

Hospital Information System, a Tool for Effective Decision Making of Healthcare Managers

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Abstract

Statistics and information are considered the most important source of power in organizations and the source for all managerial activities. If correct and comprehensive information are readily at hand, incorrect decisions will be reduced to a minimum. The purpose of this study is to review the effects of hospital information system in regards to effectiveness of decisions made by managers. The present study is a review and search of relevant articles in authentic national and international databases including articles from 2001 to 2016. Keywords used were: health information system, hospital information system, etc. Seventy articles were obtained from the search and 32 (abstracts and whole articles) were ultimately selected after removing irrelevant articles. During initial review, abstracts were first read and if needed the entire article was studied. Results of this review indicate that hospital information system play a significant role in improving hospital management performance along with performance of medical staff. Use of such systems were highly recommended in all articles. Application of such systems has also been considered amongst main requirements of managerial development. Also, most articles claimed that managerial decision making based on real information lead to increased performance and progress of management and ultimately increased hospital effectiveness and performance. In conclusion, hospitals must create and develop hospital information systems and recruit trained experts in providing practical information and knowledge in order to improve their current status.

Keywords: Health information system, Hospital performance, Hospital information system, Hospital management

Background and Objectives

In the current age, information and statistics are the most important source of power in the world and amongst the most valuable sources at the disposal of organization managers. Superiority of developed nations is also mostly influenced by information rather than economics, military, or cultural and political aspects.¹ Just as human resources, raw material, and financial sources play a significant role in production, information has a particular place in the age of information and communication. Generally speaking, the source of all managerial activities is information. Information is the critical flow and main aspect of decision making and planning. Without relying on comprehensive information, managers are not able to make effective

decisions regarding a certain matter. Therefore, a comprehensive information system is of utmost importance, especially considering that management is based on the trade of accurate and relevant information.^{2,3}

Emergence of information technology has brought about major changes in information exchange environments through the development and expansion of computer systems and information exchange, development of world wide networks such as the Internet which are based on valuable information and various services.⁴ Also, considering the burst of information resulting from electronic devices and computer technologies during recent decades, it is essential to develop systems for producing and managing information. In this regard, application of notification systems in healthcare has increased dramatically. Due to development of health information systems in healthcare centers, application of equipment, software, and programs related to such systems has also in-

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creased.² Use of such systems have the advantage of not only reducing errors and increasing accuracy and speed of operations regarding healthcare services but also reduce costs by coordinating services and improving care quality.³

Use of healthcare information for educational and research purposes and development of medical and paramedical sciences, improving treatment quality, optimization of managerial methods in healthcare centers, etc, are also amongst the main reasons for gathering information in healthcare centers.⁵ Use of efficient information systems for improving performance, effectiveness, service quality, and patient satisfaction is an undeniable necessity in the healthcare society. There is no doubt that a comprehensive information and notification network is needed within the country. One which includes all levels of health, from the level of rural health bases to the third level of referral, i.e. specialty and subspecialty centers and the ministry of health.⁶ On the other hand, trial and error is an extremely inaccurate and irrecoverable approach for healthcare organizations considering their position in determining and improving public health.⁷

Therefore, management based on correct, accurate, and timely information and enjoyment of a comprehensive information management system is significantly important. Hospitals, as one of the most important social organizations, have a major role in improving overall health of a country and providing healthcare services and are one of the most sensitive organizations which demand correctly gathered information in order to be managed and require monitored, categorized, and deduced information to be provided in a timely manner so that all hospital decision makers, especially managers and heads are able to make appropriate decisions.⁸ Thus, performance of a complex organization with various sectors, such as a hospital requires access to information. Herein, information may be related to the patients themselves or related to hospital performance and so it is important to distinguish between these two categories of information.⁹

On the other hand, during recent years, patient information has undergone tremendous changes regarding volume and amount of information. This is due to the emergence of new and expanding diagnostic and treatment techniques.¹⁰ Hospital features and requirements are also constantly changing due to development of practical information. These changes have lead hospitals to further rely on computer-based information systems.¹¹ In this regard, the only known way to gather, store, communicate, and present large amounts of information and satisfying consumer needs is the application of computers. The consumer may be a nurse who inputs patient information to

the system or a supervisor of a clinical department who is planning to present a certain medical care procedure in the coming week, or a member of the board of directors of the hospital who would like to use the system for managerial support. The hospital information system (HIS) was developed for the purpose of answering these demands.¹²

Methods

The present study is a review of relative articles gathered from the following sources: Google Scholar, Iran Doc, Magiran, Sid, Science Direct, Scopus, and Danesh Gostare Barekat system from 2006-2016. Keywords use for searching the mentioned databases include: health information system, hospital information system, clinical information system, and information system. The following keywords were used to search foreign language databases: hospital information system, multi hospital information system, and clinical information. Seventy articles were obtained after searching the databases and 32 (abstract or whole documents) were ultimately selected for study after removing irrelevant cases.

Inclusion criteria was defined as: articles which provided the required information (from abstract or whole document) despite type of study on HIS or its sub-systems. During initial review only article abstracts were read and if required, whole documents were studied.

Review

Just as production in the 1940s, marketing in the 1950s and 1960s, and economical and financial skills in the 1970s were considered the most important factors of change and main characteristic of western societies, from the 1980s till now, information has been the main measure of progress and development of various nations.^{8,13} Information in provision of health care services is as critical as blood such that physicians, nurses, and other healthcare providers rely on information in order to provide treatment services.¹⁴ A complex organization with various departments such as a hospital, requires timely and effective access to information in order to carry out its activities. Nowadays, computer systems are used as the most effective tool for gathering, storing, and retrieving large amounts of information and for the communication of such information in order to satisfy consumer needs. These consumers use computers in order to achieve various objectives including documentation in healthcare fields, future planning, and decision support for managerial and clinical decision making. HISs are amongst computer tools developed for achieving the aforementioned objectives.¹⁵ Amongst the main goals of health information systems include carrying out epidemiological researches, management of health in-

formation systems, abstinence from rework, improving care quality, and reducing costs.¹⁶ Considering these goals, it could be concluded that these systems are an infrastructure for decision making.¹⁷ It should be mentioned that having an appropriate infrastructure, an administrative culture, and provision of necessary supports and education allows users to cope with and adapt to new circumstances. Therefore it can be said that having an organizational culture bent on supporting the solidification of health care systems is one of the most important factors ensuring the success of such systems in the health domain.¹⁸

Necessity of Using Health Information System on Part of Hospital Employees

Nowadays information is considered as national resources in all countries and access to information has become an international rivalry. In designing and developing information systems, employees must be noted as key factors which manage such systems.¹⁹ Also, creating and developing information technology in any system requires an appropriate cultural environment. Thus, healthcare employees play a major role in creating, developing, and gathering information regarding health system and medical treatment and designing of information systems through means of having acquired the necessary knowledge and information regarding the flow of information in health care systems.²⁰ In recent decades, information technology has brought about major changes in lifestyle and its various aspects including healthcare. Scientific and academic texts have indicated that making the best decision in medical domains requires the use of information technology such that a vast corpus of information and knowledge has been produced for this domain and has already been applied. However, due to lack of appropriate planning and structured formal systems for converting, maintaining, and transferring information and knowledge regarding health, it can be said with certainty that healthcare organizations are potent in regards to amount of information and data but lack the required knowledge for using such information.²¹ Application of information technology in medical fields is expansive.²² For instance, it is used in medical researches and as a means for preventing diseases and epidemics, which is one of its great advantages.²³ Healthcare industry is specifically dependent on information technology and this technology plays a critical role in medical performance and hospital management.²⁴ Ultimately, it must be mentioned that HISs will be better accepted amongst employees if they are consistent with working procedures of hospital personnel and will in the long run, result in increased performance. Also, this can also reduce medical errors and improve employee efficiency.²⁵

Necessity of Evaluating Health Information Systems

Health information systems are coherent and integrated systems designed and implemented for gathering, registering, processing, retrieving, and distribution of health-care information. Evaluating health information systems is one way of improving sentiment of performance of such systems. Therefore, evaluating the performance of these systems is significantly important.²⁶ Evaluation is an important part of the progress and implementation of any system which indicates strengths and weaknesses of a system.^{3,27} Evaluation is based on comparison in which current status (after applying a new system) is compared to the previous status (with or without a previous system). Promotion of quality, performance, and effectiveness of healthcare services is dependent on regular evaluation of health information systems.²⁸ Information systems can be defined as an information process including involved parties and information technologies. It should be noted that information technology is only one part of an organization's information system. Therefore evaluating information technology must not only consider the actual technology, but also its interaction with involved parties in the information process.²⁹ Success of a health information system is highly dependent on appropriate planning. Planning must include subject of evaluation, time of evaluation, necessary resources, sampling phases, sample size, and training of experts for gathering data.³⁰ Results of evaluation can then be used in decisions regarding required investments for designing information systems, improving performance and effectiveness, system reception amongst users, and reduced error when working with the system. Also, these results may be used as a feedback for redesigning and promoting the current system.³¹

Necessity of Aligning Health Information Systems With Hospital Strategies

Health care organizations pay as much attention to applying health information systems as they do to correct implementation of health care procedures.³² According to the 11th annual report on critical issues of company information systems, 72% of chief information officers claimed their biggest concern was consistency of their information system with organization objectives and healthcare organizations are no exception.³³ Considering that information systems have been proposed as one of the key issues in management strategies and can include all hospital activities,³⁴ organizations endeavor to create a certain consistency and alignment amongst information system strategies and business.³⁵ Also, seeing as to how requirements in the health domain change

over time, organizations must align their information systems with these changes³⁶ and consider using these strategic systems in regards to competitive advantages.³⁷

Errors in Health Information Systems

Errors of healthcare systems are multi-modal in nature. Amongst the most important factors effecting the occurrence of errors are human-related, system-related, tool (equipment)-related, and process related factors.³⁸ It is by controlling such factors that we are able to reduce the occurrence of errors. When an accident occurs, it does not matter who is at fault, but why and how this accident occurred are very important and must be investigated in order to recognize the system's vulnerabilities which have created the necessary circumstances for error. Increased number of patients, growing physical space of hospitals, increased treatment standards, reduced and human errors in traditional exchange of information are amongst factors demanding the use of HISs.³⁹ In order to reduce human errors, experts must pay attention to both technical structure of data bases and appropriate education in consistency with users' knowledge of previous, current, and future state of health information system.⁴⁰

Conclusions

According to the important role of information in improved management of organizations and the emergence of novel information technology, the 21st century has become widely known as the information age. In order to promote public health, application of patient-oriented data, integration of decision making procedures, and use of comprehensive data in clinical researches and health reports is extremely essential. When data are used by managers and are actively distributed, a motivating environment is created where use of information amongst middle managers and employees of the health domain can easily progress. Through active use of information, chief officers are able to reinforce the significance of information throughout the organization. One of the main principles in using data by managers, is having the necessary knowledge and skill needed for managing health data.⁴¹

HISs have without a doubt an undeniable role in improving hospital management performance and performance of medical staff, such that these systems are highly recommended by scientists in management. Managers also claim that in order to create change in hospitals, we are bound to use information systems. Computer-based HISs provide the circumstances for managing hospitals with easy access to information at any time and any place in order to make decisions and make use of real information gathered from working environment. Decision making in

management is based on real facts and information and can lead to the increase performance of managerial procedures and ultimately increase performance and effectiveness of hospitals.⁴² Implementing health information systems in health care organizations is a complicated and rather difficult task which relies on various factors in order to be successfully implemented and operationalized.⁴³ Perhaps it can be stated that the most important factor effecting the successful implementation of health information systems is the cooperation and participation of users in developing health information systems. Healthcare managers must carry out an in-depth analysis of user requirements and current user activities and finally choose the best system.⁴⁴

The source of all managerial activities, especially those related to the health domain, is comprehensive, relative, and up-to-date information.⁴⁵ HISs can be beneficial in achieving various managerial objectives and improving quality of healthcare procedures, however, paying attention to the use of these systems alongside user satisfaction and moving towards improving current status is of great importance in regards to achieving organizational goals. In this regard, satisfying managers is greatly important, since satisfied managers can in way transfer their satisfaction to their subordinates and play an effective role in the overall reception of information systems.⁴⁶ This allows the hospital managers to access information required for decision making whenever and wherever necessary. Managerial decision making based on real facts and data results in increased efficiency and progress and ultimately leads to improved performance and effectiveness of hospitals. Therefore, empowering managers and experts of health data management is highly recommended. Low reliability of health information systems results in users' distrust and dissatisfaction with the system and encourages the use of manual procedures for managing information. The most important reason why satisfaction is low amongst health information systems is the lack of sufficient training of system users.⁴⁸ Ergo, experts and managers must be educated and trained in procuring practical information and producing appropriate knowledge and skills. It can be stated that necessary training for employees must be in accordance with the level of technical and practical knowledge of employees and is consistent with a fundamental evaluation plan. Data represent unspoken and hidden words of performance and it is up to experts to convert such hidden knowledge to understandable information through scientific and academic approaches.¹¹

Ultimately, it is hoped that information-based management and informed decision making and conclusively, health quality fall unto the path of progression and im-

provement.

Authors' Contributions

All authors made the same contribution to this study.

Competing Interest

The authors declared no competing interests.

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