ORIGINAL PAPER

Nurses Readiness and Electronic Health Records

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Background: The importance of the electronic health records in health care well known to everybody, as well as, the role of nurses to provide clinical care; they have a valuable role in successful implementation of electronic systems. The aim of this paper is to assess the nurses' readiness for EHR implementation. **Methods and Materials:** This was a descriptive cross sectional study, conducted in 2013. Using cluster sampling, 310 nurses selected from teaching hospitals at Tehran University of Medical Sciences (TUMS). A self-structured questionnaire was used for gathering data. Data management and analysis was performed using SPSS for windows by using descriptive statistics. **Results:** 85.9% of nurses, participated in the study. The Microsoft Word (58.8%) was the higher level of skill according to ICDL. The mean of computer skills, knowledge and attitude of nurses towards EHR was 43.4%, 51.2% and 65.2%, respectively. In overall, the mean of readiness of nurses was 57.2%. Establish proper communication among providers and prevent duplications was the most positive attitude and complexity of service delivery was the most negative attitude toward EHR. **Conclusion:** The most obvious finding to emerge from this study is that it should be considered in the education, training and participation of nurses, it should be ensured the level of knowledge and attitude toward EHR and finally, some related courses in Health Information Systems suggested including the curriculum of nursing.

Keywords: Electronic Health Records, Nurse, Readiness assessment, Implementation, Attitude, Knowledge, Computer skills.

1. INTRODUCTION

In the past decades, some activities began to use information systems in the healthcare domain. Its main target is to gain Electronic Health Records (1, 2). On the other hand, changing paper-based records to electronic/ computerized records, the nursing practice veer towards computerized documentation of care (3). In fact, nursing managers turned to use the electronic records to meet their clinical, administrative and legal informational requirements (4). Electronic health records are an important issue in the context of the health sector, which includes longitudinal health care information, stored in electronic form, to support the ongoing care, education and research (3, 5). Electronic health records provide many advantages for nurses, including medication reminders, prevent drug interactions, immediate access to patient medical history and documentation of clinical care (3).

Always, there are restrictions on the use of EHR (6). In many studies, lack of user participation and readiness are the major factor to failure of information systems, as well as lower investment of resources about user's readiness to accept changes and implementation of EHR (7, 8). Nurses have an important role to provide clinical care, thus they have a valuable role in successful implementation of electronic systems (3). If health care providers accept these technologies, we will have a successful EHR. Without their acceptance and participation, all efforts to develop of an HER would be ineffective (9). The role of manpower readiness is a critical factor for the success implementation of EHR. The attention to this significant matter has faded in the country (Iran), especially in the Tehran province. Beside, nursing- as the focus of care- has an important effect to implement information systems. This

study aimed to assess the readiness of nursing in teaching hospital at Tehran University of Medical Sciences.

2. METHODS AND MATERIALS

This descriptive-cross sectional study, was conducted in 2013. Using Simple sampling from nurses of teaching hospitals at Tehran University of Medical Sciences, 284 employees were randomly selected. The data were collected by self-structured questionnaire. The questionnaire consisted of four categories. The first part, deal with demographic information of employees. The second category, deal with computer skills, based on ICDL skills that measured according to five Likert type. The third part of the questionnaire included fourteen questions and measured the knowledge level about objectives, benefits and overall concept of EHR. These parts of questions have one correct answer. The latest part included twenty – three questions and deal with attitude of participants toward EHR that measured by five options (strongly agree, agree, no consideration, disagree, strongly disagree).

The design of this questionnaire was based on Jebraeily and his colleagues (1). Concept validity was evaluated by the experts' views. To assess the internal consistency of questions the questionnaire was pre-tested and after the analyzing the data, the Cronbach α was calculated ($\alpha=0.82$).

Using descriptive statistics, the average scores of computer skills, knowledge and attitude of participants were computed. Frequency tables were used to describe ordinal data. The correlation between computer skills, knowledge and attitude were tested using the Spearman test. A p-value of <0.05 was considered statistically significant. The data were evaluated by the Statistical Package of Social Science (SPSS) for win-

Type of skill	Mean	Standard Deviation (SD)	Percentage
Initial Concepts	2.50	0.73	50.0
Windows	2.44	0.74	48.8
Microsoft Word	2.94	0.78	58.8
Microsoft Excel	2.04	0.66	40.8
Microsoft Access	1.23	0.48	24.6
Microsoft PowerPoint	2.10	0.62	42.0
Using Email and the Internet	1.93	0.73	38.6
Total	2.17	0.34	43.4

Table 1. Participants level of computer skills (Range 1-5)

dows. Participation was voluntary and nurses gave their consent to participate. In order to respect the confidentiality, the identification information of participants was not mentioned publicly.

3. RESULTS

Of the study population, 85.9% of nurses (77.5% Female, 22.5% Male) completed and returned the questionnaire. The mean age was 32.44 ± 7.47 and mean years of work experiences was 8.75 ± 6.56 . Most of the participants had a Bachelor's degree (98.4%) and only 1.6 % had master degree and above. 86.3 % of them had an ICDL training certificate. In analyzing the computer skills of participants (Table 1), results showed

Issues	Mean	SD	Percentage
To promote the quality of care	4.07	0.99	81.4
To establish Proper communication among healthcare providers	4.36	0.75	87.2
To prevent medical errors using alerts and reminders	4.11	0.96	82.2
To prevent duplication	4.36	0.74	87.2
To enhance service delivery	3.79	1.10	75.8
To help better documentation	3.84	0.99	76.8
To timely access information	4.32	0.74	86.4
High security & confidentiality in the EHR regarding the paper-based records	2.50	0.99	50.0
Higher accuracy and precision in the EHR regarding the paper-based records	3.97	0.74	79.4
Lower flexibility and modify information in the EHR regarding the paper-based records	2.12	0.81	42.4
To make the work most satisfactory and simplify	3.46	1.10	69.2
To improve work	3.34	1.07	66.8
To causes increased workload and wasting time	2.33	1.06	46.6
To improve workflow	3.74	1.00	74.8
To endanger the work position	2.30	0.77	46.0
To disclose weakness and incompetency of the employee	2.19	0.75	43.8
To impose discipline of work	2.19	0.75	43.8
To cause new responsibilities and much expectations	2.09	0.79	41.8
To increase the need to acquire new skills	3.87	0.81	77.4
To cause complexity of service delivery	2.04	0.69	40.8
To impose high costs on the organization	2.06	0.71	41.2
To eliminate and the lack of permanent backup of data due to hardware and software problems in the EHR	3.82	0.78	76.4
To endanger confidentiality and security in the EHR	4.07	0.82	81.4
Overall	3.26	0.19	65.2

Table 2. Mean score of nurses' attitude towards EHR (Range 1-5)

	Mean	SD	Percentage
Computer skills	2.17	0.34	43.4
Knowledge	2.56	0.65	51.2
Attitude	3.26	0.19	65.2
overall	2.86	0.20	57.2

Table 3. Nurses Readiness on the EHR implementation (range 1-5)

	Computer skills		Knowledge		Attitude	
	Coefficient	p-value	Coefficient	p-value	Coefficient	p-value
Computer skills			0.019	0.77	-0.055	0.39
Knowledge					-0.241	0.00
Attitude						

Table 4. Spearman correlation among computer skills, knowledge and attitude of Nurses

that the highest level of skill according ICDL was Microsoft Word (58.8 %). Most nurses had the lowest skill in Microsoft Access skill (24.6 %). Almost, half of them used computers at home (50.2%) but only 32 % used computers at work. The use of Email and World Wide Web was 28%.

The mean score for knowledge of nurses about EHR's uses and applications was 51.2 %. A minority of nurses has a good knowledge regarding "clinical terminologies in the EHR" (19%) and "standards related to EHR" (33%). They have the highest level of knowledge regarding "main goals of EHR" (75%) and "types of information in the EHR" (66%).

It can be seen from the data in Table 2 that the most positive attitude towards EHR is about "to establish proper communication among healthcare providers" (87.2%) and "to prevent duplications" (87.2%). The most negative attitude towards EHR is about "to cause complexity of service delivery" (40.8%). As Table 3 shows, the overall readiness of nurses on EHR implementation was 57.2 percent. As can be seen from the Table 4, there is no significant correlation between computer skills and knowledge and between computer skills and attitude, but a negative correlation found between knowledge and attitude ($p < 0.05$).

4. DISCUSSION

In this study, the readiness of nurses in teaching hospital at Tehran University of Medical Sciences on implementation the EHR was assessed. The readiness of nurses in this study was computed by computer skills, knowledge and attitude. The level of computer skill was assessed based on ICDL training.

Amatayacul (2005) believe that to assess readiness of healthcare providers for implementing EHR, their computer skills, knowledge and attitude should be surveyed (10). Terry and colleagues (2008) showed that the readiness of healthcare providers is related to their computer skills and knowledge about EHR. They stated that physicians, nurses and other providers who have high computer skills would welcome the implementation of EHR (11).

Hier et al. (2005) reported that using of computer by healthcare providers was 59.5% at home and 86.75% at work and using of Email was 88.2%(12). In the same study of Jebraeily et al. (2010) clinician's use of computer was 55.4% at home and 53.6% at work and the use of Email and WWW was 59%. In Jebraeily's study the highest mean of computer skills by clinicians was Microsoft Word skill(75%) and the Microsoft Access skill was the lowest (40%)(1). The comparison of these studies showed that the mean ICDL skills (especially, Microsoft Word and Access) of nurses in this study is lower than of

Hier and Jebrailey's study. In the research of Hostgaard and Nohr (2004), reported that nurses have less experience to use computer (15.6%)(8), while Jebrailey et al. (2010) showed that nurses' level of computer skills was 53.4%(1). In this research, we found that nurses' level of computer skill was 43.4%. This level is less than of Jebrailey et al. study and higher than of Hostgaard and Nohr study. Given that nurses dealing with computer in environments with information systems, it is necessary to improve their skills in this area, particularly in skills such as MS Office. Regarding knowledge about EHR, on average, the nurse's knowledge level was 51.2%. In Jebrailey et al. were 64% (1).

Moody (2004) in a study that surveyed nurses' perceptions, attitude and preference on EHR documentation stated that nurses believe the EHR is a care facilitator (81%), improves clinical documentation (75%), threatens information confidentiality (54%) and increases workload (66%). In this study nurse believes that EHR improves clinical documentation (76.8%), threatens information confidentiality and security (81.4%) and increases workload (46.6%) (13). Richards and colleagues (2005) showed that 95% of participants use internet and Email. Nurses use E-Health less than physicians. They showed that the most positive aspects of E-Health were clinical usefulness (76%), equipment performance (74%) and facilitating the use of equipment (74%). The major barriers to implement E-Health was the lack of education (55%), high costs of equipment purchase (54%), the increase of nurses and physician's workload (43%) and concerns over the information confidential (36%) (14). In the study of Jebrailey et al. (2010) the most positive attitude towards implementing EHR was improving quality of health care services (86%) and improving the documentation (81%) and the most negative attitude was endangering work position (42.4%), increasing workload and time wasting (49.8%) and endangering information confidentiality and security (54.6%)(1). As the results showed, to concern about information confidentiality and security, to increase the workload and costs was common negative attitude in all studies. Also, to make prevention of duplications and to improve quality of documentation were the most positive attitude. According to findings, the majority of nurses are of the opinion that EHR Complicates service delivery therefore it may reduce motivation and trust to the system. To improve this type of attitude it is better to take the necessary acts in order to increase their awareness.

In a systematic review study, Hobbs(2002) indicated that healthcare providers have a few interests to use computers, but there is a positive correlation between their knowledge and attitude towards the use of computer (15). In the study of Jebrailey et al. (2010) there were no significant between knowledge, attitude and computer skills (1). However, the findings of the current study is not consistent with Hobbs and Jebrailey's studies. The reason may be because people awareness of the advantages and disadvantages of the system has no equilibrium. This means that they may be more concerned about the potential disadvantages of the system and that's why they have negative attitudes. In overall, the average of nurses' readiness to implement EHR was 57.2%. In the study of Jebrailey et al. (2010) it was 61.6% and the average of computer skills, knowledge and attitude towards EHR was 55.6%, 60.8% and 68.4%, respectively (1).

5. CONCLUSION

This study has shown that the level of computer skills of nurses needs to enhance. The findings of the study suggest that the hospitals should conduct practical training courses on computer uses and applications.

As the correlation analysis between knowledge and attitude showed, the nurses who have high knowledge about EHR have a low attitude toward it. In general, it seems that nurses intend workshop/conference about the role of computerized systems in the field of healthcare. Strongly, it is recommended that a related course on health information systems / EHR should be included in the curriculum of nursing.

Since, the readiness of personnel is a critical factor to implement an EHR, therefore, it is essential to consider the education, training and participation of nurses ensure appropriate knowledge and attitude about them.

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CONFLICT OF INTEREST: NONE DECLARED.

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