

# Patient Safety Culture: A Meta-analysis of Data from Hospitals

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## Abstract

**Background and Objectives:** Patient safety (PS) is one of the most important and essential elements of quality in healthcare setting. A systematic review and meta-analysis was performed to assess the status of patient safety culture using the Hospital Survey on Patient Safety Culture (HSOPSC).

**Methods:** In this systematic review and meta-analysis study, data were collected through searching databases including Scopus, Google Scholar, Science Direct, PubMed, Cochrane Library, Magiran, and Iranian Scientific Information (SID) using keywords like “patient safety”, “patient safety culture”, and “patient safety climate”, combined with “hospital: “Hospital Survey on Patient Safety Culture”, “measurement”, “assessment” and “survey”. Out of 1764 retrieved articles, 30 articles were entered into the study. To calculate the overall PSC score and perform the meta-analysis, the computer software (CMA2—Comprehensive Meta-Analysis) was employed.

**Findings:** Using HSOPSC and random effects, the PSC score was calculated to be 56.9%. While the dimension “teamwork within hospital units” generated the highest score (72%), the dimension “non-punitive response to error” received the lowest score (40%). According to PSC grade, “very good” grade had the highest score (%41.3). Approximately %46 of the respondents did not complete any event report in the past 12 months.

**Conclusions:** It seems better that the interventions for improving PSC focus on the dimension of “non-punitive response to error”. The results of this study can be used by policy makers and managers to create and improve a patient safety culture

**Keywords:** Patient safety culture; Patient safety; Adverse event reporting; HSOPSC; Meta-analysis

## Background and Objectives

Quality in a healthcare provider organization can be defined from many different aspects, and there are various methods and instruments to measure and improve it [1-4]. Quality in healthcare has different dimensions and components [5, 6]. Patient safety (PS) is one of the most important and essential elements of quality in healthcare setting. Measurement of patient safety culture (PSC) is a top priority and important subject in improving PS [7-

13]. Neiva & Sorra [8] defined PSC as: “the product of individual and group values, attitudes, perceptions, competencies, and patterns of behavior that determine the commitment, and the style and proficiency of an organization’s safety management”. PSC measurement is now being increasingly used in healthcare, and several methods have been developed [14-16].

The Hospital Survey on Patient Safety Culture (HSOPSC) of the Agency of Healthcare Research and Quality (AHRQ) is an important and reliable questionnaire for the measurement of PSC in hospitals [17-20]. In recent years many studies have [21-25] shown the reliability and validity of this questionnaire, and it has been tested in many studies and translated into many languages around the world [26-29].

The present study is a systematic review and meta-

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analysis on the PSC score of different studies, which used HSOPSC questionnaire.

## Methods

In this systematic and meta-analytical review study, the required data were collected by searching the following keywords: patient safety, patient safety culture, patient safety climate and combined through hospital, "Hospital Survey on Patient Safety Culture", measurement, assessment, survey and their Persian equivalents in Scopus, Google Scholar, Science Direct, PubMed, Cochrane Library, Magiran, and Iranian Scientific Information (SID) databases. Manual journal and web site searching was also used. To increase the confidence of identification of the articles, the reference lists of the selected articles were also searched. Articles published during the period 2000–2013 were searched. The inclusion criteria for the study were: articles published in Persian and English languages, articles about the measurement of PSC in hospital and home nurse setting, and articles that measured PSC with HSOPSC questionnaire. Exclusion criteria included: articles that measured overall safety culture (not PSC), articles that measured PSC in primary healthcare, articles on psychometric properties, articles that did not measure all dimensions of HSOPSC questionnaire, conference presentations, case reports, and interventional and qualitative studies. Two reviewers evaluated the articles according to the checklist of descriptive-analytical studies (SCORB). First, articles with non-relevant titles to the subject of this review were excluded. Then the abstract and the full text of the articles were reviewed, respectively.

Out of the 1764 retrieved articles, 1740 articles were excluded due to the previously defined exclusion criteria, and 30 articles were entered in the study (Figure 1). After accurately studying and extracting the required data, they were summarized in the table and mathematically analyzed. Excel 2010 software was used to draw graphs. Endnote X5 software was used for organizing, title and abstract reviewing and also identification of duplication study. To calculate the overall PSC score and perform the meta-analysis, computer software (CMA2—Comprehensive Meta-Analysis) was employed. The results were reported by forest plots, in which the size of each square indicates the sample size, and the lines drawn on each side of the square indicate the confidence interval of approximately 95% for PSC score.

HSOPSC questionnaire was developed by AHRQ in 2004. The original version of this questionnaire has three parts, 12 dimensions, 44 items and 2 single

questions (Box1). All items were measured on the 5-point Likert scale of agreement ("Strongly disagree" to "Strongly agree") or frequency ("Never" to "Always") [30, 31].

## Results

Out of the 30 reviewed studies, 6 studies were organizational report [31-36]. The characteristics of the reviewed articles are brought in Table 1.

To perform the meta-analysis, the heterogeneity index was determined within the articles using ( $I^2$ ). After confirmation of heterogeneity of the articles, the best estimation of the PSC score was determined by using the random effect model (Figure 1).

The PSC score using HSOPSC based on the random effect was determined to be 56.9% (95% confidence interval---CI, lowest = 55.9%, highest = 57.9%,  $I^2=99.4$ , Q-value = 3139.234, df = 26\*,  $P < 00.01$ ).

Two articles were excluded from the meta analysis due to methodology problem.

Mean of each of the 12 dimension of HSOPSC is shown in Figure 2.

As shown in Figure 2, "teamwork within hospital units" has the highest score of PSC (72%) and "non-punitive response to error" has the lowest score of PSC (40%).

Mean of PSC grade (excellent, very good, acceptable, poor, and failing) in HSOPSC questionnaire is shown in Figure 3.

According to PSC grade, "very good" grade has the highest mean (41.3) and "failing" grade has the lowest mean.

Mean of reporting number of events in the past 12 months is shown in Figure 4.

The results given in Figure 4 show that approximately %46 of the responders did not complete any event reports in the past 12 months, and approximately %4.2 of them completed 11 or more event reports in the past 12 months.

## Discussion

Strong safety culture is essential in order to promote the patient's safety and providing high quality services to the patients in the organizations, which provide healthcare services [37]. The main priority of promoting the safety culture situation among the healthcare services is measuring the present safety culture [38]. Due to the multi-dimensional and unclear nature of safety culture, in order to measure it precisely and appropriately, we need some valid and reliable measuring tools. One of the most

References	Sample size	1*	2	3	4	5	6	7	8	9	10	11	12	Mean	SD
El-Jardali et al. Lebanon; 2010(22)	6807 staff**	72.5	78.3	66.4	82.3	24.3	36.8	78.4	56	49.7	57.3	68.1	68.2	61.5	17.6
Handler et al. USA;2006(9)	104 staff	45.7	54	70.8	45.6	10.6	40.1	66.2	47.5	37.5	41.7	37.8	49.7	45.6	15.2
Castle and Sonon. USA;2006(10)	2840 staff	39	24	50	27	34	21	40	55	27	27	38	31	34.4	10.4
Ravaghi et al. Iran;2012(42)	216 staff	49.2	65	53.8	62.8	14.8	12.2	44.3	45.8	57.2	37.3	45.4	40.5	44	16.5
Chen and Li. Taiwan;2010(52)	788 staff	69.5	84	83	94	45	39	62	72	48	58	59	57	64	16.8
Abadi fard azar et al. Iran;2010(48)	145 staff	64	66	66	67	51	57	62	62	61	63	63	61	61.9	4.3
Jasti et al.Pittsburgh;2009(50)	58Internalmedicine house staff	54	67	75	69	43	52	61	56	19	37	27	33	49.4	17.6
Baliangrud et al. Sweden;2012(53)	220 nurses	68.8	51.3	73.1	80.6	78.8	62.2	26.3	37.5	57.3	66.9	42.1	18	55	20.4
Abdi et al.Iran; 2010(54)	311 staff	15	19.5	27.5	47.2	17.8	35	24	18.2	19.9	29.7	19.9	14.1	23.9	9.5
Agharahimi et al. Iran;2012(55)	94 staff	62	70.6	72.8	67.6	68.8	59.4	62.2	61.4	59.4	56.4	63.8	63.4	64	4.9
Al-Ahmadi. Saudi Arabia;2009(56)	1224 staff	51.4	75.9	64	69.9	21.1	31.2	65.4	56.3	47.6	44.2	63.3	56.2	53.8	15.9
Nie et al. china;2013(57)	1160 nurse & clinician	55	88	63	84	60	45	69	66	-	65	50	-	65	13.4
Boghaei et al. Iran;2010(58)	500 staff	59	69	67	80	31	36	49	55	62	45	56	42	54.25	14.3
Al-Ahmadi. Saudi Arabia;2010(51)	223 professionals	59	87	70	84	22	27	74	50	61	60	77	63	61.1	20.2
Agnew et al.UK;2013(59)	1866 clinical staff	56	64	65	73	44	45	38	39	32	54	45	56	50.9	12.4
Fujita et al.Japan;2013(60)	6963 staff in Japan	53	55	62	70	43	37	52	44	35	49	53	68	51.75	11.1
Fujita et al.Japan;2013(60)	10,019 staff in Taiwan	52	81	65	79	29	36	58	51	39	38	44	33	50.4	17.3
Izadi et al. Iran;2012(61)	196 staff	67	73	76	75	54	48	65	62	69	68	70	66	66	8.2
Wagner et al. Netherlands;2013(62)	3779 professionals in the Netherlands	49	47	63	85	66	59	31	28	42	68	52	36	52.1	16.8
Wagner et al Netherlands;2013(62)	10 146 professionals in the Taiwan	52	80	65	81	31	40	60	56	43	40	55	31	51.9	16.8
Wagner et alNetherlands;2013(62)	196462 professionals in the USA	64	71	75	79	44	55	70	57	44	62	63	60	62	11
Aboul-Fotouh et al.Egypt;2012(49)	510 staff	33.9	78.2	46.4	58.1	19.5	49.3	27.2	38	24.6	34.6	39.7	33.4	37.48	16
Arabloo et al. Iran; 2012(47)	145 staff	60	62	61	65	44	47	54	53	60	53	56	58	56.08	6.2
Campbell et al.USA; 2010(63)	2,163 physicians and nurses	64	70	75	79	44	55	70	57	45	62	62	60	61.91	10.7
AHRQ Publication. USA;2007(34)	108,621 staff	63	69	74	78	43	55	69	57	45	61	62	59	61.25	10.5
AHRQ Publication. USA;2008(33)	160,176 staff	64	70	75	79	44	55	70	57	45	62	62	60	61.91	10.7
AHRQ Publication. USA;2009(35)	196,462 staff	64	71	75	79	44	55	70	57	44	62	63	60	62	11
AHRQ Publication. USA;2010(36)	338,607staff	65	72	75	80	44	56	72	58	44	62	63	62	62.75	11.2
AHRQ Publication. USA;2011(37)	472,997 staff	66	72	75	80	44	57	72	58	45	62	64	63	63.16	11
AHRQ Publication. USA;2012(64)	567703 staff	66	72	75	80	44	56	72	58	45	62	64	63	63.16	11

Table 1 characters of studies measurements patients' safety culture using hospital survey on patient safety culture (HSOPSC).

\*1- Overall perception of safety, 2- Organizational learning/continuous improvement, 3- Supervisor/manager expectations & actions promoting safety, 4- Teamwork within hospital units, 5- Non-punitive response to error, 6- Staffing, 7- Hospital management support for patient safety, 8- Teamwork across hospital units, 9- Hospital handoffs & transitions, 10- Communication openness, 11- Feedback & communication about error, 12- Adverse event reporting & recording

\*\*including wide range of health care provider in hospital such as: physicians, nurses, clinical and non-clinical staff, pharmacy and laboratory staff, supervisors and hospital managers.

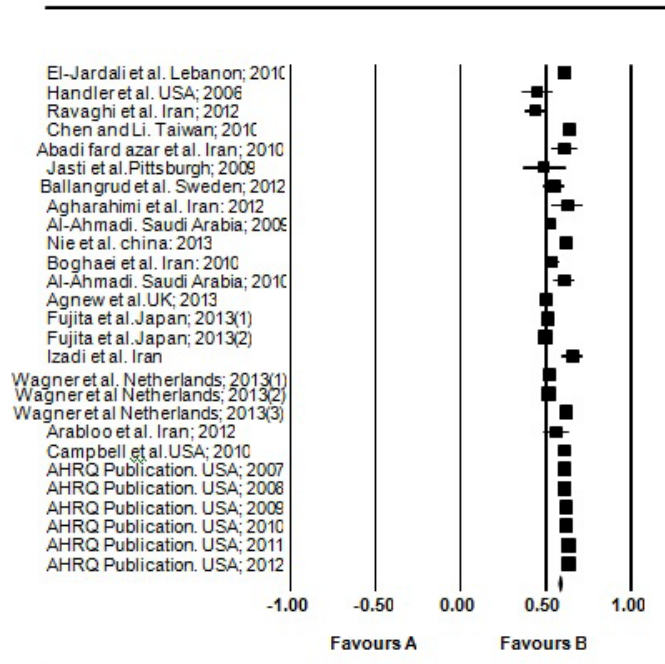


Figure 1 PSC score using HSOPSC

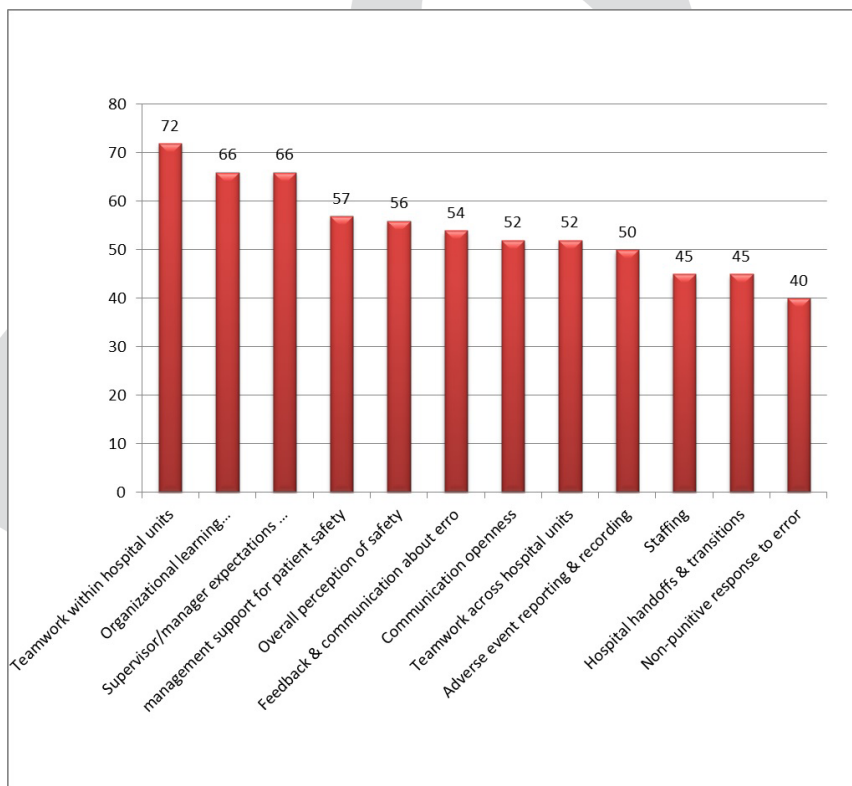
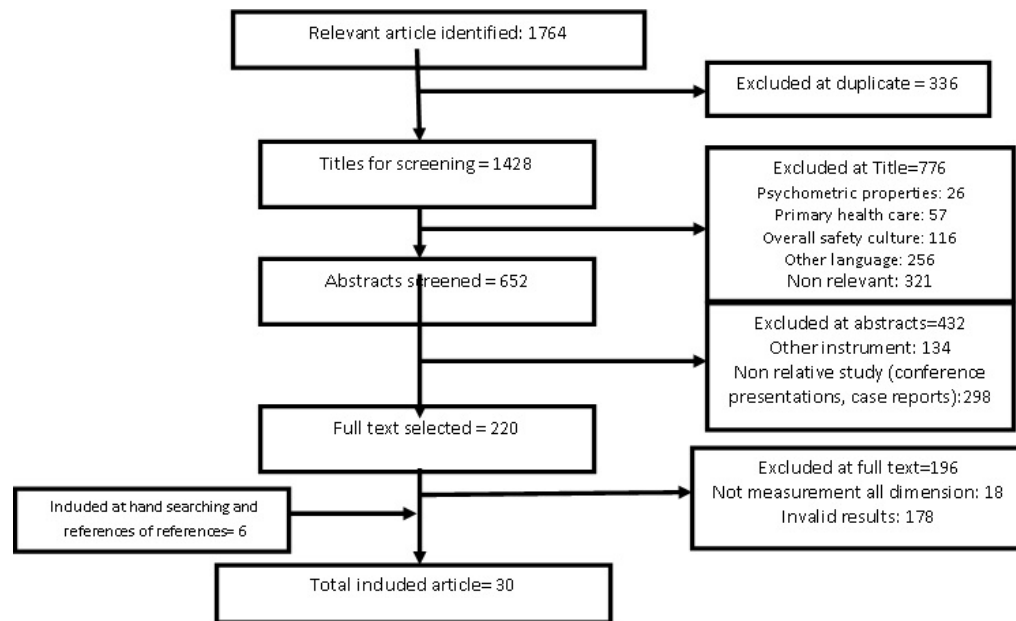


Figure 2 Mean of 12 dimension of HSOPSC



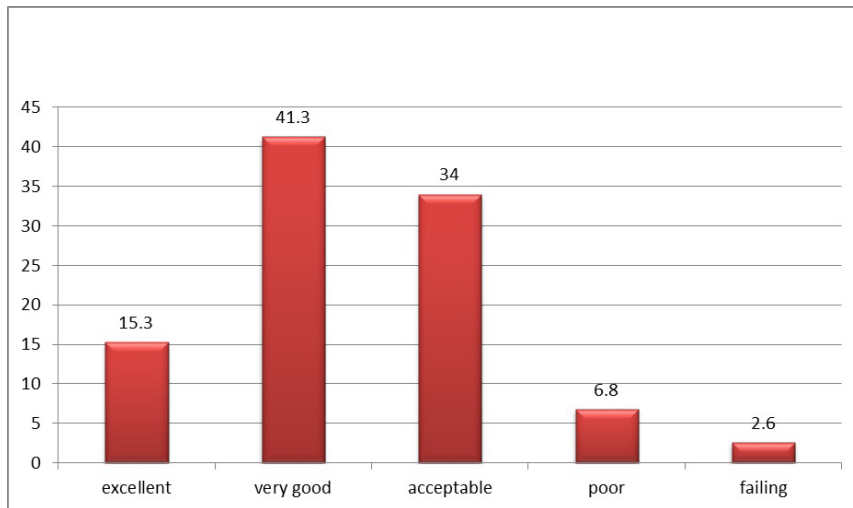
**Diagram 1** Literature review and retrieval flow diagram

valid and reliable tools is HOSPSC [27, 40]. The results showed that the mean of safety culture at the examined hospitals is 56.9%. The HOSPSC tool has 12 dimensions, which have higher mean for teamwork within the hospital units and lower mean for non-punitive response to error.

According to the results of this study, non-punitive response to error is the weakest dimension among the HOSPSC dimensions, showing that the staff avoid reporting their faults since they know about being charged otherwise. Since involving the staff in recognition and prevention is crucial, and also it is important to handle the healthcare services with possibly no mistakes or faults, environments with fear of punishment and penalties after mismanagement or delaying the promotion cannot increase the quality of patient's care. The results showed that 56% of staff did not report any faults in the past 12 months, which is due to the followings: First, no error has been occurred in this time exactly. Second, there was no report due to the presence of punishment atmosphere in the hospital and low safety culture. Due to the higher incidents of medical errors taken place in the hospital by the healthcare staff [40-44], the first case seems to be unlikely. Therefore, it seems that hospital administrators should change the current punishment system into reporting and participating system for controlling and managing the medical faults properly in order to prevent possibly or decrease the errors, and learn

how to deal with them. Finally, hospital administrators should pay more attention to patient's safety. Giving the staff awards for reporting their faults, no punishment in case of errors, participation in patient's safety, and giving responsibility to the staff could be useful to improve "non-punished response to errors" and "patient's safety culture in hospital". Hospital administrators should try to remove the following unfavorable elements from the system for enhancing the patient's safety culture: 1) scold, 2) fear, and 3) silence [40, 45, 46].

The research results indicated that there were no proper hospital handoffs and transitions. It can be due to the lack of suitable facilities and equipments in observance of available standard, improper chronological structure, excessive workload, and the small number of staffs. Some results of other studies in this filed showed that hospitals are faced with difficulty with this kind of safety culture [10, 39, 48]. So, because of the importance and role of proper and accurate transition and exchange of patients' information both in decreasing medical mistakes and increasing the patients' safety in hospitals, it is important to attempt to increase the safety culture. Designing some proper inward and outward systems, which facilitate procedures of transition and exchange of information is more essential. Also convincing and training the staffs to observe and amenable transition and ex-



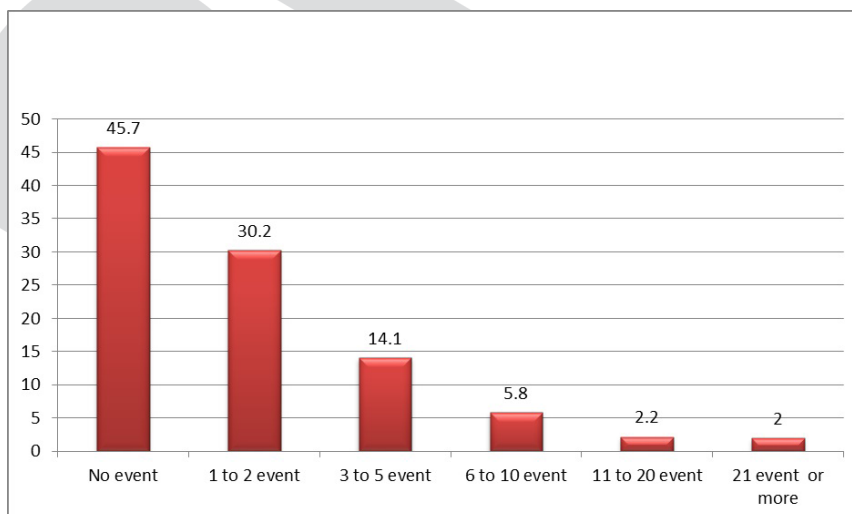
**Figure 3** Average percentage of respondent giving their PSC grade

change the patients' information in the hospital can be an appropriate solution.

Staff affairs are not in a good condition. According to the results of a previous study, small number of staff led to increasing their workload while decreasing the staff attention to patient safety [12, 46, 49]. In some cases, the absence of accurate management of the personnel leads to these kinds of problems. Ignoring staffs needs, interests and abilities may lead to create some problems in patients' safety. Ignoring

social and emotional needs of staff at the workspaces can add to the present problems. The present problems in this field can be decreased and the safety culture can be promoted by managing human forces in the hospital properly, detecting and caring about staff needs and wishes, creating proper work and salary conditions, sharing the staff in decisions and managing procedures, and developing and supporting unofficial groups at the hospital.

Although this study provided clearer and better view



**Figure 4** Average percentage reporting events in the past 12 months

of patient safety culture in the hospitals by the whole review of studies and fulfilling meta-analysis for their results with high volume of samples, yet there are some problems unsolved. The important limitation of this study was lack of assessing of articles, which were conducted using tools other than HSOPS. The other limitation related to this study was lack of meta-analyzing tools due to indistinct amount of samples. Also, due to the lack of enough studies in the field of primary care, we suggest that similar studies should be done in the field of patients' safety culture.

## Conclusions

Non-punitive response to errors, staffing, and transition and exchange of patient information must be placed on the priority of patient safety improvement plans.

### Authors' Contributions

The authors contributed equally to this work.

### Competing Interests

The authors declare no competing interests.

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