



# Barriers for the Using of Information Systems in Hospitals: A Qualitative Study

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## Abstract

**Background:** Information technology is one of the most important issues in health systems. It has been developed in health sectors and is widely used by hospital managers. Identifying barriers in the use of hospital information systems can be the first step for better information management and better implementation of quality improvement and clinical governance plans.

**Objectives:** The aim of this study is to investigate the barriers for the using of information systems in hospitals.

**Methods:** This is a qualitative study, which used content analysis for analyzing to achieve study objectives. Sampling was done using purposive and heterogeneous methods and data collection continued until data saturation. The researcher was referred to hospital managers to identify individuals who had the most information regarding health information systems to identify barriers of using information system.

**Results:** Results of this study showed that challenges and barriers of information management and use of information systems are related to each other. Based on the results of this study the most important challenges of using information systems are knowledge factors.

**Conclusions:** Designing a comprehensive plan can eliminate barriers of using information systems because barriers and challenges are integrated and related to each other.

**Keywords:** Hospital Information Systems, Information Management, Decision Making, Evidence-Based

## 1. Background

Nowadays, information technology and its use is one of the most important issues. Information technology has been developed in medical and health sectors and is widely used by health system managers. The healthcare industry depends on information technology, which has a vital role in medical performance and hospital management (1).

Information management has been defined as: technology of receiving, storing, processing, transferring, and presenting of information (2). It is believed that information technology can enhance organizational capabilities (3). Information management and use of information systems can improve quality of care, safety, cost saving, and can also create new innovations (4).

The literature review indicates that the use of hospital information system (HIS) can increase efficiency and effectiveness of care and cost saving (5, 6). In addition, these sys-

tems improve the readability of data recorded, user satisfaction, and reduce medical errors (7-9). Considering that information technology creates a great potential for improving quality of care, efficiency and effectiveness of personnel, particularly in hospitals and medical centers (10). Therefore, it seems necessary to set up a proper information system in order to understand the problem and use the best available data for providing on time and scientific information (11).

The proper use of information system enables hospital managers to access information for decision making every time and place; in addition, it also helps them make decisions based on actual information. This fact increases efficiency and hospital performance development (12). Implementation of information technology in health systems often require changes in work tasks and processes simultaneously or before applying new technologies (13). One of the most important reasons for failing in projects is the dis-

ability of using technology (14). However, studies in Iran have been shown that efficient use of information systems are challenges of the health system in Iran (15,16). The studies done by Yaghmaei et al., showed that despite the fact that informational systems are helpful for improving the quality of clinical services, the clinical staff didn't like to use it (17). The study done in Mashhad, Iran, showed that many of the clinical staff disagreed on the role of information systems in quality improvement (18). Although, information management and use of information systems are performing in hospital accreditation plans and clinical governance quality improvement plans. Clinical governance is a framework, in which service providers are responsible for continuous quality improvement (19).

Information systems management is one of the main domains of clinical service governance and also one of the domains of accreditation in hospitals in Iran. Identifying barriers and challenges in the use of hospital information systems can be the first step for better information management and better implementation of quality improvement and clinical governance plans (20). There are not enough studies in regards to barriers and challenges of information management as well as use of information systems in Iran, therefore, this study is important in terms of comprehensiveness, timeliness, and goodness. Considering subject importance, this qualitative study will explore challenges of information management in hospitals. The qualitative method has been chosen to clarify unknown areas and a deep understanding of the subject.

## 2. Objectives

The aim of this study is to investigate the barriers for the use of information systems in hospitals.

## 3. Methods

This is a qualitative study, which used content analysis for analyzing to achieve study objectives in 2016. The use of a qualitative-descriptive method is due to the fact that this method is a systematic method to describe experiences in social organizations (21). Population study included hospital managers, information technology manager, and information technology experts (intermediate, managers) in hospitals of Tehran University of Medical Sciences. The inclusion criteria included having at least 5 years of work experience and participation in implementation of the clinical governance program. The exclusion criteria included individuals who were unwilling to interview. Sampling was done using purposive and heterogeneous method and data collection continued until data saturation. Since in

qualitative research there is no emphasis in scale or statistical estimation and the important issue is valuable sample regarding research study, in this study the use of non-randomized (knowing cases) sampling was used. In purposive sampling, research subjects are selected based on research objectives (22). For this reason, the researcher was referred to hospital managers to identify people who had the most information about health information systems. Before interviews, the researcher explains about the research and its objectives to participants.

In addition, the participants were assured that their information would remain a secret. Interviews began with the questions "How is the use of information and information management in your hospital?, How is the data collection of your hospital?, What is the purpose of data collection in your hospital?, and How is the process of using information?"; they were guided considering study objectives. Study objectives had been explained to participants before interviews. Each interview took between 40 - 80 minutes, mean: 59 minutes. The number of interviews was 21. During the interviews we took note on the gestures. For more data validity we used reviewing techniques so that at the end of each interview we presented a summary to them about what they talked about during an interview. For more validity and reliability, interview results were compared with previous studies to integrate data sources. For more result transferability we choose people from different levels of decision-making and implementation. Data collection and data analyzing was done at the same time. To analyze data obtained from interviews we used framework (structural) analysis. Framework analysis, a kind of quantitative content analysis, summarizes data to form thematically to facilitate data analyzing.

## 4. Results

In total, 21 information system management experts were interviewed. Participants included 8 men and 13 women. The age mean was 42 years and the mean work experience was 11 years. All participants were in key positions in hospitals including: hospital director, hospital manager, nursing manager, clinical governance director, and R&D director. Data analysis led to extraction of three main themes including: knowledge, organizational, and hardware factors (Table 1).

Results of this study showed that challenges and barriers of information management as well as use of information systems are related to each other and sometimes are cause and effect. This can provide an opportunity to design a comprehensive program to eliminate these barriers.

Based on the results of this study, the most important challenges of using information systems are knowledge

**Table 1.** Themes Identified of Challenges of Using Hospital Information System

Themes	Categories
<b>Knowledge factors</b>	Lack of common language in definition of hospital indicators
	Lack of motivation for learning HIS applications
	Not training employees about the importance of indicators and data entry
	Don't effective using of data management
	Lack of enough knowledge for comprehensive use of HIS
	Mismatch of manual statistical reports and HIS
	Don't data entry in HIS systems by users
	Nonuse of indicators for quality improvement
<b>Organizational factors</b>	Multiplicity of data recording systems
	Not supporting of top management
	Duplication of data recording on paper forms and computerized forms
	Don't attention to the importance of information systems for improving hospital performance
	Don't defining of many indicators in HIS systems
	No requirement for managers and employees to on time and proper use of data
<b>Hardware factors</b>	Lack of IT proper substructure in hospital
	Shortage of manpower
	Don't updating and low- speed computers
	Low- speed of internet

factors. Fortunately, these factors can be eliminated by use of expert human resources or by training human resources. This study mentioned that lack of common language in the definition of hospital indicators is related to knowledge factors.

Indicators are variables that can measure changes directly or indirectly. Indicators are the most important factors that can show hospital performance and should be checked regularly. The information is used for indicator measurement so that information is the foundation of any high-quality system. If information is not accurate enough, there is no effort for quality improvement. Considering the important role of information in defin-

ing of indicators, common language is necessary for that. Common language in the definition of indicators, which means that different level of decision-making should have the same definition about variables so we can compare the performance between different parts of the hospital and improve it.

"Many of indicators don't have a common definition and define in each system differently. For example, the definition of emergency patient is different from ministry of health, expert of data recording and emergency physicians view", one of the participants (M17) said. When there is different definition of an indicator (a knowledge factor), it's impossible to compare that over time or different unit of a hospital or between hospitals.

Multiple systems of data recording (an organizational factor) are a reason for the lack of common definition of hospital indicators. Multiple systems of data recordings decrease the accuracy of data recording and also need more human resource. In addition, due to the shortage of human resource (a hardware factor), best use of multiple systems of data recording is difficult. Shortage of human resources results in collection of crude data and improper data analysis.

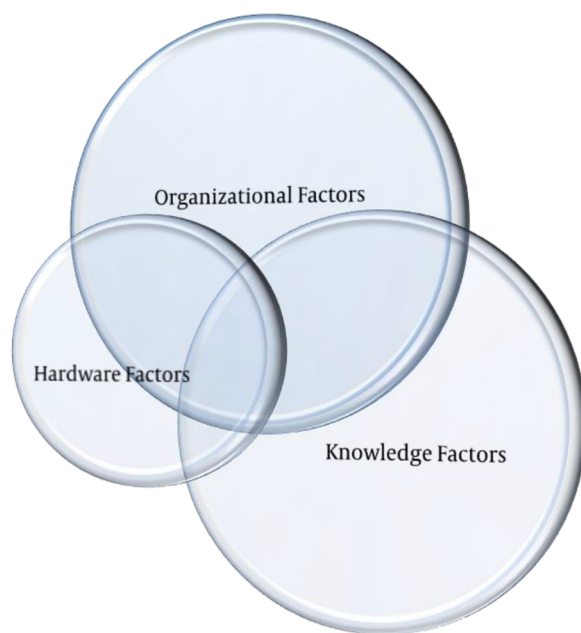
"We have just one person for data recording... and he/she doesn't have enough time to analyze data", one of the participants (m4) said. One of knowledge factors barrier for best use of hospital information was recognized as lack of motivation to learn HIS applications and not training staff about importance of indicators and data entry.

Considering that information system is a new science, resistance of employees seems usual about this science, especially in old employees. Scientific teaching and learning can provide changing of employee's behavior. Hospital managers should design a comprehensive teaching plan for providing motivation and commitment for employees to change their behavior. "Employees are so busy and don't have enough time to give information to the information recording expert, also they don't have motivation for doing that because paying is not based on performance", one of participant (m12) said.

Managers have a crucial role for motivating staff. Unfortunately, not supporting from top managers is an obstacle mentioned by participants. The main reason for the lack of top manager's support of information system is, not paying attention to the importance of information system in improving hospital performance. It's clear that obstacles of using information systems are completely related to each other. "Top managers don't support collecting, recording, and analyzing data due to the fact that they aren't aware about the importance of using information in improving hospital performance", one of participants (m2) said.

These challenges indicate that data collected is not used for managerial decision making and quality improvement. Before collecting data, the managers should ask themselves about how they want to use that? The data must be associated to actual decision making. Hardware problems such as: lack of proper and advanced IT substructure in hospitals, not updating computers, and low-speed Internet can decrease managers and employee's motivation for using information systems. "Systems are too old and often be disconnect because these systems are not supported properly, which means there is no substructure for using HIS" one of participants (M1) said. "First of all, we should create substructures for using HIS. If managers were aware about the importance of HIS, they spend money for that absolutely" one of participants said. Duplication of data recording on paper and computer form was another barrier in using HIS. "Forms are filled on paper and computer, therefore, sometimes manual reports are different from HIS reports" one of participants said.

The results of this study showed that barriers and challenges of using information systems and information management are related to each other (Figure 1).



**Figure 1.** Barriers and challenges of using information systems and information management

## 5. Discussion

Hospitals, as a complicated organization and health service provider, need efficient and effective management.

Hospital information system, as an informational powerful tool, helps hospital managers make decisions (23). The purpose of this study was to explore barriers and challenges of using information systems in hospitals. Results of this study revealed 3 main themes of challenges and barriers for using information systems including: organizational factors, hardware factors, and knowledge factors, which was the most important factor.

Knowledge and skill of employee's gaps and organizational factors were known as the most important factors in developing information systems in hospitals in the Lapao study (24), which has conformity with this study. Managers can eliminate all barriers of using information systems with a comprehensive plan due to the fact that these barriers are completely related to each other. Lack of common language in defining hospital indicators, not training employees on the importance of hospital indicators and data entry, as well as not using indicators to improve quality was known as a knowledge factor theme in this study. Hospital indicators, as a tool for measuring performance, evaluates and compare services. Therefore, indicators should be valid and reliable. In the study by Asefzadeh, it was shown that being a common language to defining health indicators for measuring health system is necessary. In addition, this study suggested a standard conceptual framework to achieve a common language (25). Lack of motivation to learn HIS applications, lack of sufficient knowledge to best use of HIS and not training employees on the importance of indicators and data entry were known as barriers to use HIS in this study. "Despite recognizing the value of learning information system, many of the users are reluctant to use these systems" Lee said in his study (26). Motivational factors are mentioned as challenges of learning information systems in the Dehghan Nayeri study (27). Awareness of managers and hospital employees about Hospital Information System applications and training employees about the importance of applications of information systems is very important (28). Kolayee and Rostami stated in their studies that "the knowledge of managers about information systems is low" (29, 30), which compatible with results of this study. Lack of motivation for learning and using information of HIS for decision making is because of low awareness of employees regarding applications of information systems (31). Not paying attention to the importance of using information systems in improving hospital performance and no support from managers to use them was known of barriers for best using of information systems in this study. "Managers don't support the use of information systems in hospitals. This is due to the fact that they don't know about information system applications in hospitals" Koolaei said in his study (29). Little Johns stated that "The most impor-

tant barriers for developing information systems in hospitals are lack of organizational commitment and no support from managers", (32). Considering that development and maintenance of information systems are very costly, managers have a key role in analyzing and using information systems. A study in USA regarding the impact of hospital information systems on costs showed that the correct use of these systems could decrease hospital costs about 26%-30%. In addition, they it can also have impact on quality of providing cares (33). Education is an important factor for participation and getting management support for using information systems in hospitals (34); no matching in manual statistical reports, HIS reports, and duplication data recording in paper and computer forms was known as another barrier for using information systems. "There is no belief to use hospital information systems" Roozbahani said in his study (35). Organizations with high bureaucracy accept information systems slowly (36). Distrust to information systems cause work to be done manually, thus, data will be discrepant and useless (37). Multiplicity of data recording systems and shortage of human resources were known as other barriers for using information systems in this study. Integration of data recording systems, especially in terms of shortage of human resources, can cause the use of these systems (38). "Hospital is a complex organization with different kind of activities, therefore, it should have a comprehensive and integrated HIS to help administrative and clinical management in decision making", Mineny said in his study (39). Establishment of a comprehensive and integrated hospital information system can cause saving in costs and time (40). Lack of proper and advanced subtraction was known as another barrier for using information systems in hospitals in this study. "Lack of proper subtraction and lowering the speed of information systems are a problem in using information systems and should they should be revised", Gholamhoseini mentioned in his study (41). In this regard Bastani et al., showed that relationship between electronic health and the Internet is important (42).

Designing a comprehensive plan can eliminate barriers of using information systems, due to the fact that barriers and challenges are integrated and related to each other.

The most important limitation in qualitative studies is the unwillingness of people to participate in the study, researchers tried to reduce it by assuring the confidentiality to participants. Also, considering that the research environment is in the education center, it cannot be generalized to all medical centers.

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## Footnotes

**Authors' Contribution:** Mohammad Keshvari and Ali Reza Yusefi developed the study concept and design. Roudabe Omidifar collected the data. Samin Nobakht and Roudabe Omidifar analyzed and interpreted the data. Abbas Homauni and Ali Reza Yusefi wrote the manuscript. Samin Nobakht revised and edited the manuscript. All authors read and approved the final manuscript.

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