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Research Paper

Success or failure of hospital information systems of public hospitals affiliated with Zahedan University of Medical Sciences: A cross sectional study in the Southeast of Iran

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ABSTRACT

Introduction: After implementation, evaluation of hospital information systems (HISs) is critical to ensure the fulfillment of the system goals. This study aimed to assess the success or failure of HISs in public hospitals affiliated with Zahedan University of Medical Sciences.

Materials and methods: A cross-sectional descriptive and analytic study was performed in 2016. The study population comprised IT and HIS authorities and hospital information system users. The sample consisted of 468 participants. The data were collected using two questionnaires and analyzed with the SPSS software using descriptive and analytical statistics.

Results: The mean score of functional, behavioral, ethical, organizational, cultural and educational factors from the users' perspective was 3.14 ± 0.66, 2.97 ± 0.60, 3.39 ± 0.70, 2.96 ± 0.642, 3.09 ± 0.63, and 2.95 ± 0.74, respectively. The mean score of organizational, behavioral, cultural, technological, educational and legal factors from IT and HIS authorities' perspective was 3.51 ± 0.54, 3.35 ± 0.45, 2.75 ± 0.61, 3.58 ± 0.32, and 3.96 ± 0.59, respectively.

Conclusions: The evaluated hospital information systems were considered relatively successful in terms of functional, ethical, and cultural factors but were considered as a relative failure in terms of behavioral, organizational, and educational factors form the users' perspective. Only the legal factor showed success, while organizational, behavioral, technical and educational factors showed relative success and the cultural factor showed relative failure from HIS and IT authorities' perspective. Therefore, assessing the users' needs before implementing the system, involving them in various stages of implementation, training them, and improving their computer skills seem to be necessary to achieve a better level of system success.

1. Introduction

Organizing and rendering optimal health services require the management of huge amounts of information, and automation of health information management processes is inevitable in today's competitive environment. Reducing healthcare costs and enhancing the quality of the services in the health scope require information systems. Healthcare information systems could improve the health care practitioners' performance and the quality of the patient outcome [1]. A Hospital Information System (HIS) is a computer system designed to manage all the aspects of a hospital's operations such as clinical, administrative, and financial activities [2,3]. However, implementation of the HIS is very difficult and complicated. Thus, for relative success of these systems, items such as human factors, costs, and time should be considered (3, 4). Jabraeily and Mbananga introduced inadequate training and resistance of users as the main causes of information systems failure [4,5].

Success could be defined as achievement of a purpose, business reputation, or position. Likewise, in health information systems, success is the usefulness of the information system for users and healthcare managers [6,7]. Given the complexity of information systems, their success and failure could be seen in various situations [6–10]. A study by Fowler showed that only 28% of information systems have a successful performance. Furthermore, this report indicated that development of an information system, even in the best situation, is gradual and time-consuming and involves high costs [8].

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Nearly three-quarters of all information system projects face with failure [11]. Even in the United States of America, there are reports of the failure of half of the healthcare information system projects [7,12]. Although information systems have been used in health care organizations for more than three decades, completely successful cases of these systems are not commonly encountered [10]. These systems optimize operational activities and improve the organizational performance as well as the patients' and users' satisfaction [13–16]. Failed information systems are unable to meet theirs users' and patients' satisfaction [6,10].

With the increasing impact of information technology on organizations and their costs, it is critical to evaluate the quality of the services offered by these information technologies, especially in terms of user satisfaction [17,18]. Evaluation of the HISs for improvement of healthcare services and ensuring their successful implantation and positive effects on healthcare delivery are very important [17,19,20]. Hospital information systems are frequently implemented. However, these systems are rarely evaluated to assess whether they have achieved their main goals although it is critical to evaluate these systems' advantages and disadvantages [21]. Regardless of the HIS advantages, these systems are not without problems [22,23]. Appropriate evaluation guarantees the success of these systems [24,25] and could sometimes solve the existing problems [22,26].

Given the huge investments on the development and implementation of hospital information systems, evaluation of the success or failure of these systems seems to be necessary to appreciate their value and efficiency [27]. The measurement of user satisfaction with information systems is the most effective method for the evaluation of these systems [28]. Because of the complexity of hospital health information systems, numerous factors influence their success or failure such as functional, technical, cultural, economic [7,29], legal, political, ethical, organizational, and managerial factors [7]. Evaluation of the users' perception of the HIS and quantifying their satisfaction instead of considering technical aspects of these systems is very important because a well-developed system is considered weak if its users recognize it as a weak system [30]. There is no unique standard method for successful implementation of health information systems so that a failed method in one healthcare facility may work very well in another [31].

Generally, HIS evaluation could provide evidence whether it has achieved its expected goals and offer reasons for the success of the system. Furthermore, HIS evaluation is useful for policy and managerial decision making and budget allocation to promote the HIS [32]. The present study aimed to evaluate the success or failure of hospital information systems in public hospitals affiliated with Zahedan University of Medical Sciences. Moreover, we tested one hypothesis related to the determinants of the success or failure of hospital information systems and the computer skill level of the respondents as follows:

H1. There is a significant relationship between the respondents' computer skill level and the surveyed factors.

2. Material and methods

This descriptive-analytical cross-sectional study was conducted in 2016. The research population comprised three main groups: information technology and hospital information system authorities, senior health care managers, and HIS users (including nursing, medical records, laboratory, radiology, pharmacy, and financial departments) working in Ali-ibne-abitaleb, Khatam-ol-anbia, Alzahra, Baharan, and Buali hospitals affiliated with Zahedan University of Medical Sciences. The first, second, and third group comprised 32, 12, and 915 individuals, respectively (745, 56, 35, 33, 28, and 19 persons in the nursing, medical records, radiology, laboratory, financial, and pharmacy department, respectively). Because of population limitations in the first two groups, sampling was not done and the whole population was selected as a sample. In the third group, sampling was done only for nursing users. According to the Cochran formula, 253 persons were required, and stratified sampling was used to select samples in each hospital.

All facilities were public hospitals that had key HIS subsystems including the financial information system (FIS), admission, discharge, and transfer (ADT), nursing information system (NIS), laboratory information system (LIS), and pharmacy information system (PIS). These subsystems were implemented for 5–10 years. Administrative information systems (ADT and FIS) and clinical information systems (NIS, LIS, and PIS) were implemented from 2005 and 2010, respectively. All subsystems used in all hospitals were considered.

We used a questionnaire designed by Sadoughi et al. [7] based on a systematic review of the factors influencing the success or failure of hospital information systems. The questionnaire was divided into 3 separate questionnaires based on the evaluated factors and population according to the opinions of three faculty members in the field of health information management (HIM). These questionnaires contained 120 questions for IT and HIS authorities (47 questions), senior healthcare managers (40 questions), and users (33 questions). Each question was scored by the respondents for importance. For each question, a five-point Likert scale (from 1: very low to 5: very high) was used to rate each sub-factor.

The first questionnaire contained 47 questions and was divided into six factors including organizational (n = 7), behavioral (n = 10), cultural (n = 4), technical (n = 18), educational (n = 5), and legal factors (n = 3). The second questionnaire had 40 questions and was divided into six factors including organizational (n = 7), managerial (n = 20), cultural (n = 4), strategical (n = 3), economic (n = 3), and political factors (n = 2). The third questionnaire comprised 33 questions and was divided into six factors including organizational (n = 7), behavioral (n = 10), cultural (n = 4), functional (n = 5), educational (n = 5), and ethical factors (n = 2). Since only two managers completed the questionnaires properly, the data of this population were excluded from the study.

The questionnaires were then validated by a panel of three health information management experts. The test-retest reliability was conducted for determining the reliability of the questionnaires. The first, second, and third questionnaire had a Cronbach's alpha of 0.92, 0.88, and 0.93, respectively. The data were analyzed in terms of descriptive (mean ± standard deviation) and analytic (spearman and Pearson correlations) statistics using the Statistical Package for Social Sciences (SPSS) software.

The mean score of the factors was used to evaluate the success or failure of the evaluated hospital information system. A mean score of 3.75 or more out of 5 was considered as complete success, a mean score between 3 and 3.75 out of 5 was considered as relative success, a mean sore between 1.5 and 3 was considered as relative failure, and a mean score of less than 1.5 out of 5 was considered as complete failure of the information system.

3. Results

A total of 468 questionnaires were distributed, of which only 338 were completed and returned (return rate = 72.2%). Fifty-three questionnaires that were too incomplete or inaccurately completed were excluded. Of these 53 questionnaires, 23 were completed by managers, of which 21 were discarded because too many items were unanswered, and only two questionnaires were completed properly. Thus, managers were excluded from the study. The remaining 30 questionnaires were excluded due to incompleteness related to the users of nursing (17), medical records (5), radiology (2), laboratory (3), and financial (3) departments. Therefore, excluding these questionnaires did not affect the results of the main sample.

Most of the IT and HIS authorities were female (70%), half of them were between 25 and 30 years of age, and the majority of them had less than five years of work experience (70%) and a bachelor's degree