequate
195 feedback and communication about error (46%) cause the employees don't acquire
196 adequate information about errors and necessary feedback about administered changes and
197 error prevention methods.

198 Another very important issue is staffing which its score was 37% in this study. Most of
199 employees stated that don't have enough employee to doing work load (34%) and work in
200 crisis mode to do more work with faster time (36%). In the studied hospitals employees work
201 more shifts to compensate shortage of professional employees, so that during past 1 year
202 54.8% of employees had worked more than 40 h in a week. Long hour of working increase
203 employees fatigue, medical errors and adverse side effects [15].

204 **5. CONCLUSION**
205

206 Administration of quality improvement strategies such as clinical governance and
207 accreditation are completely related to patient safety. This study emphasizes that some
208 patient safety dimensions need to be improved. It is necessary to design error and accident
209 reporting system, reinforce non-punitive culture to increase error reporting, provide more
210 professional human sources in hospitals to decrease other employees work hour and finally
211 it is necessary to hospital management support for patient safety to be assured. The survey
212 should be repeated after implementation of appropriate interventions to monitor
213 improvements in patient safety culture in these hospitals.

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