Original Article

Assessing the Safety Status of Kashan University of Medical Sciences Faculties by Audit Method in 2018

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Abstract

Aims: In any organization, there is a set of safety hazards that, if ignored, can lead to accidents. Universities can be considered a small example of organizations with all kinds of risks. The aim of this study was to investigate the level of safety noncompliance of Kashan University of Medical Sciences with the safety audit method. **Materials and Methods:** The present study is a descriptive cross-sectional study in which the safety status of faculties of Kashan University of Medical Sciences was assessed by audit. Audit checklists were prepared in accordance with national safety standards and regulations as well as the expert opinion of safety experts, including electrical safety, fire safety, general safety, safety requirements, beam safety, emergency response program, safety the pressure system, the safety of the elevators, and the general specifications of the faculties. **Results:** Based on this study, it was observed that in the areas of public safety, the highest noncompliance was reported in the areas of emergency, safety requirements, and pressure system with 88 cases (88.23%) and no noncompliance in the areas of public safety and elevators 0 (0%). According to the year of construction, the highest noncompliance was reported in the areas of emergency and safety requirements (100%) in 17 cases and the lowest noncompliance was in the field of public safety, which had no noncompliance 0 (0%). **Conclusion:** The safety situation of the classes of the studied faculties, especially in the subjects of safety requirements, emergency response program, and safety system under pressure, was at an unfavorable level. The most important reason for this was the lack of clear responsibilities and the lack of organizational structure in the field of safety issues, which in order to improve it, universities need to establish a safety management system**.**

Keywords: Audit, checklist, Kashan, safety

Introduction

Accidents are one of the most important causes of death in the world.[1-3] In most developing countries, injuries are the leading cause of death and the most important cause of disability at working age.[4-7] Every day human life is always faced with threats.[8] Nowadays, protecting the physical health of employees and students is one of the principles that underlie all goals and plans[9] for this reason, a safe environment must be provided in all organizations that serve the community.[10] In any organization, there is a set of safety hazards that, if ignored, can lead to accidents. Organizational safety issues cover a wide range of issues, including the following categories. The first category is related to safety in operation, which includes work at

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height, welding and cutting, safety of equipment and machinery, etc. The second category is related to safety in the organization, which includes warehouse safety, fire management, enclosures, warning signs, and so on. Moreover, the third category includes the safety of persons in the organization, which includes the elimination or reduction of hazards and the use of personal protective equipment. Universities can be considered a small example of organizations with all kinds of risks and risks that can occur in high-risk industries. Universities in each country play an important role in training the required specialized personnel.[11] Therefore, education at all levels has a very important role in achieving risk control and reducing its potential risks in universities.[12] Most universities have educational environments (such as colleges, laboratories, etc.). Educational activities are one of the main pillars of learning in any country, the implementation of such activities increases the knowledge, skills, and scientific attitude of educational groups.[13] On the other hand, dangers such as fire, explosion, fall, etc., also threaten people active in this field. Undoubtedly, as the time of exposure increases, the risk of exposure to them and the risks and possible accidents will also increase.[14,15] Unfortunately, today, we see unpleasant and unpleasant events in educational environments.[16] For example, the capsule explosion incident of the fire extinguisher in the laboratory of Tarbiat Modares University in Tehran in 2006, resulted in the death of a doctoral student and severe injury to one of his colleagues.[17] According to US government statistics, nearly 10,000 accidents were reported in research laboratories in 2005.[18] Between December 1997 and May 2004, there were 21 incidents in the laboratories of the University of Taiwan that caused harm to professors and students.[19] The above are small examples of university incidents in the country. The point to be noted is that academic activities and the educational environment according to the provisions of Article 4 of the Labor Law are considered a workshop activity. According to Article 85 of the Labor Law; To protect the country's manpower and material resources, it is mandatory for all workshops, employers, workers, and trainees to follow the instructions developed by the High Council for Technical Protection and the Ministry of Health, Treatment and Medical Education.[20]

In the study of Kiaei *et al*., which was conducted on the subject of safety assessment of clinical laboratories of medical centers of Qazvin University of Medical Sciences in 2011, the assessed level of safety of laboratories was determined to be good (79.5%). In this study, the fire safety axis with a score of 32.3% had the lowest score.[21] The mentioned studies are an example of research conducted in assessing the safety status of laboratories of research and academic centers in the country. Farrokhi and Bayat Badaghi did a research (2011) entitled "Physical security and safety in public and university libraries in Zanjan province." The results showed that the current security situation of library space seems to be moderate and all security spaces should be reviewed and optimized according to existing standards.[22] Pourasad (2007) in a study entitled "Study of safety conditions in public libraries of West Azerbaijan province" concluded that libraries are not in good condition in terms of safety. About 95.65% of libraries do not have a warning system and other security systems have a similar situation. Of the safety courses, only 91.3% of the staffs have passed the fire extinguisher courses and only 50% of the libraries are earthquake resistant.[23] The aim of this study was to investigate the noncompliance of safety levels of Kashan University of Medical Sciences with safety audit method and it is hoped to be able to identify safety risks and hazards and provide measures to eliminate or reduce the risk level.

Materials and Methods

This cross-sectional study was conducted in 2020. The study was conducted in all faculties of Kashan University of Medical Sciences, Kashan, Iran, and examined the safety status of the faculties by safety auditing method. Totally, 5 faculties, which include a total of 17 floors, were studied.

In the first stage, executors, during a preliminary study, the most important potential dangers and safety issues in the faculties were identified through talking to the officials and staff of the faculties. Then the topics including electrical safety, fire safety, general safety, safety requirements, beams safety, emergency response program, pressure system safety, elevator safety and general characteristics of faculties including faculty type, year of construction, and class are examined. Audit checklists based on national protection standards and regulations (16–19) and the expert opinion of safety experts were prepared the most important cases of each of the safety issues are shown in Table 1. The checklists had a total of 130 questions, of which 28 questions on electrical safety, 20 questions on fire safety, 30 questions on general safety, 13 questions on emergency response, 12 questions on safety requirements, 12 questions on system safety under Pressure, and 16 questions were devoted to the safety of elevators.

To collect the required information, the facilitators went directly to the faculties of Kashan University of Medical Sciences and the checklists were completed through observation, interviews with managers and officials of different departments (laboratory expert) as well as reading documents.

In the data classification system, based on the audited conditions, according to the standards and safety requirements, each item of the checklist is assigned zero scores of "item No item," 1 "noncompliance," 2 "partial compliance" and 3 "compliance." Then the scores of the items related to each domain were added together and if each domain received <50% of the total score as a safety noncompliance and if it had more than 50% of the total score as safety compliance was considered in that area. Finally, the data were sent in the form of a report to eliminate the noncompliances separately for the officials of the studied faculties.

Results

During the review of 5 faculties of Kashan University of Medical Sciences, the highest noncompliance was reported

in the areas of emergency, safety requirements, and pressure system with 15 (88.23%) and also the lowest noncompliance was in the areas of public safety and elevators, which did not have any noncompliance. Among the faculties, the medical school had the highest noncompliance in the field of electricity and fire and the nursing school had the lowest noncompliance [Table 2].

In addition, these faculties were analyzed, according to the year of construction, the most noncompliances were reported in the areas of emergencies and safety requirements with (100%) 17 cases and the lowest noncompliances were in the areas of public safety with no noncompliances. Among the faculties according to the year of construction, the faculties that were established in 1986 had the highest safety noncompliance and also the colleges that were built between 2015 and 2018 had the lowest safety noncompliance [Table 3].

Discussion

The results of this study showed that the faculties of Kashan University of Medical Sciences have many failures and risks and there is a possibility of various adverse events or incidents. The highest noncompliance in terms of the number of floors in the areas of emergency, safety requirements, and pressurized system with (88.23%) was reported with 15 cases and also the lowest noncompliance in the areas of public safety and elevators, which had no noncompliance. In addition, the highest noncompliances in terms of year of construction of colleges were reported in the areas of emergency and

Table 1: Safety issues studied in the safety audit of Kashan University of Medical sciences

Safety issue	The most important cases under consideration
Emergency response plan	Preparing an emergency response plan, forming an emergency response team, having a plan to control potential hazards and emergencies, periodic maneuvering program to maintain continuous preparedness of crisis team, coordination with other relevant bodies in matters of emergencies such as fire and police, provision of means of communication in crisis, how to arrange the equipment, identify safe place, status of emergency exit routes, training of people
Safety requirement	Establishment of safety and health management system, evaluation and risk management, presence of safety officer, holding safety committees, safety monitoring and inspections, record and report incidents and near miss, safety instructions, installation of signs and warning signs, safety training and safety plans and programs
Fire safety	Fire prevention and extinguishing, installation of fire doors and automatic fire alarm systems in sensitive places, installation of explosion-proof electric systems in necessary places, existence of existing ventilation systems to expel dangerous gases, installation of fire extinguishing capsules
Electrical safety	Periodic inspections of electricity generators by the city electricity department, electrical safety warnings and recommendations, the presence of insulated flooring in the vicinity of electrical panels, installation of systems to protect devices against power fluctuations, the presence of surge arresters, switches and sockets and explosion-proof lights existence of ground connection system, availability and presence of electrical technicians in colleges, existence of emergency electrical system, locking and labeling instructions during repairs, existence of sufficient number of earth wells in colleges, proper maintenance of electrical equipment and use of equipment safety when performing electrical repairs
General safety	Use of personal protective equipment, safety of physical spaces of different departments of colleges such as floors, walls and stairs, immunization of personnel against infectious diseases, environmental conditions of colleges such as lighting, sound and weather conditions, the existence of proper ventilation system in dangerous parts such as the laboratory, the presence of emergency shower and eyewash in the laboratory
Pressure system	Equipment location, on-site ventilation system, distance from flammable and explosive equipment, technical inspection of equipment, special place for fire alarm and extinguishing equipment, technical inspection certificates, special place for engine house map installation, engine house outlets
Elevator	Technical inspection of internal surfaces of elevator shafts, elevator level difference in each floor, door sensors, sidewalls and roof of the elevator, elevator equipment room, existence elevator off switch in the equipment room, communication devices, signs inside the elevator, emergency rescue system, elevator shaft cleaning, elevator emergency power
General specification of faculties	Name of the faculty, year of construction, number of students, and number of classes

Table 2: Frequency and percentage of noncompliance of faculty safety fields by floors faculties

Items	Health (N)	Paramedical (N)	Nursing (N)	Dentistry (N)	Medical (N)	Whole insecure floors
Electricity	2	3	-	1	5	11 (64.7)
Fire	2	-	-	1	5	8 (47.05)
General safety	-	-	-	-	-	-
Emergency conditions	3	3	3	3	3	15 (88.23)
Safety requirements	3	3	3	3	3	15 (88.23)
Pressure system	2	3	3	2	5	15 (88.23)
Elevators	-	-	-	-	-	-
Total number of floors	3	3	3	3	5	17

*The numbers indicate a lack of safety and noncompliance

Table 3: Frequency and percentage of noncompliance of faculty safety fields based on years of construction of floors

Field	Year of construction			Whole insecure floors
	1986 (N)	2006 (N)	2015-2018 (N)	
Electricity	6	5	-	11 (64.7)
Fire	6	2	-	8 (47.05)
General safety	-	-	-	-
Emergency conditions	6	6	5	17 (100)
Safety requirements	6	6	5	17 (100)
Pressure system	6	5	4	15 (88.23)
Elevators	-	3	-	3 (17.64)
Total number of floors	6	6	5	17

*The numbers indicate a lack of safety and noncompliance

safety requirements (100%) with 17 cases and the lowest noncompliances were in the field of public safety, which had no noncompliances. The results of the present study showed that no training or team has been provided to respond to emergencies, which is in line with the study of Halvani *et al*. on the subject of identifying and evaluating the risk of laboratories of Yazd university of medical sciences using standard checklists.[24] In the public safety department, items such as the use of personal protective equipment, safety of physical spaces in different departments of colleges such as floors, walls and stairs, protection of personnel against infectious diseases, environmental conditions of colleges such as lighting, sound, and weather conditions the existence of a proper ventilation system in hazardous and sensitive areas were examined. All floors complied with safety standards and requirements. These findings are consistent with the study of Jahangiri *et al*. in the teaching hospitals of Shiraz University of Medical Sciences[25] in terms of public safety. The fire safety situation in Kashan medical schools was also in an almost unfavorable situation. One of the most important weaknesses in the schools is the lack of fire doors and automatic fire alarm systems in some sensitive areas. Mirhoseini and Mirakbari in a study entitled "Fire Safety Survey of Islamic Azad University Libraries"[26] found that none of the libraries meet fire safety standards due to the use of various electrical equipment in different parts of colleges, especially laboratories, attention to the principles of electrical safety to prevent electrocution of employees and fires caused by defects in electrical systems is of particular importance. In the study performed according to Table 2, most of the floors are in a relatively unfavorable situation in terms of the level of fulfillment of safety requirements. One of the most important reasons for this is the lack of continuous monitoring of electrical technicians on the electrical safety situation in different parts of the faculties. Due to the use of various chemicals in laboratories as well as different gas cylinders in different departments, the risk of fire in colleges is high and it is necessary to take the necessary measures to prevent it. In the field of safety requirements due to the absence of the safety officer, holding safety committees, safety monitoring and inspections, registration and reporting of accidents and quasi-accidents, safety instructions, installation of warning signs, safety training and plans, all faculties were in unfavorable situation. Considering that the existence of safety instructions and following them has been effective in reducing unsafe conditions and behaviors in colleges, it has been recommended to be formulated and implemented in all occupational safety and health recommendations. Rezapour *et al*. in a study entitled "Assessment of safety status and intervention to improve it in the workshops and laboratories of Isfahan University of Arts"[27] showed that one of the most important risk factors is the absence or defect of tools, equipment, signs and Safety warnings and safety training. It should be noted that due to the lack of studies on the safety of colleges and also the use of different tools and methods in a few studies, it was not possible to accurately compare the results of safety audits of colleges in this study with other studies. For this reason, other similar studies were used.

Conclusion

From the results of this study, it can be concluded that the safety situation of the floors of the studied faculties, especially in terms of safety requirements, emergency response program and safety system under pressure was at an unfavorable level, the main reason for which can be unclear responsibilities and the lack of organizational structure in the field of safety issues. According to the results obtained in the present study, it is suggested that to reduce the risks and improve the safety situation, necessary interventions such as training of managers and staff, formulation and strict implementation of safety rules and regulations in universities, scenario development and emergency training, regular and purposeful monitoring of safety in universities, observance of safety principles as an important part in the evaluation and grading of universities should be done.

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Conflicts of interest

There are no conflicts of interest.

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