

## ORIGINAL ARTICLE

# Fire Safety Status in the Hospitals of Shiraz University of Medical Sciences, Shiraz, Iran

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## ABSTRACT

In today's world of advanced technology, "nothing is safe" and the fear from painful disasters caused by job accidents always exists. Therefore, hospital preparation for probable accidents, such as fire, and providing safety for both the staff and the patients in these situations are vital necessities. This study aimed to evaluate the fire safety status and level of fire-awareness in the hospitals of Shiraz University of Medical Sciences, Shiraz, Iran. This cross-sectional study was conducted in two parts. 1) Reviewing the fire-safety status in the hospitals of the university and 2) Evaluating the level of fire awareness among the hospital personnel. In evaluating the level of fire awareness, 520 subjects were selected among Radiology, Pharmacy, Laboratory, And Nursing stations staff. The fire-safety status was assessed using a checklist including 54 questions evaluating fire-safety and emergency exit pathways. In addition, a questionnaire including 12 questions was used in order to evaluate the level of fire awareness. The results revealed maximum and minimum fire-safety status in Namazi Hospital (mean=20.36) and Shooshtari Hospital (mean=16), respectively. In addition, the highest and the lowest levels of fire awareness were found in Qotbeddin Hospital (mean=5.85) and Sina Hospital (mean=3.35), respectively. Level of fire-awareness of the study population had association with educational level and job tenure.

**Keywords:** Hospital, Fire safety, Fire knowledge, Iran

## INTRODUCTION

Nowadays, more attention is being paid to different aspects of safety [1]. In health system, safety is defined as a set of security measures used to protect the physical assets, staff, and clients and also reduce the possibility of damage; of course, safety cannot eliminate all the risks [2]. The first reason for paying attention to safety in hospitals is the moral responsibility [3]. In fact, all the organizations, especially those which provide emergency services, are committed to create a safe environment for both the staff and the clients [4]. On the

other hand, the second reason for paying attention to safety is the legal responsibility. Observing safety considerations in different wards of hospitals can lead to reduction of risks and potential complaints.

As we know, manpower is a fundamental and important resource for every organization and paying attention to this source is essential for organization success [5]. In England, 75% of the reports suggest that the hospital staffs are exposed to harmful factors and 17% are susceptible to several job-related diseases [6]. Observing safety principles is one of the important tasks of managers [2]. With a 7- year safety program, the rate of saving in the costs was more than 5 million and in hospital wards using this program, the average of safety-costs had a 20% reduction [3]. Working in

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**Table 1.** Comparison of safety status between the hospitals of Shiraz University of Medical Sciences

Hospital	Fire safety score				p-value*
	M	SD	Min	Max	
Namazie	20.36	3.93	9	23	
Hafez	19.69	2.01	16	22	
Khalilie	19.33	3.57	10	21	
Shahid faghihie	19.41	2.27	13	21	
Ali Asghar	19.09	3.70	9	22	
Fatemeh	18.69	2.39	11	21	
Zeinabieh	18.46	2.47	11	21	<0.001
Shahid Dastgheib	18.10	2.92	11	20	
Gotbeddin	17.9	3.33	8	20	
Ebnesina	17.81	3.37	9	21	
Shahid chamran	17.41	1.67	16	19	
Sina	17.20	4.04	6	20	
Shoshtarie	16.00	3.46	7	19	

Note: the maximum possible grade is 30 and the minimum is 0.

\*Kruskal-Wallis test

hospitals and medical institutes can affect the staff's health. In the United States, 9000 health workers experience occupational related injuries every day [4]. Because of the existence of flammable materials, medical gases, ionizing radiations, and chemical agents in work places, great care is essential for protecting both the staff and the patients [2]. One of the most important dangers is the existence of combustion sources and oxidizing materials in hospitals, which can be the initial cause of fires.

Fire is a threatening danger for hospitals and can cause financial damages and casualties. According to Ramachandran (1999) 'Safety is the complement or antithesis of risk. Safety will be increased if the risk is reduced. There is no such thing as absolute safety. Some level of risk is virtually unavoidable. A building may be considered to be 'very safe' from fire if a sufficiently 'low fire risk' is associated with its structure, contents and occupants'. Occupants play a vital role in lowering the fire risk if their behavior during evacuation exactly follows the theoretical frame work. But people's behavior is sometime unpredictable [1, 7].

Hospital residents are generally infirm people; so that they cannot save themselves in dangerous situations. As a result, fire in hospitals could have casualties more than any other places [8].

Furthermore, due to the existence of expensive and valuable equipments in hospitals, fire can cause extreme financial damages [9]. Therefore, fire-safety is an important factor in hospital safety and management and it is necessary to pay serious attention to this factor [10].

One major factor in occurrence of occupational accidents is incaution. Habits, such as working incautiously and in unsafe situations, are usually the result of lacking knowledge. Thus, job training with an

emphasis on safety aspects is very effective in motivating the employees and resolving the problems [11].

Because of the important role of hospitals in public health, we decided to investigate the fire-safety condition in hospitals of Shiraz University of Medical Sciences (SUMS), Shiraz, Iran in order to find out the deficiencies and improve the condition.

## MATERIALS AND METHODS

The present cross-sectional study aimed to review the fire-safety status and level of fire-awareness in the hospitals of SUMS. In order to evaluate the level of fire awareness, 520 individuals of 13 hospitals were selected among Radiology, Pharmacy, Laboratory, and Nursing stations staff. Moreover, in order to review the fire-safety status, we used a checklist which included 54 questions evaluating two factors: a) fire-safety and b) emergency exit pathways. All items of the checklist were observed by the researchers at hospitals. The item was assessed to be either *provided* (yes) or *not provided* (no). The item was, then, scored 1 if it were *provided* (yes) and 0 if it were *not provided* (no). The total safety score was calculated as a plus of all score of items in the checklist [7]. Moreover, a questionnaire (fire safety knowledge) including 12 questions was used in order to evaluate the level of fire awareness [7].

The questionnaire used in this study included personal and general questions and its validity and reliability had been confirmed (Cronbach's alpha = 0.6616).

At first, the hospital managers were consulted and the legal procedures were performed. Then, the data were collected using the checklists which were completed objectively. Besides, the questionnaires were

**Table 2.** Comparison of fire-safety knowledge between the hospitals of Shiraz University of Medical Sciences

Hospital	Fire safety knowledge score				p-value*
	M	SD	Min	Max	
Namazie	5.85	1.97	1	9	<0.001
Hafez	5.47	2.73	0	11	
Khalilie	5.35	1.29	3	8	
Shahid faghihie	5.25	2.4	0	10	
Ali Asghar	5.07	2.61	0	10	
Fatemeh	5.02	2.02	1	9	
Zeinabieh	4.77	2.36	0	9	
Shahid Dastgheib	4.62	1.72	1	8	
Gotbeddin	4.47	2.07	1	8	
Ebnesina	4.2	1.73	0	7	
Shahid chamran	4.12	1.71	0	7	
Sina	3.9	1.75	1	7	
Shoshtarie	3.35	1.98	1	7	

Note: the maximum possible grade is 12 and the minimum is 0.

\* Kruskal-Wallis test

**Table 3.** Fire-safety knowledge in level of education groups of the staff studied

Level of education	Fire-safety knowledge		p-value*
	M	SD	
Diploma (n=101)	3.42	0.37	0.004
A.D. (n=108)	3.91	0.25	
B.Sc. (n=302)	5.85	0.27	
M.Sc. (n=9)	6.75	0.34	

\* Kruskal-Wallis test

distributed among 40 staff in each hospital in order to evaluate the level of safety-knowledge.

**RESULTS**

In Tables 1 and 2, were used from Likert scale for rating of checklist and questionnaire. After the checklist and questionnaire were completed, item responses were summed to create a score for a group of items and in

any hospital, mean of total score was calculated. Then mean of score were compared in different

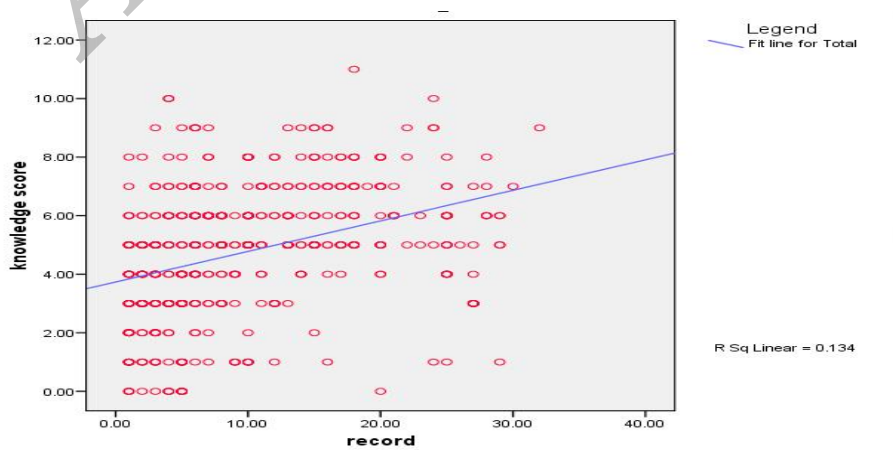
hospitals.

*Part I:* Table 1, comparing the fire safety status in hospitals of SUMS. The comparison between the scores shows that Namazi Hospital had the highest fire safety score (mean=20.36) and Shushtary maternity had the lowest fire safety score (mean=16). Of course, the maximum score (20.36) is not a good score, which shows improving the safety status as a necessity in all the hospitals.

First, Kruskal-Wallis test was used in order to determine the significance of the difference between safety statuses of different hospitals ( $p < 0.001$ ).

*Part II:* Table 2, evaluating the level of fire safety knowledge in SUMS. This part also includes tables which show that there is a link between fire-safety knowledge and level of education. Here, the maximum score was 12; so that Ghotbeddin Hospital's score; i.e., 5.85, does not have an acceptable fire-safety knowledge rate. Besides, knowledge of fire-safety was not enough in any of the study hospitals. This shows the great need for suitable and continuous training. We also need to improve the safety culture which itself needs organized programs.

First, Kruskal-Wallis test was used in order to determine the significance of the difference between



**Fig 1.** The relationship between the job tenure and the fire-safety knowledge score

safety statuses of different hospitals ( $p < 0.001$ ).

*Part III:* The results of Kruskal-Wallis test revealed a significant relationship between the staff's fire-safety score and their level of education (Table 3).

It can be understood that higher educational level is effective in the tendency to accept the safety rules. In addition, people with higher educational degrees are more desirous to learn and accept the fire-safety rules.

In addition, Using the Pearson Correlation test, a significant correlation was found between the job tenure and the fire-safety knowledge score ( $p = 0.004$ ). According to Fig. 1, the more one's job tenure increases, the more fire safety knowledge s/he gains.

## DISCUSSION

The present study was conducted in the hospitals of SUMS, Shiraz, Iran and the results were comparable with the researches carried out in other cities. The findings showed that none of the hospitals had fire detector systems, but 83.5% of the hospitals had a sufficient number of fire capsules and 61% of them had fireboxes. None of the study hospitals had emergency exiting ways and only one hospital had available exiting stairs.

The results of a study conducted in the hospitals affiliated to Gilan University of Medical Sciences showed that none of the study hospitals had emergency exiting ways and if there were any, they were not utilizable [12]. There were not any fire-detecting systems in those hospitals and fire capsules were the only existing fire extinguishing equipments. In Shiraz University of Medical Sciences, the results indicated that only 2 out of 11 hospitals had fire detector systems [4].

Furthermore, study in Tanzania showed no specific guidelines in the hospitals for evacuation of patients in dangerous situations [3]. All the hospitals under study had fire extinguishing equipments which consisted of fire capsules and high pressure tubing. Nevertheless, the best systems are those which can alert the staff in the initial moments and before expansion of the fire.

Overall, it is obvious that studies conducted in different cities (Shiraz, Gilan, Tanzania) [4, 5, 12] have obtained similar results, which means that a common problem exists in all the mentioned hospitals. The problem is not paying enough attention to fire safety in hospitals. The international standard fire control systems are those which can alert people in the initial moments of fire [10]; however, almost all the study hospitals did not even have the fire capsule system. Moreover, 70.2% of the hospital staff stated that they had not been trained about fire controlling, none of them knew how to use the fire control system, and 90% did not know about the fire teams. The staff's level of knowledge about combustible and flammable material was estimated as 55.2% and 77.1%, respectively. These

results are due to the inadequate fire safety knowledge of the hospital staff as well as the absence of fire teams.

The findings of a research carried out on the level of fire safety awareness of the hospital staff in SUMS in 2006 showed that most of the staff did not have enough information about fire-safety, there were not any fire systems in the study hospitals, and 77.2% of the staff were not trained on fire controlling [13]. The similarity between the results of this study and the present one shows that the fire safety status has not improved in the hospitals of SUMS during the past 2 years.

## CONCLUSION

Review of fire safety status and determination of its associated factors is important in hospitals. The results showed that level of fire-awareness of the study population had association with educational level and job tenure. So that, staff with higher educational level and job tenure had higher level of fire-awareness.

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