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# The Readiness of Hospitals to Deploy the ISO 14001 System: A Case Study of the Educational Medical Hospitals of Shahid Beheshti University of Medical Sciences

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***ABSTRACT***

***Introduction:*** Standards of quality have been a huge success for organizations around the world. Hospitals need to establish standards, especially environmental ones. Hence, the codification of ISO 14001 is a necessity for hospitals. The aim of this study was to conduct a survey on the preparation of the teaching hospitals of the Shahid Beheshti University of Medical Sciences to implement ISO 14001.

***Materials and Methods:*** This is a cross-sectional study based on a questionnaire with internal reliability (Cronbach's alpha = 0.787) to assess manager and staff attitudes toward the establishment of ISO 14001. The data was collected from hospitals at the Shahid Beheshti University of Medical Sciences. There were also questions on environmental standards. The guidelines for environment management system auditing were used to assess the general conditions. Then the data were analyzed by the SPSS software.

***Results:*** The mean age of the 250 people in the study was 32.52 ± 6.98 years with an age range of 21 to 55 years. Females made up 64.6% of the participants in this study and 35.4% were male. The relationship between the knowledge and the variables of work experience, education, age, and sex was performed, and the Analysis Of Variance (ANOVA) showed that the knowledge of the females was less than that of the males (p = 0.01). Based on the current situation with the standards, hospitals were classified.

***Conclusion:*** The application of quality management systems (e.g. ISO) can be due to the development of standards and the modification of health centers. Thus, they may promote the quality of services, reduce costs, and raise the level of public health.

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## Introduction

Today, the role of quality management is well known for improving the performance of organizations and their productivity in international communities. Governments are increasingly considering the use of different standards. All governmental, semi-governmental, and private organizations have recognized the application of quality management models as an extremely important strategy; most importantly,

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manufacturing industries have also been working in this direction [1]. However, many organizations are yet to enter this field. Hospitals need to be models of cleanliness and health; so, respecting health regulations, especially environmental health [2], should be a priority. The major health hazards in hospitals are due to the non-implementation of health regulations, solid waste, sewage, unhealthy water and food, not respecting public health, and harmful physical, chemical, biological, ergonomic, and psychological factors that expose all patients, visitors, personnel, and eventually the community, to hazards. The role of environmental health is very important in reducing hospital infections [3]. Meanwhile, ISO 14001 is a new way of protecting the environment. This standard helps over time to ensure secure and consistent management of environmental laws and obligations within organizations. Mandatory compliance with the rules to prevent environmental damage is not enough [4]. Therefore, the implementation of ISO 14000 can provide the necessary grounds for environmental management. ISO standards represent an international reference in good practices to help secure the trust and confidence in a timely delivery of the product along with the quality services required by the customer. These good practices are a set of standardized requirements for a quality management system, regardless of what the organization is doing, how large it is, or whether it is private or public [5]. Various studies have shown that the implementation of ISO 14000 in industries has led to the productivity of organizations. For example, Kevin Wilson conducted a study to measure the usefulness of environmental management and the deployment of ISO 14000; the obtained results indicated the effect on cost reduction, energy savings, and efficiency in systems [6]. In 2005, Elefsiniotis et al. in New Zealand conducted a study on the relationship between sustainable development and environmental management of ISO 14000, which resulted in compatibility between the nature of ISO 14000 and sustainable development [7]. Therefore, ISO 14001 designs the needs that a quality management system should meet. In fact, the purpose of ISO is to promote the standardization of related activities in the world, with the view that it facilitates the exchange of goods and services, as well as develops cooperation in a circle of scientific activity, economics, and intellectual technology [8, 9]. The deployment of the ISO 14001 system will also affect the percentage of employment, the quality of efficiency indicators of various wards such as the operating room, pharmacy, laboratory, and so on, the degree of patient satisfaction, the degree of personnel satisfaction, increased hospital revenues, and cost reductions in hospitals. For this reason, organizations such as hospitals, which handle a variety of tasks and a large volume of services, are required to prepare in advance for the deployment of environmental and safety systems [10]. This is provided in the three areas of managers, personnel, and the conditions of the hospital organization because a failure in using quality management systems may lead to defensive reactions to the systems within these organizations [11]. ISO 14001 is an effective system for managing the determined goals of organizations. Hence, the purpose of this study is to determine the level of readiness of the Shahid Beheshti medical–educational hospitals for the deployment of the ISO 14001 standard as an effective management system.

## Materials and Methods

The present study is an applied cross-sectional study that was conducted in hospitals affiliated to the Shahid Beheshti University of Medical Sciences in 2014. Among 12 educational hospitals of the Shahid Beheshti University of Medical Sciences, seven hospitals were randomly selected with a sample size of 250 using the existing formulas. The subjects were selected randomly using the list of names available at the hospital. At the next stage, based on the ISO 14001 run instructions, a questionnaire was prepared that included questions about environmental standards in order to measure the attitude of the managers and the personnel toward the deployment of the ISO 14001 environmental standards. In addition, the ISO 14001 environmental standard audit

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checklist was used to measure the general status of the center in line with the implementation of the relevant standard. The general status of the hospitals was classified into five groups according to the classification of health indicators (water, sewage, waste disposal, laundry, and kitchen status). The validity of the questionnaire with regard to its content validity and reliability was obtained by calculating the Cronbach's alpha coefficient as 0.787. The questionnaires and checklist were completed by the hospital management personnel as well as the recruitment personnel. The scale of the questionnaire score was adjusted so that a person could express his or her opinions in different degrees-very low, low, moderate, high, and very high-and scores of 1 to 5, respectively, were assigned to these responses. The health indicators and the status of the hospitals were ranked in five groups, according to desired, good, moderate, and poor status. Finally, after collecting the information, the data obtained were examined through the SPSS version 19 software and analyzed using the one-way ANOVA.

## Results

The mean age of the participants in this study was 32.52 ± 6.98 years with an age range of 21 to 55 years. According to the results, 64.6% of the participants that completed the questionnaire were female, and 35.4% of the participants were male. The mean of the work experience in this study was 7.9 ± 6.31 years. According to the degree of education, 5.3% of the subjects had a doctoral degree, 10.5% had a master's degree, 66.5% had an undergraduate degree, 9.1% had an associate degree, and 8.6% had a diploma. The results of the grouping of the subjects according to gender in terms of education level are reported in Table 1.

**Table 1:** Grouping the subjects in terms of the education level according to gender

| Groups | Male (%) | Female (%) |
|---|---|---|
| Diploma | 27.01 | 12.61 |
| B.Sc. | 51.35 | 74.88 |
| M.Sc. | 12.19 | 9.62 |
| ph.D. | 9.45 | 2.96 |
| Total | 100 | 100 |

In this study, 19.6% of the respondents were managers and 80.4% were employees. In the final assessment of the personnel's knowledge, 2.4% of the subjects were in the group with low knowledge, 22% were in the group with moderate knowledge, and 75.6% were in the group with high knowledge. In addition, a relationship between knowledge and being either a manager or a regular employee was statistically significant (p = 0.02). A relationship was also found between the knowledge level and the variables of work history, education level, age, and gender. However, only the relationship between the knowledge and the gender was significant in that the level of knowledge in the female participants was less than that in the males (p = 0.01). The public health and hygiene of hospitals are among the main issues that need to be addressed. They are among the reasons making it necessary to have a good index for assessing hospitals. For this reason, the status of health indicators in the hospitals was divided into five groups of water, sewage, waste disposal, laundry, and kitchen status. From the point of view of examining the health indicators in the hospitals, we also concluded that, in general, the health status of the environment of most hospitals is desired according to the defined indicators and the studies performed. The results of the current hospitals' conditions according to the five classified health indicators are presented in Table 2.

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**Table 2:** Hospitals' current conditions according to health indicators

| Hospital name | Laundry | Kitchen | Wastewater | Water | Waste |
|---|---|---|---|---|---|
| Hospital 1 | Moderate | Good | Poor | Good | Good |
| Hospital 2 | Good | Good | Good | Good | Good |
| Hospital 3 | Good | Good | Good | Good | Good |
| Hospital 4 | Good | Good | Moderate | Good | Good |
| Hospital 5 | Good | Moderate | Moderate | Good | Moderate |
| Hospital 6 | Good | Good | Poor | Good | Good |
| Hospital 7 | Good | Moderate | Poor | Good | Moderate |

## Discussion

The results of this study indicate that the status of the health indicators is desired in the studied hospitals in the five groups of water, sewage, waste disposal, laundry, and kitchen status. The status of the educational hospitals of the Shahid Beheshti University of Medical Sciences, according to the checklist completed by the environmental health engineering experts of each of the given hospitals, covered the average daily production of waste by hospitals, 80% of which consists of public waste (similar to households) with a maximum of 15% of hazardous waste (infectious and pathologic), 3% of chemical and pharmaceutical waste, 1% of sharp objects, and less than 1% of other special waste (including radiographs, broken thermometers, etc.). Thus, lack of management lead to causet infecting total amount of waste generated, and subsequent lead to a serious threat to the health of personnel, patients, and the entire community. The status of the waste disposal of the studied hospitals is relatively good, which may be due to the deployment of a part of the management systems. the water supply sources are in the desired status category as this need is met by the urban transmission and distribution system. However, there is a need to improve and modify the methods in relation to the environmental aspects. But this is not consistent with the results of Zahedi et al. on the effectiveness of the environmental management system in Tehran's hospitals[3]. This may be due to the increasing attention paid to the importance of the deployment of the ISO system in hospitals and the improvement of the situation. The health status of the kitchen and laundry room was also in the desired category, but further investigation and upgrading of the environmental standard system is needed to ensure the most effective solution in hospitals. One of the main weaknesses and problems in the studied hospitals is the wastewater disposal systems. This is developing in some hospitals, but it seems necessary to conduct more detailed studies with the aim of accurate and complete identification of the health and safety risks posed by this indicator. There are no clear statistics on the occupational diseases caused by employment in health care settings in the country. Hence, it is evident that the changing health indicators in the hospital environment regarding the provision and promotion of services-such as the indicators of water and wastewater, waste, food health, public health, occupational diseases and disasters will lead to the optimization of resources, increased productivity and better use of human resources, increased service motivation, customer satisfaction, and health promotion. In other words, the observance of the principles of environmental and professional health in hospitals affects various current health costs by changing the various health indicators. The results of this study are consistent with other studies, including Hesan, Kevin and Wilson, and Mohammad Zahedi et al.[3, 6, 12]. In particular, the results of numerous studies in different countries emphasize the role of personnel training in improving waste management; it is suggested that the relevant authorities should consider this. In addition, the transition from the waste management approach to the less waste generation approach has been considered especially through personnel training [13, 14]. The results of this study also indicate that the current

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status of the hospitals, in terms of waste disposal and waste management, is weaker than other indicators. Therefore, it is suggested to pay more attention to adopting a scientific and strategic approach based on structured and systematic analytical systems. In previous experience, this has led to significant savings [15]. Moreover, effective management reduces 58% of the volume of waste; thus, we can partly prevent the spread of infection [16–18]. The use of ISO quality management systems can lead to the improvement and development of standards for health centers, improving the quality of services provided, reducing costs, and raising the level of health of the community. In this regard, not only managers but also all employees should pay attention to the quality and its benefits within their scope of responsibility. This, in turn, would reduce costs, and increase efficiency and productivity in the organization [19, 20]. The results of the Dargahi study entitled "The effect of knowledge and attitude and finally the performance of senior managers on management knowledge in the efficiency of health services in public hospitals in Tehran province" showed that 55% of medical managers and 50% of executives had knowledge of the principles of management while other senior managers had a relatively low level of knowledge. In addition, the study stated the importance of deploying management systems as a continuous task [21]. However, the level of knowledge in this study was divided into three groups 2.4% individuals with low knowledge, and individuals with moderate and high levels of knowledge at 22% and 75.6%, respectively. Finally, a significant relationship was found between the knowledge and being a manager and employee, which could be due to more managerial experience in deploying the ISO system. The results of the present study are also consistent with the study results of Jahangir, who conducted a comparative study of the level of knowledge and the application of the principles and methods of quality management by the managers and personnel of the Social Security Organization. In this study, 75% of respondents believed that the management system in the social security organization was associated with international standards [22].

## Conclusion

Therefore, the hospital management is responsible for providing the necessary programs to ensure the health and safety of the patients, personnel, and visitors under all conditions, especially in emergencies. The good practices of the hospital officials in the fields of public health, environmental health, and personal health is a manifestation of success in other aspects of management in the hospital. Therefore, it is suggested to examine the behavior of the managers concerning the deployment of the environmental standards system in organizations, especially in hospitals in future studies, and/ or examine and assess the level of knowledge and readiness not only with regard to environmental standards, but also for all levels of ISO and other newer issues, by conducting appropriate interventional training programs.

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## Conflict of interest

We affirm that this article is the original work of the authors. We have no conflict of interest to declare.

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