

Hospital Information System Utilization in Iran: a Qualitative Study

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Abstract- Hospital information system (HIS) should ideally allow different forms of data to be stored and used for decision making by clinicians and managers alike. This system has been developed since the early 1980's, and many hospitals gradually converted from an unrelated system into an integrated one. In successful implementation of HIS plans, the role of human factors, either individually or as a group, is expected to be very important and decisive. In this phenomenological qualitative research, in-depth personal interviews were conducted with the hospital's senior managers, and discussions were conducted in six to eight member focus groups. To include participants for interviews, purposive sampling was used in an Iranian hospital among doctors, nurses and other healthcare providers who had experience in using HIS. Data collection continued until saturation stage. The meetings took about 90 to 120 minutes, in which the participants were asked about discovering needs as well as facilitating and inhibiting factors regarding HIS application. Two members of the research team independently analyzed the interview transcripts. As a result, problems in HIS isolation were reported to be related to the following: software, hardware, manpower, management and training. About the last point, it was stated that adequate continuing professional development programs did not exist for proper use of computers in the hospital. To achieve the ultimate goal of HISs (e.g. increasing patient satisfaction and decreasing hospital costs), it is necessary to create basic changes in the training system, and to get feedback from hospital personnel. Other steps include addressing software and hardware shortcomings as well as moving towards reinforcing the facilitating factors and refraining from inhibiting ones discovered in this study.

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Introduction

The goal of computerized HIS is to utilize the computers and communicational equipment for collecting, saving, processing, extracting and linking the patient care information to management information; in other words, in this system, data are simultaneously saved in a database, so that they could be available for the authorized users with a structure adapted to the user's certain needs, where and when needed.

Concerning the extensive developments in the medical technology and increase in the patients' expectations, increasing need for using HIS has been emerged in the hospital and in the 21th century those hospitals which lack HIS will not be able to compete with other ones (1-3). The HIS structure is formed on the basis of each department's expectations of the computerized HIS; this structure will be necessarily

complex, so it is known as the mother industry (4-6). HIS has been changed and developed since the early 2000's and converted from an inconsistent system into a consistent one with an axis named patient electronic records. An ideal system should have many technical features such as: the ability to identify medical trigger events, compliance with medical informatics standards', and the possibility of using expert system, great flexibility in adapting to the culture and hospital workflow. HIS has many capabilities and added values and could create a revolution in the hospital services (6-10).

Evidence from documents at hospitals and health centers indicated that proper use of electronic software is not available, and this could lead to reduced productivity of the system documents and inefficient use of information in health records. The conducted research in Golestan province, Iran, showed that just 18% of the

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managers were well aware of information systems and this percentage decreased to 3% in the research of Nikmehr *et al.*, (11-12).

In study of Cruz-Correia *et al.*, quality of hospital information systems (HISs) were assessed and results showed that existing audit trails (AT) do not have enough quality to guarantee traceability or be used in HIS improvement. Its quality reflects the importance given to them by the CIO of healthcare institutions. Existing standards are still not broadly used in Portugal (13).

Chen and Hsiao investigated physicians' acceptance of HISs in Taiwan. This study shows that system quality and information quality are significant factors influencing perceived ease of use of HIS while information quality and service quality are key factors affecting perceived usefulness of HIS. Results indicate that perceived usefulness and perceived ease of use significantly affect HIS acceptance from the physician's perspective (14).

The frameworks were being developed to increase the involvement of the professional staff in learning activities in around the world. Because without structured programs, it was possible that owners of the health professionals think about staying up to date in terms of knowledge and skills was difficult. In this study, we intended to prepare a framework for training of health professional staffs who were responsible for a major role in the storage of medical information to become more effectively involved in training activities and improve their skills and ability to collect data with new methods.

The main objective of this study was to evaluate the effectiveness of training courses for HIS.

Materials and Methods

This was a phenomenological qualitative research conducted in 2009 through in-depth personal interview with the senior managers and holding discussion in six focus groups consisting of health staff (doctors, nurses and medical personnel). There were generally less than 10 persons in the focus groups. According to the above, sampling was purposive and included persons who took informatics courses in the hospital, or those who could utilize HISs.

Sampling continued to the saturation stage. The accuracy and quality of the results were guaranteed through maintaining the methodological similarity by the experienced operators and two researchers to analyze the obtained contents. All the meetings of the focus

groups were facilitated by an experienced operator and with the assistance of information resources expert. These meetings lasted 90 to 120 minutes, and the participants were asked open questions about four main issues of facilitating and encouraging factors, inhibiting factors, the optimal existing factors to meet the needs. The members were controlled during the focus groups interviews and after meetings two members made reports discuss about the program's effects. Their statements were written and recorded on a cassette. The recorded cassette was listened immediately after the interview to ensure that it is understandable. Data analysis was started with listening to the participants' verbal description and continued with the repeated study of the manuscripts. The researcher's immersion extracted the main sentences and concepts in the data. Data collection and analysis were inseparable, and data analysis began data collection. A complete description writing indicative of all the stages of data collection and analysis -bracketing, member checking, journaling, reflexivity, deviant case analysis- was used in this study to ensure the research validity and accuracy.

The organization investigated was an educational, medical and research specialty and subspecialty hospital. This hospital had 7 floors and 300 beds and was moved to the current location at 1998. Different parts of the hospital are emergency room, operating room, outpatient surgery, dialysis, and outpatient chemotherapy.

Results

The main extracted axes of this research were as below:

Software problems related to the program, hardware problems, manpower related problems, problems related to the management and supervision, and finally the training problems.

There were the comments of the interviewees including two groups of managers and personnel in the text.

Software problems

The issues raised in this field are as following:

The possibility of information loss was high when they were transferred among the departments. The person who follows up the incomplete information record or all parts of a file were not defined, and they could not be recorded.

The program was hard to work with and had some limitations on entering information into the program.

One of the staff stated that

I think it is so long for one reception, for example if we want to discharge a patient we need to fill out the forms one by one. It needs much information! I think there is no need to all of this information. It can be a little more compact.

Since all the users had equal access to the program and all of them could change the information, program security was low and not in the desired level.

One of the personnel said

For example, my colleague or even I can enter the reception and let the insurance a patient who is not insured. The system due to the lack of a personal password let the sick person that is not insured be able to use insurance.

While recording the information, numerous errors occur in the program. System was not adequate and met a low level of expectations. Some codes were not defined in the system. There was no possibility to search information on the basis of an item. Since launching the program, no upgrade was performed in the system. There is no possibility to get the statistical output from the system. Just hospital reception and website could correct the patients' information.

Hardware problems

This part included the following issues:

The systems were old and elementary. Anti-viruses did not fully cover the systems, and they were infected therefore, the computer processing speed was low. Some departments did not have any system. Printers did not exist in some departments or were disabled.

The number of the computers was less than the number of the users in the different departments of the hospital. Computer was not used in all the departments and for all the matters.

Manpower related problems

The problems related to the personnel, and their skills were raised in this part:

Some users were not familiar enough with a computer. Some people did not have the culture of using the program. Some doctors did not use the specialized information of the program recorded by the para-clinical specialists and re-examine the para-clinical documents such radiology stereotypes for final diagnosis. The personnel were not familiar with the comprehensive and advanced capabilities of the program. Information was not timely updated.

One of the staff stated that

For example, we may request some equipment, system constantly say that this equipment is not available. Then we will know that the pharmacy has not yet recorded this equipment. Thus, the system gives an error.

Problems related to the management and supervision

The problems raised in this part were related to the management of the hospital and program. All of the hospital departments were not equipped with computer systems and HIS program. Hospital management and legislative references still refer to the paper document and don't consider the computerized document valid. Diseases were not codified based on the ICD system in the program. The information of the hospital before launching the program was not entered into the program and was not traceable. Outpatient visits were not recorded in the program. Manager and personnel did not mutually interact to find the program problems. Personnel were afraid of giving feedback about weaknesses of the program. Manager's performance was weak in holding feedback sessions. Personnel were dislocated among the departments regardless of their familiarity with the program of that department.

One of the personnel said

Initially, I was working in the pharmacy, and then I went to the endoscopy ward so that his program was different. Then I went to the dentist, and there is another thing I learned. Then I came to the emergency department.

Working schedule of the HIS program's evening shift staff is not harmonized with the personnel's working time; they were not compatible with each other. Hospital managers did not solve the users' problems. Program officials did not have sufficient knowledge of the program and when the personnel face problems; they do not give a solution. When the personnel encounter software or even hardware problems, its department was not reachable. Manager did not employ a (specific and specialized) person in the hospital to handle the HIS program matters.

Training problems

The issues raised in this field included:

Old and inexperienced staff trained the new personnel not by specialized staff. The personnel were trained late, so the training time was not commensurate with the time of department's need. The directors did not monitor the personnel performance. The personnel

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without the basic computer skills were employed.

Users were weakly trained; they were not adequately trained for correct encoding, extracting and classifying information, and providing statistics, tables and diagrams. There was no in service training and basic computer tutorials for the personnel. Users were not trained for advanced and optimal utilization of the program. Hospital website's officials (IT department) were not trained to acquire skill of program application and to become familiar with its errors. There was no specialized training for every department in the time of personnel dislocation.

Discussion

This was a research on the use of HIS in the hospitals. As qualitative studies were dynamic, the obtained results were beyond training and included function's method, problems and facilitating factors in using this progressing software system in the hospital and a small part of the results was about investigating the training courses and software using methods which were presented in the conclusion. Since this system's objective was to save data in a database simultaneously, so that they could be available for the authorized users when and where they were needed, with a structure adapted to the user's certain needs. The obtained results showed that all the major stages i.e. saving, processing and extracting information, had basic problems.

The personnel of the developed countries' hospitals were completely introduced with the goals of using this software before learning how to use it. So every user informs the software designed company of his/her required demands and options and after implementing software pilot in the hospital, the personnel were fully trained; for one year, the designers daily received the feedback of every department's users and upgraded the system. After that, they solved the minor problems through active supporting (9,10,15). The goals of implementing HIS were presented to the participants, but there was a need to hold seminars in this field and use specialized staff committed to the existing system to interact with the users actively to promote the software and hardware quality. Also, seasonal training classes must be held to receive feedback from new and old users and introduced them with HIS.

Chen and Hsiao (2012) in their study showed that system quality and information quality were significant factors influencing perceived ease of use of HIS, while information quality and service quality were key factors affecting perceived usefulness of HIS. They indicated

that perceived usefulness and perceived ease of use significantly affected HIS acceptance ($R^2=0.545$) from the physician's perspective (16).

Wangenheim *et al.*, (2012) analyzed user satisfaction in synchronous telemedicine and tele-consultation environments and the collected data were quantified and underwent statistical analysis, which showed a clear perception of the improvement in the quality of service by both patients and healthcare professionals. The findings of their study also showed that both patients and healthcare professionals felt that introducing these new technologies was a positive step, even in upstate areas and when they involved great changes in the usual processes of primary care (17).

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