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VOL/ISSUE NO: 32/7

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AUTHORS: Assia boughaba, Salah Aberkane, Youcef-Oussama Fourar and Mébarek Djebabra

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Study of safety culture in healthcare institutions: case of an Algerian hospital

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Received 23 September 2018
Revised 12 February 2019
Accepted 11 April 2019

Abstract

Q1

Purpose – For many years, the concept of safety culture has attracted researchers from all over the world, and more particularly in the area of healthcare services. The purpose of this paper is to measure safety culture dimensions in order to improve and promote healthcare in Algeria.
Design/methodology/approach – The used approach consists of getting a better understanding of healthcare safety culture (HSC) by measuring the perception of healthcare professionals in order to guide promotion actions. For this, the Hospital Survey on Patient Safety Culture questionnaire was used in a pilot hospital setting where it was distributed on a number of 114 health professionals chosen by stratified random sampling.
Findings – The results showed that the identified priority areas for HSC improvement help in establishing a trust culture and a non-punitive environment based on the system and not on the individual.
Originality/value – Safety is recognized as a key aspect of service quality, thus measuring the HSC can help establish an improvement plan. In Algerian health facilities, this study is considered the first to examine perceptions in this particular area. The current results provide a baseline of strengths and opportunities for healthcare safety improvement, allowing the managers of this type of facilities to take steps that are more effective.

Keywords Organizational culture, Patient satisfaction, Employee involvement, Healthcare, Safety culture, Nursing outcomes, Safety management, Hospital care, Surveys

Paper type Research paper

Introduction

The term "Safety Culture" seems to have been used for the first time after the Chernobyl disaster in 1986. The investigation report of the International Advisory Group on Nuclear Safety affiliated with the International Atomic Energy Agency's has identified "a poor safety culture" as one of the factors contributing to the worst nuclear accident in history (IAEA, 1986).

The safety culture concept has been used more often in safety research, especially in high-risk industries such as nuclear power, oil, gas, chemicals, construction and others (Van Nunen *et al.*, 2018). More recently, this concept has shifted to the healthcare sector where many studies have demonstrated its importance in improving healthcare safety (Van Nunen *et al.*, 2018; Mello and Barbosa, 2014; Halligan and Zecevic, 2011; Occelli *et al.*, 2007).

These studies have shown that the higher the level of healthcare safety culture (HSC), the less there were medical errors (Santa *et al.*, 2018; Stock and McFadden, 2017; Navon *et al.*, 2005). Similarly, other studies have confirmed the hypothesis that HSC improvement

The authors report no conflict of interest in the undertaking of this research.

International Journal of Health Care Quality Assurance
Vol. 32 No. 7, 2019
pp. 1-19

0952-6862
DOI 10.1108/IJHCQA-09-2018-0229

was associated with a decrease in adverse events (Xie *et al.*, 2017; Wang *et al.*, 2013; Braithwaite *et al.*, 2010).

Consequently, the HSC evaluation is of great importance for a healthcare facility. This evaluation is based on three complementary aspects that define the complex concept of HSC (Cole *et al.*, 2013; Cooper, 2000): the psychological aspect that reflects what health professionals feel, the behavioral aspect that is inherent in their field practices and the organizational aspect that highlights the healthcare policy of their respective institutions.

It should be recalled that the complementarity between these three aspects materializes the tripartite interaction represented in the definition given by the Advisory Committee for the Safety of Nuclear Installations (ACSNI Human Factors Study Group, 1993).

Note also that each of these three aspects is evaluated individually by specific methods such as: self-administered questionnaires and interviews for the first aspect; clinical studies and observations for the second aspect; and examination of policies, structures and procedures, organizational and safety audit for the third aspect (Vasconcelos *et al.*, 2018; Cole *et al.*, 2013; Cooper, 2000).

However, when the aim is to evaluate the HSC that groups together the above-mentioned three aspects, two methods are of common use: the quantitative methods where the questionnaires occupy a place of choice, and the qualitative methods centered essentially on collective or individual interviews.

Authors (Vasconcelos *et al.*, 2018; Singla *et al.,* 2006; Health and Safety Executive, 2005) point out that in the healthcare sector, quantitative methods based on individual and self-administered questionnaires are currently predominant. These questionnaires focus on the evaluation of HSC indicators that capitalize the three previously mentioned aspects in the form of HSC dimensions.

For Cooper (2000), HSC dimensions can be summed up in the attitudes, perceptions and beliefs of individuals, their behavior and the management systems of healthcare safety.

Other authors (Boughaba *et al.*, 2014; El-Jardali *et al.*, 2010; Fernández-Muñiz *et al.*, 2007) share the same dimensions of HSC. These dimensions materialize the model and the ability of an organization to manage healthcare safety.

For Halligan and Zecevic (2011), the most frequently cited dimensions were leadership commitment to safety, trust-based open communication, organizational learning and the non-punitive approach to reporting and analyzing adverse events. These dimensions translate HSC into both: a primary mechanism for a safe and effective healthcare; a determinant of continuous learning and effective teamwork; and a key factor in safety behavior such as reporting errors.

Q2

The Agency for Healthcare Research and Quality define HSC as "the product of individual and group values, attitudes, perceptions, competencies, and patterns of behavior that determine the commitment to, and the style and proficiency of, an organization's health and safety management" (Sorra *et al.*, 2016).

Currently, the dimensions most used for the quantitative evaluation of HSC are in a number of ten (cf. section materials and methods) that perfectly compile the three aspects of HSC (psychological, behavioral and organizational). These dimensions can be grouped into three macro-dimensions (Hellings and Schrooten, 2008): managers expectations and actions in regards with patients' safety, reporting frequency of adverse events and teamwork between the different establishment' services.

Another interesting aspect of these ten dimensions of HSC is that they are included in the Hospital Survey on Patient Safety Culture (HSOPSC) developed by the American Agency for Healthcare Research and Quality (Arabloo *et al.*, 2012). This questionnaire has already been tested and validated in the USA and is widely used in several countries; Notably in France where it has been translated, tested and validated by the Coordination Committee for Clinical Evaluation and Quality in Aquitaine (Occelli *et al.*, 2013).

The same questionnaire was used in this study in order to explore how healthcare professionals perceive healthcare safety in their facilities according to the ten dimensions of HSC. These dimensions are explored through 38 items (cf. Table I).

In other words, the objective of this paper is to evaluate quantitatively the HSC of an Algerian hospital using the HSOPSC questionnaire. Furthermore, the purpose of this evaluation is to assess the level of HSC in Algerian hospitals through the evaluation of the

Section 1
Q1- Are you?
a. Man b. Woman
Q2- How old are you?
a. 20–30 years b. 31–40 years c. 41–50 years d. Old than 51years
Q3- How long have you worked in this hospital?
a. Less than 1 year b. 2–10 years c. 11–20 years d. 21 years or more
Q4- What is your professional category in this hospital?
……..
Q5- What is your contract of employment?
a. Intern b. Fixed Term Contract c. Undetermined Duration Contract d. Permanent
Section 2
Dim 1 Overall perceptions of patient safety
Q1 (-): It is just by chance that more serious mistakes do not happen around here
Q2: Patient safety is never sacrificed to get more work done
Q3 (-): We have patient safety problems in this unit
Q4: Our procedures and systems are good at preventing errors from happening
Dim 2 Frequency of events reported
Q5: When a mistake is made, but is caught and corrected before affecting the patient, it is reported
Q6: When a mistake is made, but has no potential to harm the patient, it is reported
Q7: When a mistake is made that could harm the patient, but does not, it is reported
Dim 3 Supervisor/manager expectations and actions promoting safety
Q8: My supervisor says a good word when he/she sees a job done according to established patient safety procedures
Q9: My supervisor seriously considers staff suggestions for improving patient safety
Q10 (-): Whenever pressure builds up, my supervisor wants us to work faster, even if it means taking shortcuts
Q11 (-): My supervisor overlooks patient safety problems that happen over and over
Dim 4 Organizational learning – continuous improvement
Q12: We are actively doing things to improve patient safety
Q13: Mistakes have led to positive changes here
Q14: After we make changes to improve patient safety, we evaluate their effectiveness
Q15: We are given feedback about changes put into place based on event reports
Q16: In this unit, we discuss ways to prevent errors from happening again
Dim 5 Teamwork within hospital units
Q17: People support one another in this unit
Q18: When a lot of work needs to be done quickly, we work together as a team to get the work done
Q19: In this unit, people treat each other with respect
Q20: When one area in this unit gets really busy, others help out
Dim 6 Communication openness
Q21: Staff will freely speak up if they see something that may negatively affect patient care
Q22: Staff feel free to question the decisions or actions of those with more authority
Q23(-): Staff are afraid to ask questions when something does not seem right
Dim 7 Non-punitive response to error
Q24 (-): Staff feel like their mistakes are held against them
Q25(-): When an event is reported, it feels like the person is being written up, not the problem
Q26 (-): Staff worry that mistakes they make are kept in their personnel file
Dim 8 Staffing
Q27: We have enough staff to handle the workload
Q28 (-): Staff in this unit work longer hours than is best for patient care
Q29 (-): We work in "crisis mode" trying to do too much, too quickly
Dim 9 Management support for patient safety
Q30: Hospital management provides a work climate that promotes patient safety
Q31: The actions of hospital management show that patient safety is a top priority
Q32(-): Hospital management seems interested in patient safety only after an adverse event happens
Dim 10 Teamwork across hospital units
Q33 (-): Hospital units do not coordinate well with each other
Q34(-): Things "fall between the cracks" when transferring patients from one unit to another
Q35: There is good cooperation among hospital units that need to work together
Q36 (-): Important patient care information is often lost during shift changes
Q37 (-): It is often unpleasant to work with staff from other hospital units
Q38 (-): Problems often occur in the exchange of information across hospital units

Table I.
Questionnaire contents

ten indicators' scores. Thus, the hypothesis adopted is "the higher the scores of the indicators, the more that the HSC is developed within the hospital."

In order to justify the interest given to the quantitative evaluation of HSC in Algerian hospitals, we note that the literature on healthcare safety shows that its promotion strategies are based on two main levers that are (Leggat and Balding, 2018; Lee *et al.*, 2015; Shaw-Taylor, 2014): the development of HSC and the continuous improvement of healthcare safety and quality. It is obvious that the second lever depends closely on the first one because, to the best of our knowledge, this continuous improvement is possible only when the level of the HSC is qualified as "developed."

Another reason justifying the interest granted to the quantitative evaluation of the HSC in the Algerian hospitals relate to the Algerian policy for the promotion of the National Healthcare System (NHS) of that is briefly explained in the following section.

On the Algerian strategy of promoting the NHS

In Algeria, as in all countries, healthcare is not only a fundamental right but also a resource for the country's social and economic development. Moreover, the Algerian constitution insists on the right of citizens in health preservation and protection. In this context, the Health Law 85-05 in its Article 4 defines the NHS as a tool intended for the protection, the promotion, the improvement, the evaluation, the surveillance and the maintenance or restoring the population's health. Therefore, the NHS must be organized in a consistent way to ensure public health in a comprehensive, coherent and sustainable manner.

Despite these orientations, the NHS has experienced multiple difficulties that affected its smooth operation:

- An almost generalized dissatisfaction of health professionals which was materialized by a massive departure toward early retirement.
- Citizens' dissatisfaction showed toward the NHS in terms of organization, quality of care and care safety. In this regard, complaints have been made by citizens concerning medical errors or even neglect of patients care especially in maternity units where many patients experienced abusive orientations to other hospitals for reasons of unavailability of human and material resources.
- The Algerian government notes disparities in national health coverage and more particularly in southern Algeria where the situation is alarming.

To remedy this situation, a hospital reform policy has recently been implemented with the aim of promoting public health in the broad sense of the term. This promotion aims to achieve two objectives: better organization of healthcare offers and better care safety in hospital services. The achievement of the second objective is conditioned by HSC promotion within hospitals. It is in this context that the rest of this article presents a HSC evaluation in a pilot hospital setting.

Materials and methods

Questionnaire

Given that this study is a first attempt to evaluate HSC in Algeria, the questionnaire chosen is the one developed by HSOPSC (Sorra *et al.*, 2016) which is currently the most used in many countries like the USA and France.

This standardized questionnaire is organized in two parts (Table I). The first part is composed of questions relating to general information, while the second part is composed of 38 questions arranged in ten dimensions allowing to measure healthcare professionals' perception in regards of the HSC. The HSC ten dimensions are the following: overall

perceptions of patient safety, frequency of events reported, supervisor/manager expectations and actions promoting safety, organizational learning-continuous improvement, teamwork within hospital units, communication openness, non-punitive response to error, staffing, management support for care safety and teamwork across hospital units.

Target sample

The questionnaire was distributed at the pilot hospital on 114 staff members who were selected by stratified random sampling in order to respect the distribution of the hospital's actual staff, which is of 634 employees.

It should be noted that stratified sampling is a method that first subdivides the population into homogeneous groups (strata) and then extracts a random sample from each stratum (professional category). This method supposes the well definition of the population's structure. Different statistical formulas make it possible to calculate the appropriate size of the sample with a controlled degree of confidence.

In this study, we selected the following formulation of a sample size n:

$$n = \frac{N\left(Z_{(1-\alpha/2)}\right)^2 \sigma^2}{(N-1)e^2 + \left(Z_{(1-\alpha/2)}\right)^2 \sigma^2}, \tag{1}$$

where N is the size of the total staff, which is equal to 634. Z being the associated critical coefficient for a 95% degree of confidence. α is the significance level that is equal to 5 percent. σ is the standard deviation which is equal to 3 (this value is derived from a primary study). e is the margin of error equal to 0.5.

From these data, we obtain the following value for the critical coefficient Z:

$$Z_{1-0.05/2} = Z_{0.975} = 1.96. \tag{2}$$

Hence, the value of the sample size n:

$$n = \frac{634(1.96)^2(3)^2}{(633)(0.5)^2 + (1.96)^2(3)^2} \approx 114. \tag{3}$$

The breakdown of the sample into professional categories is shown in Table II.

	n	%		N	%
Gender			Age (years)		
Man	47	41.2	20–30	30	26.3
Woman	67	58.8	31–40	42	36.8
Seniority (years)			41–50	41	36
0–01	18	15.8	⩾51	1	0.9
2–10	52	45.6		n/N	%
11–20	21	18.4	Professional category		
⩾20	23	20.2	Nursing assistant	28/156	24.5
Work contract			Nurse	39/217	34.2
Intern	12	10.5	Doctor	14/78	12.3
FTC	5	4.4	Administrative staff	10/55	8.8
UDC	12	10.5	Other	23/128	20.2
Permanent	85	74.6			

Table II. Socio-demographic characteristics of respondents

Distribution and data collection

The following steps materialize the adopted planning for the distribution and data collection:

- s_1: informing the targeted staff members on the operation in order to prepare them for the HSC evaluation and the issues it presents for their establishment.
- s_2: distribution of the questionnaire in paper format on the participants.
- s_3: sending a reminding letter to participants about the value of their involvement in the operation of HSC evaluation. This reminder letter is intended to avoid non-response by the participants.
- s_4: collection of responses and evaluation of the response rate.
- s_5: thanking and informing participants on the operation's results (feedback).

In case, the response rate is insufficient, a return to step "s_3" is necessary.

Note that steps s_1, s_2 and s_5 have a duration of one week each. Step s_3 has a duration of three weeks. Step s_4 is of four weeks duration. Therefore, the total planned duration of the HSC evaluation within the pilot hospital took two and a half months.

Data entry

The collected data are entered in a computer where responses were recorded on a five-point scale ranging from (5) strongly agree to (1) strongly disagree. The software "Statistic Package for Social Sciences (SPSS)" was used in this study, as well as various tests including: descriptive statistical analysis (frequency, mean and standard deviation), inferential statistics – ANOVA – and reliability analysis.

The results per item were calculated as a percentage of positive responses (responses in favor of a developed HSC). For each dimension, a score was calculated corresponding to the mean of positive responses:

$$S_{D_i} \frac{np_i}{N_i};\ i = 1, ..., 10, \tag{4}$$

where S_{Di} being the score of the ith dimension of HSC, np_i is the number of positive responses for this ith dimension and N_i is the total number of responses for this ith dimension including positive, negative and neutral responses.

As suggested by the literature, if the dimension had a score of 75 percent or more, the dimension is considered developed, on the other hand, if the dimension had a score lower or equal to 50 percent, the dimension is considered undeveloped. The dimensions that had scores between 50 and 75 percent are considered poorly developed (Izotte *et al.*, 2010).

Results

First, note that these results are those of the first study conducted in Algeria on HSC.

Overall result

The scores of the ten dimensions are summarized in Figure 1 where only three of the ten retained HSC dimensions are greater than the threshold for a developed HSC. The dimensions five, ten and one have successively the following scores: 78.5, 77.3 and 76.3 percent. These results confirm that HSC within the studied pilot hospital is not well developed. This encourages us to analyze profoundly the results obtained for a better HSC diagnosis in this establishment.

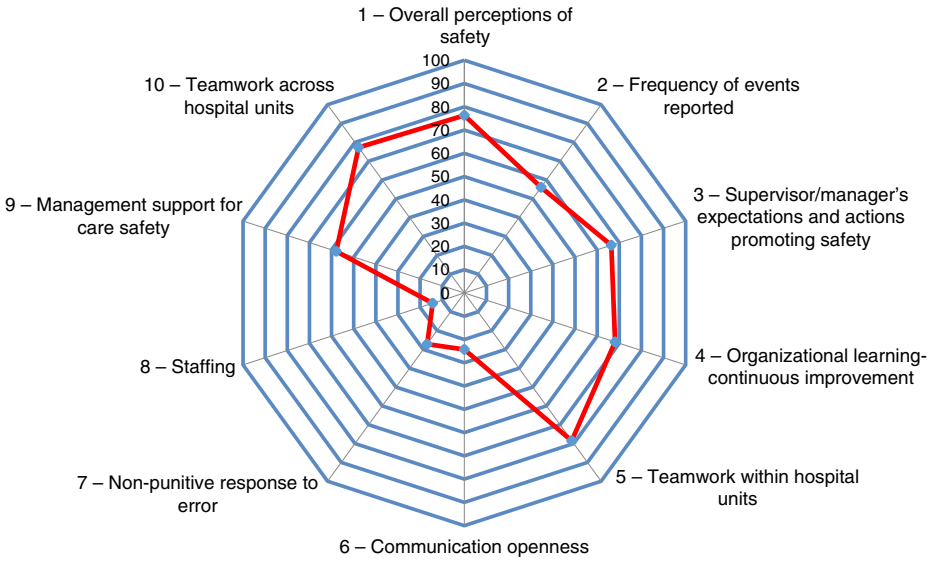

Figure 1.
Safety culture level of the studied hospital

Detailed results

Socio-demographic characteristics analysis of respondents. The socio-demographic characteristics of the participants in this study, presented in Table II, show that the gender ratio is 59 percent in favor of the female gender. This is due to the interest of this component for work in healthcare facilities, confirming the characteristic of the profession.

In addition, the staff members surveyed are young, especially since the average age is about 38 years old; 46 percent of them have less than ten years of experience. Most participants are nurses (34.2 percent) followed by nursing assistants (24.6 percent) and doctors (12.3 percent). In total, 74.6 percent of respondents hold permanent positions.

Factors scores and reliability

The most common reliability test of scale measurement is "Cronbach's α" (Hair *et al.*, 2006). This indicator provides information on the homogeneity and internal consistency of a measurement scale. The different items help describing a particular construction. Cronbach's α translates the internal consistency of the linking elements. The higher this internal coherence (approaching the value 1) the more elements contribute to the construction. The minimum value deemed satisfactory is 0.7 (Hair *et al.*, 2006).

The results of this study show that reliability indices are greater than 0.70 for 38 items in the survey, which confirms the validity of the measures (Table III).

For a better HSC level analysis in the pilot hospital setting, the mean (μ), standard deviation (SD) and the percentage of positive responses for each item and for each dimension were calculated (Table III).

Moreover, the results of Figure 1 show that HSC is globally undeveloped in this pilot establishment despite variability of scores. In this regard and in order to estimate the significant difference between the HSC dimensions and the socio-demographic characteristics (age, seniority, gender, professional category and type of work contract), the ANOVA test was also applied (Tables IV and V).

Although the mean score shows differences between age groups (Table IV), only the "Frequency of events reported and teamwork across hospital units" dimensions were

Dimensions and items	Reliability α	Effectives SD	D	N	A	SA	Positive answer* %	M M	SD[b] $\sum$
Q1 (-)		27	60	11	9	7	76.3	3.80[a]	1.08
Q2		7	5	6	78	18	84.2	3.83	0.96
Q3 (-)		10	82	10	8	4	80.7	3.75[a]	0.85
Q4		9	26	6	68	5	64	3.3	1.11
Dim 1: overall perceptions of patient safety	(0.88)						76.3	3.67	0.87
Q5		16	12	28	16	42	50.8	3.49	1.43
Q6		6	21	23	43	21	56.1	3.46	1.15
Q7		13	16	15	13	57	61.4	3.75	1.47
Dim 2: frequency of events reported	(0.87)						56.1	3.56	1.21
Q8		14	3	37	50	10	52.6	3.34	1.10
Q9		7	5	14	75	15	78.9	3.72	0.95
Q10 (-)		5	58	44	5	2	55.3	3.52[a]	0.73
Q11 (-)		25	65	13	2	9	78.9	3.83[a]	1.05
Dim 3: supervisor/manager's expectations and actions promoting safety	(0.79)						66.4	3.60	0.76
Q12		13	8	13	70	10	70.2	3.49	1.12
Q13		14	6	17	68	9	67.5	3.46	1.12
Q14		2	5	24	22	61	72.8	4.18	1.03
Q15		0	11	32	20	51	62.3	3.97	1.06
Q16		1	18	18	29	48	67.5	3.92	1.14
Dim 4: organizational learning-continuous improvement	(0.89)						68.1	3.81	0.91
Q17		3	25	5	35	46	71.1	3.84	1.25
Q18		0	4	14	79	17	84.2	3.96	0.64
Q19		0	4	13	80	17	85.1	3.96	0.64
Q20		2	23	5	70	14	73.6	3.62	0.99
Dim 5: teamwork within hospital units	(0.8)						78.5	3.85	0.72
Q21		4	48	22	30	10	35.1	2.95	1.09
Q22		10	23	53	7	21	24.6	3.05	1.17
Q23 (-)		5	10	13	44	42	13.2	2.05[a]	1.11
Dim 6: communication openness	(0.76)						24.3	2.68	0.93
Q24 (-)		5	24	39	41	5	25.4	2.85[a]	0.95
Q25 (-)		6	33	9	52	14	34.2	2.69[a]	1.17
Q26 (-)		3	22	12	44	33	21.9	2.28[a]	1.16
Dim 7: non-punitive response to error	(0.87)						27.2	2.61	0.98
Q27		20	21	44	22	7	25.4	2.78	1.14
Q28 (-)		2	8	21	50	33	8.8	2.09[a]	0.96
Q29 (-)		2	8	21	49	34	8.8	2.08[a]	0.96
Dim 8: staffing	(0.74)						14.3	2.32	0.83
Q30		22	16	36	38	2	35.1	2.84	1.14
Q31		7	4	24	52	27	69.3	3.77	1.05
Q32 (-)		50	29	22	4	9	69.3	3.94[a]	1.22
Dim 9: management support for care safety	(0.8)						57.9	3.59	0.96
Q33 (-)		36	47	9	19	3	72.8	3.82[a]	1.13
Q34 (-)		20	63	7	12	12	72.8	3.59[a]	1.20
Q35		2	15	9	46	42	77.2	3.97	1.07
Q36 (-)		62	32	13	5	2	82.4	4.29[a]	0.96
Q37 (-)		64	29	3	15	3	81.6	4.19	1.15
Q38 (-)		60	28	3	19	4	77.2	4.06[a]	1.24
Dim 10: teamwork across hospital units	(0.9)						77.3	4.04	0.95

Table III.
Means, standard deviations, positive answer and Cronbach's α reliability scores

Notes: SD, strongly disagree; D, disagree; N, neutral; A, agree; SA, strongly agree. (-): for negatively worded items, the percentage positive response is the combined percentage of respondents within a hospital who answered "Strongly disagree" or "Disagree", because a negative answer on a negatively worded item indicates a positive response. [a]Mean with inverse sense; *total number of positive answers by dimension/number total of negative, neutral and positive answers by dimension; [b]standard deviation

Table IV. Safety culture according to staff's age, seniority, gender and ANOVA test result

Dimensions	Variable/age (years)					Variable/seniority (years)					Variable/gender				
		M	SD	*H*	*p*-value		*M*	SD	*H*	*p*-value		*M*	SD	*H*	*p*-value
Dim 1: overall perceptions of patient safety				0.85	0.47				2.38	0.074				1.18	0.28
	20–30	3.47	1.04			0–1	3.18	0.87			Man	3.78	0.76		
	31–40	3.78	0.81			2–10	3.79	0.91			Woman	3.60	0.94		
	41–50	3.70	0.80			11–20	3.75	0.75							
	51 or older	4.00				> 20	3.72	0.79							
Dim 2: frequency of events reported				4.17	0.01				4.99	0.00				2.23	0.14
	20–30	3.03	1.15			0–1	2.74	1.09			Man	3.77	1.20		
	31–40	3.94	1.17			2–10	3.93	1.11			Woman	3.42	1.22		
	41–50	3.60	1.17			11–20	3.57	1.23							
	51 or older	2.00				> 20	3.38	1.23							
Dim 3: supervisor/manager's expectations and actions promoting safety				2.49	0.06				2.35	0.08				3.03	0.08
	20–30	3.31	0.89			0–1	3.19	0.87			Man	3.75	0.65		
	31–40	3.68	0.70			2–10	3.64	0.80			Woman	3.50	0.82		
	41–50	3.76	0.67			11–20	3.80	0.38							
	51 or older	3.00				> 20	3.65	0.76							
Dim 4: organizational learning-continuous improvement				2.24	0.09				3.85	0.01				1.45	0.23
	20–30	3.53	1.09			0–1	3.21	1.11			Man	3.93	0.79		
	31–40	3.95	0.77			2–10	4.02	0.79			Woman	3.72	0.98		
	41–50	3.89	0.85			11–20	3.72	0.77							
	51 or older	2.40				> 20	3.87	0.96							
Dim 5: teamwork within hospital units				0.76	0.52				1.74	0.16				0.95	0.33
	20–30	3.68	0.85			0–1	3.56	0.85			Man	3.93	0.65		
	31–40	3.90	0.60			2–10	3.90	0.65			Woman	3.79	0.77		
	41–50	3.89	0.75			11–20	3.75	0.83							
	51 or older	4.25				> 20	4.03	0.65							
Dim 6: communication openness				0.85	0.47				0.97	0.41				0.42	0.52
	20–30	2.90	1.23			0–1	2.54	1.18			Man	2.62	0.75		
	31–40	2.64	0.84			2–10	2.85	0.99			Woman	2.73	1.04		

(*continued*)

Table IV.

Dimensions	Variable/age (years)				Variable/seniority (years)				Variable/gender				
		M	SD	*H*	*p*-value		*M*	SD	*H*	*p*-value		*M*	SD	*H*	*p*-value
	41–50	2.56	0.75			11–20	2.56	0.73							
	51 or older	3.00				> 20	2.55	0.69							
Dim 7: non-punitive response to error				2.41	0.07				1.06	0.37				0.14	0.71
	20–30	2.99	1.16			0–1	2.50	1.25			Man	2.57	0.78		
	31–40	2.48	0.90			2–10	2.78	1.01			Woman	2.64	1.10		
	41–50	2.45	0.86			11–20	2.37	0.67							
	51 or older	3.33				> 20	2.54	0.90							
Dim 8: staffing				0.93	0.43				3.70	0.01				1.57	0.21
	20–30	2.21	0.87			0–1	1.91	0.71			Man	2.43	0.83		
	31–40	2.48	0.88			2–10	2.56	0.79			Woman	2.23	0.83		
	41–50	2.23	0.75			11–20	2.27	0.92							
	51 or older	2.00				> 20	2.12	0.78							
Dim 9: management support for care safety				1.80	0.15				1.42	0.24				2.43	0.12
	20–30	3.28	1.15			0–1	3.17	1.13			Man	3.76	0.79		
	31–40	3.77	0.86			2–10	3.68	0.97			Woman	3.48	1.05		
	41–50	3.63	0.88			11–20	3.64	0.88							
	51 or older	4.25				> 20	3.69	0.83							
Dim 10: teamwork across hospital units				2.86	0.04				2.39	0.07				1.50	0.22
	20–30	3.74	1.08			0–1	3.51	1.14			Man	4.17	0.84		
	31–40	4.16	0.90			2–10	4.13	0.92			Woman	3.95	1.02		
	41–50	4.17	0.83			11–20	4.23	0.75							
	51 or older	2.17	.			> 20	4.05	0.95							

Table V.
Safety culture according to professional category, contract and ANOVA test result

Dimensions	Variable/professional category	*M*	SD	*H*	*p*-value	Variable/work contract	*M*	SD	*H*	*p*-value
Dim 1: overall perceptions of patient safety				11.60	0.00				339.15	0.00
	Nursing auxiliary	3.21	1.04			Intern	1.60	0.34		
	Nurse	4.13	0.23			Determined duration contract	2.30	0.11		
	Doctor	4.20	0.30			Undetermined duration contract	3.31	0.40		
	Administrative staff	3.73	0.72			Permanent	4.09	0.25		
	Other	3.11	1.02							
Dim 2: frequency of events reported				18.11	0.00				61.99	0.00
	Nursing auxiliary	3.06	1.34			Intern	1.83	0.50		
	Nurse	4.56	0.33			Determined duration contract	1.67	0.47		
	Doctor	3.26	0.57			Undetermined duration contract	2.14	0.46		
	Administrative staff	3.60	1.19			Permanent	4.12	0.82		
	Other	2.65	1.17							
Dim 3: supervisor/manager's expectations and actions promoting safety				10.46	0.00				75.85	0.00
	Nursing auxiliary	3.24	0.89			Intern	2.10	0.71		
	Nurse	3.96	0.34			Determined duration contract	2.80	0.76		
	Doctor	4.11	0.46			Undetermined duration contract	3.02	0.59		
	Administrative staff	3.68	0.65			Permanent	3.94	0.34		
	Other	3.09	0.82							
Dim 4: organizational learning-continuous improvement				15.42	0.00				145.59	0.00
	Nursing auxiliary	3.26	0.97			Intern	2.15	0.37		
	Nurse	4.34	0.24			Determined duration contract	2.08	0.30		
	Doctor	4.49	0.41			Undetermined duration contract	2.93	0.68		
	Administrative staff	3.62	1.13			Permanent	4.26	0.38		
	Other	3.23	0.91							
Dim 5: teamwork within hospital units				14.88	0.00				50.96	0.00
	Nursing auxiliary	3.36	0.81			Intern	2.60	0.52		
	Nurse	4.13	0.32			Determined duration contract	2.80	0.33		
	Doctor	4.63	0.24			Undetermined duration contract	3.38	0.84		
	Administrative staff	3.75	0.66			Permanent	4.15	0.40		
	Other	3.52	0.74							

(*continued*)

Table V.

Dimensions	Variable/professional category	M	SD	H	p-value	Variable/work contract	M	SD	H	p-value
Dim 6: communication openness				17.57	0.00				21.09	0.00
	Nursing auxiliary	2.19	0.64			Intern	1.44	0.16		
	Nurse	3.03	0.92			Determined duration contract	1.66	0.11		
	Doctor	3.79	0.77			Undetermined duration contract	2.14	0.44		
	Administrative staff	2.63	0.59			Permanent	2.99	0.84		
	Other	2.04	0.46							
Dim 7: non-punitive response to error				44.75	0.00				9.53	0.00
	Nursing auxiliary	1.88	0.43			Intern	1.50	0.22		
	Nurse	3.08	0.75			Determined duration contract	1.93	0.15		
	Doctor	4.11	0.46			Undetermined duration contract	2.36	0.85		
	Administrative staff	2.27	0.54				2.84	0.96		
	Other	1.93	0.65							
Dim 8: staffing				32.69	0.00				14.05	0.00
	Nursing auxiliary	1.74	0.58			Intern	1.31	0.26		
	Nurse	3.02	0.47			Determined duration contract	1.60	0.43		
	Doctor	2.83	0.87			Undetermined duration contract	1.92	0.41		
	Administrative staff	1.83	0.36			Permanent	2.56	0.80		
	Other	1.72	0.56							
Dim 9: management support for care safety				13.61	0.00				54.95	0.00
	Nursing auxiliary	2.88	0.97			Intern	1.67	0.46		
	Nurse	4.06	0.51			Determined duration contract	2.50	0.59		
	Doctor	4.36	0.21			Undetermined duration contract	3.37	0.67		
	Administrative staff	3.67	0.82			Permanent	3.96	0.63		
	Other	3.17	1.12							
Dim 10: teamwork across hospital units				11.02	0.00				164.33	0.00
	Nursing auxiliary	3.63	1.04			Intern	1.97	0.35		
	Nurse	4.45	0.17			Determined duration contract	2.97	0.66		
	Doctor	4.77	0.19			Undetermined duration contract	3.21	1.00		
	Administrative staff	4.05	0.88			Permanent	4.51	0.23		
	Other	3.36	1.27							

statistically significant, with p-values of 0.01 and 0.04, respectively. The highest scores for most dimensions were identified in the 41–50 age group. However, the youngest (20–30 years old) had the lowest scores for most dimensions.

Q3 The result of the Variance Analysis – ANOVA – for seniority is not significant (Table IV), with the exception of the "Frequency of events reported, organizational learning-continuous improvement and staffing" dimensions that were statistically significant, with p-values of 0.00 and 0.01, respectively. According to the mean analysis, in most dimensions, the lowest score was observed for the 0 – 1 seniority category.

The mean analysis by gender of HSC dimensions shows that the lowest score was identified in the female gender, whereas the ANOVA test showed no significance (Table IV).

The demographic aspects of the professional category and the work contract type are distinguished as factors having an impact on the HSC as shown by the ANOVA test (Table V). Indeed, the mean analysis of the HSC dimensions shows that the highest scores were observed for the professional category of doctors followed by nurses, whereas in the case of the work contract type, the mean analysis showed that the highest scores were identified in permanent employee.

Discussion

At the studied pilot hospital, HSC is perceived, all HSC dimensions combined, as "little developed." Therefore and in accordance with the objectives of the NHS (cf. Section "On the Algerian strategy of promoting the NHS"), seven HSC dimensions must be the subject of a priority development within this establishment. The prioritization of the development of these dimensions is directly proportional to their scores: Dim 8 → Dim 6 → Dim 7 → Dim 2 → Dim 9 → Dim 3 → Dim 4.

The actions that should be taken for the development of these seven dimensions should not make us forget the continuous improvement of the three other dimensions (Dim 5, Dim 10 and Dim 1) whose scores were higher than 75 percent. In addition to the information on the scores of the seven problematic HSC dimensions of this pilot hospital, the present study makes it possible to highlight some secondary information associated with the obtained scores.

To illustrate our findings, we note that the evaluation of the "Staffing" dimension raises the problem of staff's insufficiency to handle the workload, where respondents confirm that this situation makes the staff of this pilot hospital work more hours than it is recommended for patient care. This has a direct impact on the quality and safety of care. This problem is amplified further during night shifts where the situation is problematic in the majority of the Algerian healthcare establishments (Herouala *et al.*, 2016). Many authors (Tabrizchi and Sedaghat, 2012; El-Jardali *et al.*, 2010; Leape, 2009) mention this problem of staff insufficiency in healthcare facilities and its impact on care quality.

In our opinion, the resolution of this problem is not possible and a general solution relating to the NHS improves partially the workload situation within this pilot hospital. It involves forcing private institutions and clinics to provide night shifts in order to alleviate the alarming situation in public health facilities.

In terms of communication openness, respondents gave negative responses ("strongly disagree" or "disagree") to the three items in this dimension. These results highlight a rigid relational atmosphere between the hospital staff and its managers. Hence, a passive behavior with regard to the reporting of adverse events.

In our opinion, the development of this dimension is possible only through open communication and adopting a participatory open organizational culture as confirmed by a large number of authors (Santa *et al.*, 2018; Pattison and Jill, 2015; Rabbani *et al.*, 2009; World Alliance for Patient Safety, 2008). As a result, the introduction of open communication should be clearly recommended in the NHS.

The same observation is made in the "non-punitive response to error" dimension, where the results also confirm once again the presence of a rigid relational atmosphere that constitutes an obstacle to the HSC development. In this context, it was shown that among the encountered obstacles in errors reporting, there is the lack of confidentiality, monitoring and fear of repercussions (Pattison and Jill, 2015; Moumtzoglou, 2010; McArdle *et al.*, 2003; Uribe *et al.*, 2002). It would therefore be necessary to establish a safety culture environment in which adverse events can be reported without individuals being identified, giving staff the opportunity to learn from their mistakes and, if possible, to make improvements to prevent future human and technical errors, thereby promoting patient safety (Pattison and Jill, 2015; Smits *et al.*, 2008).

Q8

To develop this dimension, we propose integrating in the NHS the experience of other sectors such as the procedure that has promoted the reporting of adverse events in the Algerian petrochemical sector, which is called the Stop-Card procedure (Mouda *et al.*, 2016).

Q4

These illustrated suggestions for the development of these three problematic dimensions in the studied pilot hospital shape the best approach, to plan HSC improvements within the Algerian health establishments. Indeed, the results of this first study on HSC in Algeria must be capitalized not within this establishment but rather at the level of the NHS by means of a national strategic plan dedicated to the HSC.

We are convinced at the end of this study that HSC development requires priority attention of policy makers and a follow-up in a spirit governed by good coordination between all the actors and professionals of the healthcare sector.

Finally, as recommendations to better develop the NSH, we suggest:

- An intense personnel training to teach them in the first place safe behaviors and to prepare them to offer safe and quality healthcare.
- New strategies to prepare favorable working conditions.
- To make healthcare safety a collective responsibility for health professionals. Such an agreement is also indicative of a better teamwork and better communication that has often been problematic because of the "blame culture."
- To substitute the "blame culture" approach with a "just culture" approach, which would counter the urge to blame, strengthen professional responsibility and prioritize the identification of systemic failures and, therefore, proceed to their attenuation.

Conclusion

The purpose of this study is to evaluate HSC in a pilot hospital setting. The obtained results show that HSC is perceived as "little developed" and it is recommended to take improvement steps. Moreover, it should be noted that even a partial improvement could be of value to the studied hospital.

This first study on HSC evaluation in Algerian hospitals allowed us, on the one hand, to have an idea on HSC level in a pilot institution and, on the other hand, to identify possible perspectives for the follow-ups to this study. This involves, in particular, carrying out the HSC evaluation in the context of a national project dedicated to promoting patients' care safety. Thus, the adopted methodology in this study must be used in the context of such a project in several hospitals with the aim of making comparisons between these institutions in terms of HSC.

Therefore, work remains to be done both experimentally and theoretically to arrive at a conceptualization of a HSC model, adapted to the Algerian context and distinguished by certain values that reflect the reality of the field.

Glossary

HSC	healthcare safety culture
HSOPSC	hospital survey on patient safety culture
NHS	national healthcare system

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