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Evaluating Hospital Information System (HIS) of Imam Reza Therapeutic Educational Center of Kermanshah

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ABSTRACT

Hospital Information System improves better decision of health services providers by providing information and records of patients. The present research was conducted to evaluate Hospital Information System of Imam Reza Therapeutic Educational Center. The present research is applied –descriptive and was conducted with cross-sectional method in 2013. Instrument of this research is a standard questionnaire of which validity has been calculated with data panel and reliability was calculated with Cronbach's alpha test as 89%. To conduct the research, 300 employees of Imam Reza Hospital of Kermanshah were asked questions with systematic stratification method and to analyze data, SPSS software, version 21 and single-sample t- test were used. Findings showed that dimensions of content and time had the highest mean of 14.79 and 7.43, respectively and dimension of form (5.64) had the lowest mean. Means of all three dimensions for content, time and form were 9, 12, 24, respectively which were below the average value. Result of single-sample t- test for comparison of average point of the dimensions with the expected average value showed that point of all dimensions had significant difference from the expected average value ($P= 0.05$). It is necessary to use information software in health section which should be designed and evaluated through participation of the authorities and personnel and based on need of each section and the users should be informed to prevent more complexities in workplace in addition to acceleration of processes.

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INTRODUCTION

Therapeutic –health care centers are responsible for health and treatment of patients. For this reason, many of the developed countries in the world equipped their therapeutic centers with information system to accelerate treatment through updated medical information system and accelerate some cases such as medical research and education in therapeutic centers [1]. Hospital Information System is the electronic tools which collects, classifies, maintains financial, administrative and clinical information and retrieves it with computer capabilities and gives it to the decision makers at any time and place [2]. Hospital Information System not only improves decision making in health and therapeutic actions by providing information and records of patient to the service providers but also plays important role in development of organizational performance [3]. Hospital Information System is a comprehensive software for integration of information relating to patient for sending and exchanging comprehensive information among the sectors and other therapeutic centers to accelerate care and therapeutic process of the patient, improve quality, increase satisfaction and reduce costs. Hospital Information System has been designed for automation of hospitals affairs such as reporting, test results, entry of physicians'

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orders , drug prescription, inventory control of the drugstore, central store, kitchen etc [4]. As Ahitof and Newman mention in 1990 that information systems are inherently open systems and interact with the changing environment which encompassed them [5].

Hospital Information System enables the hospital manager to gain access to necessary information for making decision at any time and place and make decision based on real information of his workplace. Decision of manager based on real information finally increases efficiency and effectiveness of hospital [6]. Hospital Information System establishes relationship between personnel of hospital and fulfills information requirements of hospital in the fields of care, planning, execution of strategic plans and documentation of information relating to care of patients. Since hospital is a complex institute in terms of communication , high amount of information and communication which manage this high volume of information well seems necessary in order to achieve high efficiency and productivity [7]. Importance of information systems as strategic tool for promotion of efficiency of organizational activities is increasing rapidly [8].

Hospital Information System (HIS) is an alternative to manual activities flow in hospital. This system mechanizes hospital activities from stage of admission to discharge of patient, effective communication among sectors and also faster and more accurate extraction of statistical and managerial reports. Today, use of HIS as a strategy for promotion of the cases such as identification of problems , management improvement , increase of productivity of the hospital managers , improvement of service provision , promotion of productivity level of hospital , specialization of therapeutic services and technical structure of hospital [9]. Here, it is necessary to note that Hospital Information System had disadvantages despite its advantages. The conducted researches also confirm that some of the information tools available in hospitals which are not updated, perfect and comprehensive and cannot show performance of units, are not accessible and proportionate and clear [10] and also nonconformity of tasks of Hospital Information System to the existing processes can be effective on costs and quality of health care. Therefore, considering the goals of information systems and to prevent repetition and help promote quality of cares and reduce costs, Hospital Information System software should be continually evaluated [11]. There are few researches in this field, hence, it is necessary to consider evaluation of Hospital Information System to promote and improve the mentioned systems. Ghazi Zadeh defines information systems evaluation as the process which leads to production of information for improvement of information system. In other words, results of information system evaluation allows manager to promote effectiveness of system by reviewing it [12]. Most executives believe that goal of evaluation process is to improve information systems and promote systems development process (13).

Different models have been introduced by different theorists for evaluation and their models and indices are shown in Table 1. Ahitof and Newman grouped information characteristics into three time, content and form dimensions as follows. These characteristics can be considered as effectiveness evaluation indices of information systems and three dimensions of information are mentioned in Figure 1 based on the research model [14,15].

Table 1: Information system evaluation models.

Model	Evaluation indices in model
Ahitof and Newman	(time –content –form)
Badrei	Cost/benefit –communication value –acceleration value –restructuring value –innovation
Strategic alignment	Business strategy –infrastructure of organization –information technology –information technology infrastructure
Organization architecture	Information –data-systems –systems –technology –work
Two-sided	User-system

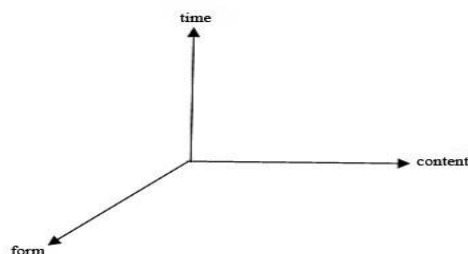


Fig. 1: Information Three Dimensions 3.

The reason for selection of this model is that Hospital Information System has been considered by the researchers as an evaluation system in other hospitals of developed countries and has been considered as main model considering structure of Hospital Information System of our country which has been inspired by such form of systems to some extent [10]. This study was conducted to evaluate Hospital Information System in

Imam Reza Therapeutic-Educational Center of Kermanshah University of Medical Sciences in three dimensions of time, content and form.

2. Study method:

The present research is applied in terms of goal and was conducted with descriptive –cross sectional method in 2013. Statistical population of the research includes all personnel of Imam Reza Hospital affiliated to Kermanshah University of Medical Sciences (N=1400) and sample size was obtained as 300 persons based on Cochran Formula. Data collection instrument in this research was Ahitof and Newman's Hospital Information System evaluation standard questionnaire (including time , content and form) which has been used in research by Dalvi and Ghorbani in 2013 [10]. The questionnaire was based on Likert five-point scale of which validity was determined with view of 5 faculty board members of Kermanshah University of Medical Sciences and 3 managers of governmental and private hospitals affiliated to this university. Reliability was calculated with two tests in 15-day interval with cooperation of hospital's personnel and Cronbach's alpha with coefficient of 0.89 verified the said questionnaire. To analyze data, the descriptive statistics (mean and standard deviation) and inferential statistics (single-sample t-test) with SPSS software , version 20. In addition, the reason for selection of Ahitof and Newman's model is that it has been considered as HIS comprehensive system in European and American countries and is consistent with conditions of governmental hospitals [2, 16, 17].

3. Findings:

Findings showed that 63 out of 300 studied persons (21%) were male and 237 persons (79%) were female and the maximum and minimum mean age of the people was 31-40 years and above 50 years , respectively. Regarding education, 7 persons (2.3%) held high school degree , 4 persons (1.3%) held associate's degree, 253 persons (84.3%) held bachelor's degree and 36 persons (12%) held master's degree above and also 108 persons (36%) were single and 192 persons (65%) were married. Among 300 persons , 119 persons (39.7%) had experience of between 5 and 10 years , 23 persons (7.7%) had experience of between 15 and 20 years and 23 persons (7.7%) had experience of more than 20 years as the maximum and minimum work experience. Results of studying the investigated dimensions are shown in Table 1. According to the respondents, dimensions of content and time had the maximum mean of 14.79 and 7.43 and dimension of form had the minimum mean among the studied dimensions. Mean of the three studied dimensions in this research was less than the expected average value which is 24 for content, 12 for time and 9 for form. It is necessary to note that single-sample t-test with cut-off point of 3(average level in Likert scale) has been used to answer the research questions and study views of the personnel about dimensions of the studied system.

Table 2: Statistical Indices of mean and standard deviation of variable and their indices.

Variable	Index	mean and standard deviation of each question	Mean of dimensions
Time	Timeliness: meaning that when it is required, it should be prepared and provided.	0.71±1.7	2.27±7.43
	Being up-to-date: it should determine information about the latest condition of a phenomenon.	0.68±1.95	
	Frequency: it should be prepared and provided to manager or receiver in necessary time intervals.	0.66±1.92	
	Period : it should be the past , present and future describer.	0.61±1.87	
Content	Accuracy: information should reflect what has occurred or exists really and accurately.	0.72±1.71	4.69±14.79
	Relevancy: information should be relevant to information needs of user.	0.74±1.79	
	Brevity: information should be always brief and short.	0.69±1.92	
	With specified field: information should focus on a special field inside or outside the organization to fulfill specified information needs for decision maker	0.77±1.93	
	Showing performance: information should be able to indicate progress or no progress of organization and performance of its different units.	0.71±1.87	
	Quantitative definition: information should be quantitatively prepared and provided, if possible.	0.78±1.86	
	Accessibility: information should be collected and accessible.	0.69±1.85	
	Without prejudice: information should be free from prejudice , orientation and partiality.	0.76±1.85	
Form	Proportion: information should be proportionate to the subject and has necessary suitability.	0.66±1.74	3.99±5.64
	Clarity: information should be so clear that it can be understandable for decision maker.	0.74±1.78	
	Information should be additive.	3.44±2.13	

To answer the research questions and study views of the personnel about dimensions of the studied system, single –sample t-test with cut-off point of 3 (medium level has been used in Likert scale). In this test, hypotheses and decision making manner are as follows:

Hypothesis H0 means that average pint of the studied field has no significant difference from the expected average value and hypothesis H1 means that the average point of the studied dimensions has significant difference from the expected average value.

Decision-making rule : in confidence level of 0.95, in case significance level is larger than error rate of 0.05, H0 is accepted and in case significance level is below the error rate , H0 will be rejected and H1 will be accepted.

Result of single-sample t-test for comparison of the average point of time index with the expected average value [12] showed that average point of time dimension has significant difference from the expected average value in error level of 5% (P = 0.05). Result of single-sample t-test for comparison of the average point of content dimension with the expected average value [24] shows that average point of content dimension has significant difference from the expected average value in error level of 5% (P = 0.05). Result of single-sample t-test for comparison of the average point of form dimension with the expected average value [9] shows that average point of content dimension has significant difference from the expected average value in error level of 5% (P = 0.05).

Table : Comparing average dimensions with their expected average value.

Dimension	Statistic t	Probability value (P-Value)	Lower bound	Upper bound	Test result
time	34.87-	0.000	4.82-	4.3-	Rejection of H ₀
Content	34.02-	0.000	-9.74	-8.67	Rejection of H ₀
Form	14.54-	0.000	3.81-	-2.9	Rejection of H ₀

To make better comment on low , medium and high interest of personnel in three dimensions based on upper and lower bounds of difference in confidence level of 0.05, it can be said that in case lower and upper bounds are positive , mean of the studied dimension is below average value of test and in case the lower bound is negative and the upper bound is positive , the studied dimension has not significant difference from the average value of test. The present research, the upper and lower bounds are negative for all three dimensions indicating that mean of the studied dimension is less than the average value of test.

4. Discussion and conclusion:

In this study, Hospital Information System was evaluated based on Ahitof and Newman's model. The mentioned model is evaluated in European counties as a successful model for evaluation of HIS [18]. In the present research, it has been shown that mean points of all three dimensions are lower than the average limit which is 24 for content, 12 for time and 9 for form and have no desirable level. Researchers believe that factors affecting execution of a HIS system and its inhibiting and encouraging factors should be studied for effectiveness of HIS system before making decision about execution of such system in order to prevent repetition of mistakes and negligence of the cases which stop executing the plan successfully [10].

Since most people hold bachelor's degree above in the present research and have longer than 5 years of experience, they are completely familiar with hospital activity and the assigned duties in their ward and also use of computer and can recognize differences resulting from establishment of HIS well and the reason for their dissatisfaction with HIS is low means of the issues except for education level or lack of awareness with needs of the ward. One of the reasons for their dissatisfaction is that the system is not proportionate to needs of the wards and failure of the ward authorities and personnel to cooperate in design of the systems. As observed in the present research, the system has no good proportion and this indicates disproportion of the information with the subject. Hence, it is necessary to observe this proportion in design of systems.

In this regard, findings of research by Ahmadi et al. indicate that the companies which develop these systems in Iran should pay attention to capabilities such as change of forms, screens and menus according to taste of user , compatibility of software with user's skill and knowledge level, adjustment of information displayed in the screen , change of commands title and subjects and works according to vocabulary of user , adjustment of input parameters according to need of user and coordination of response times of software with speed of work [19].

Marko also mentions that health and therapeutic information managers can assist managers in planning, decision making and policymaking for health cares by participating in planning of this system [20]. Saghaeian Nejad et al. in their study confirmed that the best way for increase of user's satisfaction with HIS is design of this system based on views and needs of the system's users [21]. The research by Zare Fazl Alahi concluded that human, education, planning and information aspects should be considered for implementation of HIS. Physicians, nurses and personnel of different par clinical sectors should be considered as effective factors and their abilities should be used for execution of Hospital Information Systems in order to promote quality of information, care and treatment of the patients in future [22].

Results in the present research show that dimensions of content (accuracy, relevancy, with specified field, indicating performance, quantitative definition, accessibility, without prejudice) have not desirable level which can result from lack of enough attention to design of software and promotion of data quality. As Ahmadi *et al.* mention, weak results in coding and archiving and completing file indicate inefficiency of software in these sectors and companies which provide information systems should pay special attention to improvement of systems in medical documents section through support of managers [23]. Asadi in a research mentions that none of the Outpatient Information Management Systems have used qualitative analysis for promotion of quality of the collected data. 62% of the emergency centers and 78% of the studied clinics had not taken any action for organizing content of files. The presence of dynamic and efficient Outpatient Information Management Systems is necessary. Hence, processes and laws of information collection, storage, processing and distribution in Outpatient Information Management Systems should be corrected and considered more [24]. In addition to the above cases, Ebadi Fard Azar *et al.* recommended more financial, human and technical investments for getting close to expectation level and needs of organizations and their users [25]. In the present research, it is shown that mean points of all three dimensions are below the average level and are not in the desirable level while Delvi *et al.* showed in their research that two research hypotheses *i.e.* time and content out of 3 research hypotheses (*i.e.* time, content and form dimensions) were confirmed in confidence level of 95% and had no desirable form level [10].

In research by Delvi, it was found that they are not good in timeliness, universality, showing performance of units, accessibility, proportion and clarity and have a mean below the average level and this case was also found in the present research. Ebtiaee also studied effectiveness of Information Management System in three dimensions of time, content and form and provision of the information. According to the research findings, the above system had relatively high effectiveness in terms of content and form and had relatively low effectiveness in terms of time [21]. Findings of the research by Saedi *et al.* showed that the information system was effective above the average level and could increase relative satisfaction of users in Industrial Estates Company [26].

Gholamhosseini *et al.* evaluated performance of the Hospital Information System and found that there were 55% of the necessary capabilities in software and believed that lack of 45% of the necessary capabilities was the great problem of the software and required removal of defects and increase of the system efficiency. At the end, the obtained results relating to satisfaction of the user with speed of the system also indicated that 70% of the users were satisfied and had confirmed it [9]. However, the present research showed that time dimension had undesirable level in all of the studied aspects and were below the average level. Considering results of this research, the following recommendations are given for improvement of condition and moving toward fully desirable condition: involving all users in design of system considering their needs and expectations about the information system, appropriateness for training of users. This case also causes most of the users to feel that they are owner while developing Information System and increases their commitment to perform duties and reduces their resistance in development of Information System. Use of different specialists in hardware, software, network and communication fields will help health information managers (medical documents), graphic designers and quality managers who have considerable effect on development of a total Hospital Information System considering their important role. Health information managers help analyze, design, select and apply information system for better management of clinical information *etc.* it should be noted that the number of Hospital Information software is limited in our country and the monopolistic market prevents competition among companies which design software. This caused the mentioned companies not to remove problems of these systems, promote and update them and to have lower cooperation with authorities of the hospitals in design of software and this case should be studied and followed by the authorities.

It is necessary to use information software in the field of health and treatment and it is necessary to note that goal of this work is not only to use software and should be evaluated with participation of the authorities and based on need of each sector and the users should be informed to prevent more complexities in workplace in addition to acceleration of processes. It is necessary to note that government should support designers of Hospital Information System not to break this monopoly in addition to increase of these companies and to create constructive competition in this field, which will improve quality and promote systems and finally improve therapeutic process.

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