

Evaluation of Hospital Information System (HIS) in General Hospitals: User Perspectives

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Abstract: Proper evaluation of information systems is essential. Evaluation should be considered as part of using the system process, which leads to the continuous improvement of information systems. If the evaluation is done from the perspective of users, successful development of measures and features related to the use and implementation of hospital information system and identifying areas that need further consideration should be provided. The aim of this study is the assessment of the viewpoints of physicians and nurses regarding the hospital information system (HIS) as well as defining the effective assessment criteria for their utilization and their satisfaction of the HIS. **Methods:** This is a descriptive cross-sectional study conducted in general educational hospitals of Tehran University of Medical Sciences during 2012- 2013. The main instrument is a questionnaire. **Results:** 68.3 % of the respondents in hospitals believed that the electronic system has more than 60% capabilities for entering the clinical test orders. In all hospitals, 44.3 % of the respondents stated that this system doesn't increase their workload. **Conclusions:** User satisfaction is a guarantee for the implementation of the information system. To improve the situation and in order to move towards the ideal condition, it is suggested that users' needs be considered in HIS design and the system be compatible with the users' skills and knowledge as best as possible.

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1. Introduction

Information technology (IT) is regarded as a powerful tool for improving efficiency and effectiveness of organizations. For this reason, all industries have taken big steps to utilize IT to remain in recent competition environment and increase their outcomes. Regarding these efforts, health industry is not an exception. Most countries, considering the direct and indirect effects of IT on every aspect of society, took measures to develop and implement IT to expand health information and to improve health outcomes (Mohammadzadeh,2006).

Studies show that with appropriate and effective use of information systems based on technology, health care organizations can achieve significant advantages in the context of less waiting time for patients (Ammenwerth et al,2003), reducing mortality (Khoubati et al, 2010), drug side effects management (Patterson et al,2012; Bimla et al, 2012), fast and timely access of health care professionals to patients' updated information(Ammenwerth et al,2003; Prgomet et al, 2009; Warren et al,2011), decreasing medical and diagnosis errors(Skolnik et al,2011; Kim et al,2012),increasing service efficiency and improving

quality of care delivery to patients and other customers(Chae et al,2011; Sawa et al,2011). Since implementation of the information system is expensive, using a proper system is very important. On the other hand, if the organizations' employees, especially health care personnel are not satisfied with the quality of information systems and the services provided by the system, they will not use the system, nor use it correctly and efficiently (Azizi et al,2012).However, the information system not properly designed has negative impact on the efficiency and quality of patient care(Ammenwerth et al,2007). Hence proper evaluation of information systems is essential.

Evaluation should be considered as part of using the system process, which leads to the continuous improvement of information systems. Of course, evaluation of hospital information systems provides challenges. If the evaluation is done from the perspective of users, successful development of measures and features related to the use and implementation of hospital information system and identifying areas that need further consideration should be provided. The main purpose of this study is

the assessment of the viewpoints of physicians and nurses regarding hospital information system, and identifying the effective criteria for their utilization and their satisfaction.

2. Material and Methods

The present research is a descriptive cross-sectional study conducted in general educational hospitals of Tehran University of Medical Sciences during 2012- 2013. Using Morgan table and stratified sampling, 359 of hospital users including 105 physicians and 254 nurses were randomly selected. The main instrument is a questionnaire designed based on reviewing articles and interviewing experts. Questionnaire items have been evaluated through 5 items, Likert type questions. In order to determine the validity, the questionnaire was distributed among five experts in the field of information technology and

health information management. After completion of the questionnaires, results were analyzed using SPSS17 software. A range of numbers from 1 to 8 was assigned for respecting the privacy of each hospital's name.

3. Results

The users' viewpoints about the capabilities of HIS for entering different orders in general educational hospitals were measured. These items included exams orders, drug prescription orders, radiology orders, physician orders, consultation requests and all patient related notes. The results are presented in Tables 1 and 2. Reviews of the means obtained in the field of orders management from hospitals surveys show that from the viewpoints of the research community, capabilities of HIS are in the range of 30-60 percent in half of the hospitals.

Table 1. Physicians and nurses' perspectives in general hospitals about HIS capabilities in orders management field (drug orders entry, exams orders entry)

order management hospital		Drug orders entry					Exams orders entry				
		none	0%	%30 >	30-60%	%60<	none	0%	%30 >	30-60%	%60<
Hospital 1	number (percent)	9(7.8%)	24(20.9%)	5(4.3%)	14(12.2%)	63(54.8%)	6(5.2%)	18(15.7%)	11(9.6%)	11(9.5%)	69(60.0%)
Hospital 2	number (percent)	5(9.8%)	10(19.6%)	1(2.0%)	5(9.8%)	30(58.8%)	5(9.8%)	6(11.8%)	2(3.9%)	1(2.0%)	37(72.5%)
Hospital 3	number (percent)	10(14.3%)	6(8.6%)	9(12.9%)	10(14.2%)	35(50%)	6(8.6%)	4(5.7%)	7(10.0%)	8(11.4%)	45(64.3%)
Hospital 4	number (percent)	4(12.5%)	3(9.4%)	1(3.1%)	1(3.1%)	23(71.9%)	3(9.4%)	1(3.1%)	0(0%)	2(6.3%)	26(81.3%)
Hospital 5	number (percent)	2(11.8%)	6(35.3%)	2(11.9%)	0(0%)	7(41.2%)	2(11.8%)	4(23.5%)	2(11.9%)	1(5.9%)	8(47.1%)
Hospital 6	number (percent)	3(13.6%)	0(0%)	2(9.1%)	1(4.5%)	16(72.8%)	1(4.5%)	1(4.5%)	1(4.6%)	2(9.1%)	17(77.3%)
Hospital 7	number (percent)	3(11.5%)	1(3.8%)	0(0%)	1(3.9%)	21(80.8%)	2(7.7%)	1(3.8%)	0(0%)	1(3.9%)	22(84.6%)
Hospital 8	number (percent)	5(19.2%)	1(3.8%)	1(3.8%)	0(0%)	19(73.2%)	4(15.4%)	0(0%)	0(0%)	1(3.8%)	21(80.8%)
Total	number (percent)	41(11.4%)	51(14.2%)	21(5.9%)	32(8.9%)	214(59.6%)	29(8.1%)	35(9.7%)	23(6.4%)	27(7.5%)	245(68.3%)

Table 2. Physicians and nurses' perspectives in general hospitals about HIS capabilities in orders management field (radiology orders entry, physician orders, consultation requests, and patient notes entry)

orders management hospital		radiology orders entry					physician orders, consultation requests, all patient notes entry				
		none	0%	%30 >	30-60%	%60<	none	0%	%30 >	30-60%	%60<
Hospital 1	number (percent)	39(33.9%)	41(35.7%)	6(5.1%)	8(7.0%)	21(18.3%)	43(37.4%)	43(37.4%)	12(10.4%)	8(7.0%)	9(7.8%)
Hospital 2	number (percent)	7(13.7%)	9(17.6%)	4(7.8%)	6(11.8%)	25(49.1%)	7(13.7%)	10(19.6%)	7(13.7%)	14(27.5%)	13(25.5%)
Hospital 3	number (percent)	5(7.1%)	8(11.4%)	8(11.4%)	8(11.5%)	41(58.6%)	19(27.1%)	11(15.7%)	23(32.9%)	12(17.2%)	5(7.1%)
Hospital 4	number (percent)	3(9.4%)	3(9.3%)	0(0%)	4(12.5%)	22(68.8%)	11(34.4%)	5(15.6%)	5(15.6%)	5(15.6%)	6(18.8%)
Hospital 5	number (percent)	2(11.8%)	4(23.5%)	2(11.8%)	3(17.6%)	6(35.3%)	6(35.3%)	5(29.4%)	2(11.8%)	1(5.9%)	3(17.6%)
Hospital 6	number (percent)	2(9.1%)	1(4.5%)	1(4.6%)	4(18.2%)	14(63.6%)	6(27.3%)	0(0%)	3(13.6%)	4(18.2%)	9(40.9%)
Hospital 7	number (percent)	2(7.7%)	1(3.8%)	1(3.9%)	2(7.7%)	20(76.9%)	5(19.2%)	1(3.8%)	5(19.3%)	4(15.4%)	11(42.3%)
Hospital 8	number (percent)	7(26.9%)	1(3.8%)	0(0%)	1(3.9%)	17(65.4%)	6(23.1%)	2(7.7%)	5(19.2%)	9(34.6%)	4(15.4%)
Total	number (percent)	67(18.7%)	68(18.9%)	22(6.1%)	36(10.0%)	166(46.3%)	103(28.7%)	77(21.4%)	62(17.3%)	57(15.9%)	60(16.7%)

Users' viewpoints about HIS ease of use in general educational hospitals were studied related to items such as effects of HIS system on physicians' and nurses' workload, user stress, and time

consumption in the application of the system. The results are presented in Table 3. More than 43 % of all of the surveyed users in all hospitals agree with the system convenience.

Table3. Physicians and nurses' perspectives in general hospitals about HIS capabilities regarding ease of use.

Ease of Use		spending more time than paper-based methods in using the system					using the system increases my stress					application of the system will increase my workload				
		Strongly Disagree	Disagree	null	Agree	Strongly Agree	Strongly Disagree	Disagree	null	Agree	Strongly Agree	Strongly Disagree	Disagree	null	Agree	Strongly Agree
Hospital 1	number	20	51	13	22	9	18	58	17	13	9	10	46	12	33	14
	percent	17.4	44.3	11.3	19.2	7.8	15.7	50.4	14.8	11.3	7.8	8.7	40.0	10.4	28.7	12.2
Hospital 2	number	13	24	3	7	4	11	29	4	4	3	8	25	4	9	5
	percent	25.5	47.1	5.9	13.7	7.8	21.6	56.9	7.8	7.8	5.9	15.7	49	7.9	17.6	9.8
Hospital 3	number	5	22	13	15	15	11	35	4	11	9	3	26	5	15	21
	percent	7.1	31.4	18.6	21.3	21.4	15.7	50	5.7	15.7	12.9	4.3	37.1	7.1	21.4	30.1
Hospital 4	number	5	15	3	8	1	5	21	2	2	2	3	18	0	7	4
	percent	15.6	46.9	9.4	25.0	3.1	15.6	65.6	6.2	6.3	6.3	9.4	56.3	0	21.9	12.5
Hospital 5	number	2	5	5	4	1	2	6	5	3	1	2	5	4	5	1
	percent	11.8	29.4	29.4	23.5	5.9	11.8	35.3	29.4	17.6	5.9	11.8	29.4	23.5	29.4	5.9
Hospital 6	number	8	11	1	0	2	8	11	1	2	0	4	13	2	1	2
	percent	36.4	50	4.5	0	9.1	36.4	50.0	4.5	9.1	0	18.2	59.1	9.1	4.5	9.1
Hospital 7	number	3	13	6	4	0	3	16	4	1	2	2	11	2	6	5
	percent	11.5	50	23.1	15.4	0	11.6	61.5	15.4	3.8	7.7	7.7	42.3	7.7	23.1	19.2
Hospital 8	number	4	11	7	4	0	4	19	2	1	0	5	15	2	3	1
	percent	15.4	42.3	26.9	15.4	0	15.4	73.1	7.7	3.8	0	19.3	57.7	7.7	11.5	3.8
Total	number	60	152	51	64	32	62	195	39	37	26	37	159	31	79	53
	percent	16.7	42.3	14.3	17.8	8.9	17.3	54.3	10.9	10.3	7.2	10.3	44.3	8.6	22.0	14.8

4. Discussions

From the viewpoints of the users, in the majority of general hospitals, capabilities of the system in the field of orders management are between 30 to 60 percent. Ahmadi et al. in his research on studying nursing information systems in Iran stated that 55.5% of the nursing information systems are able to record vital signs and that all systems can record drug and lab tests orders and imaging orders (Ahmadi et al, 2010). The majority of research community believed that the use of hospital information systems led to the ease of work. The results of this research agree with the study of Likourezos et al. that the majority of nurses believed that using computerized system speeds up their work (Likourezos et al, 2004). In all hospitals, 22 % said that the system increased their workload. In their research, Pizziferri et al. found that most of the physicians believed using computerized system wasted more time than paper system (Pizziferri et al, 2005).

Users are the most important part of any organization that play a significant role in the success of any system. User satisfaction is a guarantee for the implementation of information system. In this study,

the researchers tried to evaluate the functionality of the system from the perspective of doctors and nurses. Review of the viewpoints of the users in general hospitals found that most people feel dissatisfied with the following items and want to solve them in order to improve the use of information systems such as low speed of HIS and hanging up or disconnection of the system which leads to the lack of access to patient information or the action required for the patient. Often the system is not used by physicians and only nurses are required to work with the system. Furthermore, physical hardware such as cables, computers and other equipment are not suitable and the number of computers in the hospitals are limited.

To improve the situation and move towards the ideal condition, it is recommended that the user needs in hospital information systems design should be considered and the system should be compatible with the skills and knowledge of the users as best as possible. Also, it is necessary to design and implement comprehensive training courses on the benefits and challenges of using a HIS for all users, especially physicians to promote attitudes, knowledge and skills for using technology tools.

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