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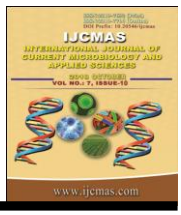

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Assessment of Unit Level Patient Safety Culture Dimensions in Tanta University Hospitals, Egypt

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A B S T R A C T

Patient safety has become a priority in healthcare system and patient safety culture among health care workers is a driving force for its application. To assess patient safety culture dimensions at work unit level among HCWs in Tanta University Hospitals. A cross-sectional study was conducted over a period of 1 year using Hospital Survey on Patient Safety Culture of AHRQ. The dimensions with the highest positive responses were; teamwork within hospital units, organizational learning-continuous improvement, and supervisors/ manager expectations and actions promoting safety (69.7%, 65.8%, and 60.8%, respectively) and the least positive response was in the dimension of non-punitive response to error (22.7%). Non-punitive work environment is essential to facilitate change in patient safety culture where blameless reporting helps better detection and management of adverse events.

Introduction

Patient safety can be defined as the prevention of errors and adverse effects associated with health care of patients (WHO, 2017). Unsafe medical care is a major source of morbidity and mortality throughout the world. Although estimates of the size of the problem are imprecise, it is likely that millions of people suffer disabling injuries or death directly attributable to medical care (WHO, 2008).

Lack of trained staff, lack of policies, procedures and a culture of safety rank high among priority areas for improving patient safety and have massive implications for health care delivery and health systems in developing countries (Wilson *et al.*, 2012).

The European Society for Quality in Healthcare has defined a culture of safety in the context of patient safety dynamically as "an integrated pattern of individual and organizational behavior, based upon shared beliefs and values that continuously seeks to minimize patient harm, which may result from the processes of care delivery" (Kristense S., 2016). Measuring safety culture provides a tangible indicator of the current status and progress of organizations over time and teams implementing improvements (Makary *et al.*, 2006).

Thus, promoting a culture of safety and avoidance of a culture of blame and establishment of work environment built on transparency and willingness to change are of the major challenges to patient safety in health care systems (WHO EMRO, 2010). The aim of this work was to assess unit level dimensions of patient safety culture among HCWs of Tanta University Hospitals.

Materials and Methods

A cross- sectional study was conducted in Tanta University Hospitals over a period of one year. The sample was obtained by two stage stratified random sampling method. The departments were divided into two different strata; medical stratum and surgical stratum. Some departments were randomly selected from each stratum. Then, each department was divided into the main job categories of HCWs; physicians, nurses, technicians and workers who were randomly selected till fulfilling the required number for that category according to its weight. Included HCWs were those in job during the period of the study, in contact with patients during care delivery and consent to participate.

Tools of the study

Data were collected using the Hospital Survey on Patient Safety Culture (HSOPSC) of Agency for Healthcare Research and Quality (AHRQ), 2004 (Sorra JS. and Nieva VF., 2004). It is a self-administered questionnaire that contained some socio-demographic, work-related data and questions about patient safety issues and medical errors reporting. The survey measured 7 unit-level aspects or dimensions of safety culture which are; Supervisor/Manager Expectations and Actions Promoting Safety, Organizational Learning-Continuous Improvement, Teamwork Within Units, Communication Openness, Feedback and Communication about Error, Non-punitive Response to Error, and Staffing. The survey items were grouped into dimensions of safety culture, and calculation of one overall frequency for each dimension was done by calculation of composite frequency of the total percentage of positive responses for each safety culture dimension. Composite frequency equals the number of positive responses to the items in the dimension divided by the Total number of responses to the items in the dimension whether positive, neutral, or negative.

Statistical design

Statistical analysis was done using the appropriate tests of significance according to the type of data using SPSS version 23. Qualitative data were presented as number and percentage. Quantitative data were presented as mean and standard deviation (SD). The level of significance was considered at p value < 0.05.

Ethical consideration

Approval of the ethical committee of Tanta Faculty of Medicine was obtained before conducting the study. Subjects were informed about the purpose, procedure of the study and benefits of sharing in it and that all collected data will be used only for scientific purposes. An informed consent was obtained and data were collected anonymously. Confidentiality was guaranteed during the whole period of the study.

Results and Discussion

The dimensions with the highest positive responses were; teamwork within hospital units, organizational learning-continuous improvement, and supervisors/ manager expectations and actions promoting safety (69.7%, 65.8%, and 60.8%, respectively). On the other hand, the dimension with the least

positive response was non-punitive response to error (22.7%). Statistically, there was a significant difference between safety culture dimensions at unit level regarding opinion of HCWs whether negative or positive (p=0.0001) (Table 1).

Physicians had the lowest mean % composite scores in all dimensions except teamwork within hospital units as workers had the lowest mean % score and non-punitive response to error as technicians had the lowest mean % score (Table 2).

Females had a significantly higher mean % score in the dimensions of supervisor/manager expectations and actions promoting safety, organizational learning-continuous improvement, teamwork within hospital units and communication openness (Table 3).

Medical departments expressed significantly higher mean % scores than surgical ones in the dimensions of communication openness, and non-punitive response to error (Table 4).

The mean composite scores of the unit level dimensions were significantly higher in HCWs with experience more than 10 years except the dimensions of feedback and communication about error, and staffing where the mean scores were higher in HCWs with less than 5 year experience but the difference was not statistically significant (Table 5).

HCWs that had indirect contact with patients showed significantly higher mean % scores in the dimensions of supervisor/manager expectations and actions promoting safety, organizational learning-continuous improvement, and teamwork within hospital units. On the other hand, HCWs who had direct contact with patients showed significantly higher mean % scores in the dimensions of staffing (Table 6).

Safety culture assessment provides a basic understanding of safety-related perceptions and attitudes of healthcare staff aiming to improve performance rather than blaming individuals.

The present study revealed that unit level dimensions of safety with the highest positive responses were; teamwork within hospital units, organizational learning-continuous improvement, and supervisors/ manager expectations and actions promoting safety and the least positive responses were in the dimension of non-punitive response to error.

Teamwork within hospital units was reported as the highest composite score in the current study (69.7%) and this is a very important issue as dealing with patients in each hospital unit needs cooperation of different HCWs.

Similarly, it was reported as the highest composite score in different national studies with varied percentages as follows; Ahmed *et al.,* 2011(59.6%) Abdelhai *et al.,* 2012 (51.7%) and Aboul-Fotouh *et al.,* 2012 (58.1%), Mohamed *et al.,* 2015 (80%) and El-Shabrawy *et al.,* 2017 (57.4%).

Regionally, in Saudi Arabia, different studies in the period from 2009 to 2014 showed different scores from average to high (68-84%) (Al-Ahmadi, 2009, Al Awa *et al.,* 2011 and El-Jardali *et al.,* 2014). El-Jardali, 2010reported team work within unit as a strength area in Lebanese hospital with a score of 82.3% whereas the score was 71% in Palestine, 2013 (Hamdan and Saleem, 2013). In Jordan, also three studies within 2014-2015showed average score from 49.8-83.8% (AbuAlRub and Abu Alhijaa, 2014, Saleh *et al.,* 2015 and Khater *et al.,* 2015). Similar high composite scores were found in Oman (Ammouri *et al.,* 2015 and Al-Mandhari *et al.,* 2014) and Kuwait, 2014(Ghobashi *et al.,* 2014).

Wagner *et al.*, 2013, in their international comparison of patient safety culture in three countries, revealed that teamwork within units had the highest composite score ranging from 75-95% with average of 85% from 45 hospitals in Netherlands, 72-90% with average of 81% from 74 hospitals in Taiwan and 76-82% with average of 79% from 622 hospitals in USA which overall showed higher results than the current study.

Organizational learning-continuous improvement was reported as area for potential improvement in some Egyptian studies; Ahmed *et al.*, 2011(57.1%) and Abdelhai *et al.*, 2012 (50%) and as a strength area in others; Aboul-Fotouh *et al.*, 2012 (78.2%), and Mohamed *et al.*, 2015 (73.3%) while it was considered as a weakness area in El-Shabrawy *et al.*, 2017 (43.7%).

Regionally, in Saudi Arabia, the average composite score ranged from 74 to 84% (Al-Ahmadi, 2010, Aboshaiqah and Baker, 2013 and Aljabri, 2012). El-Jardali *et al.*, 2010, also reported organizational learning-continuous improvement as a strength area in Lebanese hospital with a score of 78.3% whereas the score was 62% in Palestine, 2013(Hamdan and Saleem, 2013).

In Jordan, 2014-2015, this dimension showed average score from 49.2 to 84.8% (AbuAlRub and Abu Alhijaa, 2014, Saleh *et al.*, 2015 and Khater *et al.*, 2015). Similar high composite scores were found in Oman (Ammouri *et al.*, 2015 and Al-Mandhari *et al.*, 2014) and Kuwait, 2014(Ghobashi *et al.*, 2014).

Despite that the current results being lower than the results from Taiwan; 80(71-89) and USA; 71(67-75), it was higher than the results found in Netherland; 47(32-62) in Wagner *et al.*, 2013 comparison.

As regards supervisor/manager expectations and actions promoting safety dimension (60.8%), it had a lower composite score in other Egyptian studies like; Ahmed *et al.*, 2011(59.6%), Abdelhai *et al.*, 2012 (35.5%) and Aboul-Fotouh *et al.*, 2012 (46.4%), and El-Shabrawy *et al.*, 2017 (53.5%) except Mohamed *et al.*, 2015 where it was higher (75%).

Table.1 Distribution of responses of the studied HCWs regarding safety culture Dimensions at unit level

Safety culture dimensions at unit level	Mean frequency of participants' opinions (n=949)			
	Negative		Positive	
	n	%	n	%
- **Supervisors/manager expectations and actions promoting safety**	372	38.2	577	60.8
- **Organizational learning-continuous improvement**	325	34.2	624	65.8
- **Teamwork within hospital units**	287	30.3	662	69.7
- **Communication openness**	585	61.6	364	38.4
- **Feedback and communication about error**	562	59.2	387	40.8
- **Nonpunitive response to error**	734	77.3	215	22.7
- **Staffing**	573	60.4	376	39.6
χ^2=	716.610			
P value	0.0001*			

*Statistically significant (P<0.05)

Table.2 Unit level patient safety culture composite scores according to the job of participants

Patient safety culture dimensions (Unit level)	Composite score of patient safety culture dimensions according to job of participants (n=949)				χ^{2a}	P value
	Physician (n=238)	Nurse (n=601)	Technician (n=19)	Workers (n=91)		
manager expectations /Supervisor and actions promoting safety	47.8±28.0	63.8±25.5	70.5±19.3	73.4±19.1	78.614	0.0001*
Organizational learning-continuous improvement	50.7±33.8	69.2±31.3	79.0±16.5	79.5±36.1	78.018	0.0001*
Teamwork within hospital units	62.1±33.9	73.5±26.8	96.1±9.4	58.8±30.1	51.362	0.0001*
Communication openness	32.8±30.5	40.3±32.5	49.1±32.1	38.1±39.6	11.347	0.010*
Feedback and communication about error	36.0±38.2	49.9±39.1	43.9±29.5	51.3±34.5	12.199	0.007*
Nonpunitive response to error	20.0±24.9	23.0±27.8	15.8±17.1	28.6±27.9	7.517	0.057
Staffing	36.7±22.8	40.1±26.2	47.4±28.7	42.3±20.9	6.977	0.073

Data are presented as mean±SD
*Statistically significant (P<0.05)
χ^{2a}= Chi squared value of Kruskal-Wallis H test

Table.3 Unit level patient safety culture composite scores according to gender of participants

Patient safety culture dimensions (unit level)	Composite score of patient safety culture dimensions according to gender		Z^ascore	P value
	Male (n=207)	Female (n=742)		
Supervisor/manager expectations and actions promoting safety	55.1±27.1	62.5±26.4	3.359	0.001*
Organizational learning-continuous improvement	55.2±35.4	68.7±32.4	4.942	0.0001*
Teamwork within hospital units	64.7±32.1	71.1±28.7	2.422	0.015*
Communication openness	34.1±32.4	39.5±32.9	2.169	0.030*
Feedback and communication about error	40.9±40.1	40.7±30.0	0.11	0.991
Nonpunitive response to error	20.6±25.1	23.2±27.5	0.999	0.318
Staffing	40.5±24.3	39.3±25.2	0.486	0.627

Data are presented as mean±SD
*Statistically significant (P<0.05)
Z^a= Z score value of Mann-Whitney U test

Table.4 Unit level patient safety culture composite scores according to work setting

Patient safety culture dimensions (unit level)	Composite score of patient safety culture dimensions according to work setting		Z^ascore	P value
	Medical (n=480)	**Surgical** (n=469)		
Supervisor\ manager expectations and actions promoting safety	59.5±27.3	62.2±26.2	1.781	0.075
Organizational learning-continuous improvement	65.9±34.8	65.6±32.1	0.579	0.563
Teamwork within hospital units	69.9±28.9	69.5±30.3	0.031	0.975
Communication openness	42.4±34.9	34.3±30.1	3.421	0.001*
Feedback and communication about error	39.2±39.2	42.4±37.6	1.490	0.136
Nonpunitive response to error	24.7±27.7	20.5±26.2	2.540	0.011*
Staffing	38.1±26.5	41.0±23.3	1.579	0.114

Data are presented as mean±SD
*Statistically significant (P<0.05)
Z^a= Z score value of Mann-Whitney U test

Table.5 Unit level patient safety culture composite scores according to experience years of participants

Patient safety culture dimensions (unit level)	Composite score of patient safety culture dimensions according to experience years			χ^{2a}	P value
	< 5 (n=529)	**5-10** (n=115)	**>10** (n=305)		
Supervisor/manager expectations and actions promoting safety	59.4±26.9	57.2±27.1	64.7±25.8	9.812	0.007*
Organizational learning-continuous improvement	60.4±35.9	66.4±32.3	74.8±27.2	28.891	0.0001*
Teamwork within hospital units	66.8±30.8	67.2±30.8	75.7±26.1	15.966	0.0001*
Communication openness	35.9±33.1	36.5±35.6	43.4±39.6	11.985	0.002*
Feedback and communication about error	41.9±38.6	36.8±34.3	40.2±39.6	1.440	0.487
Nonpunitive response to error	23.6±26.7	15.1±22.5	23.8±28.8	10.560	0.005*
Staffing	40.5±24.5	39.6±22.5	37.9±26.8	2.646	0.266

Data are presented as mean±SD
*Statistically significant (P<0.05)
χ^{2a}= Chi - squared value of Kruskal-Wallis H test

Table.6 Unit level patient safety culture composite scores according to contact of participants with patients

Patient safety culture dimensions (unit level)	Composite score of patient safety culture dimensions according to contact with patient		Z[a]score	P value
	Direct (n=879)	**Indirect** (n=70)		
Supervisor/manager expectations and actions promoting safety	59.9±26.9	72.6±20.8	3.829	0.0001*
Organizational learning-continuous improvement	64.1±33.5	86.2±25.7	5.684	0.0001*
Teamwork within hospital units	68.8±29.9	81.4±22.4	3.452	0.001*
Communication openness	37.8±32.3	44.8±38.4	1.359	0.174
Feedback and communication about error	40.2±38.3	48.6±39.6	1.692	0.091
Nonpunitive response to error	22.3±27.0	27.6±26.6	1.956	0.050
Staffing	40.2±25.0	31.8±24.0	2.631	0.009*

Data are presented as mean±SD
*Statistically significant (P<0.05)
Z[a]= Z score value of Mann-Whitney U test

Regionally, in Saudi Arabia, the average composite score ranged from 49 to 70 %. *El*-Jardali *et al.,* 2010, reported a score of 60.6% in Lebanese hospital and Hamdan, 2013 in Palestine reported a score of 56%, 2013. In Jordan, 2014-2015, this dimension showed average score from 43.3-57.9%. The dimension showed a score of 60% in Oman and 53% in Kuwait, 2014.

The present study composite score in this dimension was nearly similar to the average from Netherlands (63%) and Taiwan (65%) and still lower than the results from USA (75%) (Wagner *et al.,* 2013).

The non-punitive response to error composite was the lowest scores in agreement with other Egyptian studies like; Abdelhai *et al.,* 2012 (29.9%) and Aboul-Fotouh *et al.,* 2012 (19.5%)revealing that HCWs, especially technicians, are not at ease when it comes to reporting errors. It was also reported as low in El-Shabrawy *et al.,* 2017 (30.3%) and average in Ahmed *et al.,* 2011(52.9%) and Mohamed *et al.,* 2015 (66.7%).

The current study also agreed with different regional studies where the composite score ranged from 16-49% in Saudi Arabia, 24.3% in Lebanon, 21-30.7% in Jordan, 17% in Palestine, 21.4-25% in Oman and 24% in Kuwait.

These results identified that non-punitive response to error is seen as a serious issue which needs to be improved as health care professionals in the Arab countries tend to think that a 'culture of blame' still exists that prevents them from reporting errors.

The composite score of non-punitive response to error was higher as perceived in Netherland ranging from 52-80% (average 66%) denoting less culture of blame in its hospitals while in USA, the score was lower; 40-48(average

44%) and as well in Taiwan; 21-42 (average31%) (Wagner *et al.,* 2013).

The current study revealed that physicians had the lowest mean % composite scores in all dimensions except teamwork within hospital units as workers had the lowest mean % score and non-punitive response to error as technicians had the lowest mean % score. The present results are consistent with the results of El-Jardali *et al.,* 2011 and Nie *et al.,* 2013 who showed that the positive response numbers of nurses regarding patient safety culture was higher than that of physicians. On the other hand, these results were not in consistence with the results found by Abdelhai *et al.,* 2012, in their study in Cairo University Hospitals where physicians had significantly higher scores than nurses and paramedical personnel.

These results can be explained by that nurses spend more time in contact and communicating with patients, and thus having more opportunity to deal with patient safety issues.

Females had significantly higher mean % score in the dimensions of supervisor/manager expectations and actions promoting safety, organizational learning-continuous improvement, team work within hospital units and communication openness

These results contradicts the results of Aboul-Fotouh *et al.,* (2012), Kim *et al.,* (2013) and Elmahdy *et al.,* 2014 who found no statistically significant differences between male and female participants regarding their mean scores of patient safety culture dimensions. They explained their results as both male and female staff follow the same regulations and work in the same climate.

Medical departments expressed significantly higher mean % scores than surgical ones in the dimensions of communication openness, and non-punitive response to error.

On the contrary, some national studies revealed significantly higher mean score of those working in surgical departments regarding all patient safety culture dimensions (Aboul-Fotouh *et al.,* 2012) whereas Elmahdy *et al.,* 2014 and others revealed higher scores in medical and paramedical departments (Abbas *et al.,* 2008). El-Jardali *et al.,* 2011, also reported significantly higher score for paramedical as compared to surgical and medical units.

Variations in patient safety culture perception among HCWs working in different hospital departments or specialties may be of value in organizational learning of the hospital. Information on safety climate can be used to guide prevention efforts toward selected units or departments.

The current study revealed that mean composite scores of most safety culture dimensions were higher in HCWs with more experience. This could be explained by more training and learning opportunities in senior HCWs or less frequent exposure and more adaptation to the junior work conditions which have a direct impact on patients. In addition, junior staff does not get sufficient information, do not know the proper channels to use to express their concerns, and also believe it is difficult to express their opinions regarding adverse events and patient safety topics.

These findings agree with the results of Aboul-Fotouh *et al.,* 2012, Raftopoulos *et al.,* 2013, and Elmahdy *et al.,* 2014. On the other hand, these findings contradict the results of Abbas *et al.,* 2008, who revealed that the total mean score of the participants' perceptions about patient safety decreased as their years of experience increased.

HCWs with indirect contact with patients showed significantly higher mean % scores in the dimensions of supervisor/manager expectations and actions promoting safety, organizational learning-continuous improvement, and teamwork within hospital units. On the other hand, HCWs who had direct contact with patients showed significantly higher mean % scores in the dimensions of staffing.

HCWs who do not deal directly with the patient are more at ease when it comes to patient safety issues. Work in laboratory units, for example, is more organized than other units because it is controlled by more professional standards and errors investigated in these units are done as a group or a system. On the contrary, when an error is performed by a nurse, the nurse is investigated as an individual rather a member of a medical team (El-Jardali *et al.,* 2011).

Non-punitive work environment is essential to facilitate change in patient safety culture where blameless reporting helps better detection and management of adverse events. Comprehensive education on patient safety culture is recommended for all health professionals specially physicians to facilitate change in patient safety. Enhancement of blameless reporting in a non-punitive environment through education and proper communication between managers and staff.

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