Original Article

Factors Affecting the Readiness of Health Centers Staff to Use the Electronic Health Record System

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Abstract

Background: In an era when the collaboration of health organizations is an important key to providing effective healthcare services, the implementation and widespread use of electronic health record systems (EHRSs) are essential. The present study was designed to evaluate the factors affecting the readiness of employees for the use of EHRS in health centers affiliated with Neyshabur University of Medical Sciences.

Methods: The research population of the present cross-sectional study with 383 sample sizes included all healthcare providers in health centers affiliated with Neyshabur University of Medical Sciences who used the EHRS. A reliable and valid researcher-made questionnaire was used in this study. Data analysis was performed using SPSS V.22 software and Pearson correlation coefficient, t test and ANOVA at the α= 0.05 significance level.

Results: In the present study, 175 (45.7%) males and 208 (54.3%) females participated. There was a direct and significant relationship between the mean International Computer Driving License (ICDL) scores and HER objectives and mission familiarity scores (14.9 ± 4.0 and 10.3 ± 2.6, respectively) ($P \leq 0.001$, $r = 0.503$). Among the human and technical as well as managerial factors, the human factor was one of the most effective factors regarding the use of the EHRS by staff.

Conclusion: The effective implementation of the EHRS by staff is directly influenced by the following factors: employees' need for computer skills and related software, presence of medical IT specialists, the impact of EHRS on job position, and staff familiarity with EHRS objectives and missions.

Keywords: Electronic Health Records, Information System, Quality Assurance, Healthcare, Usability Testing.

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INTRODUCTION

Traditional point-to-point software applications, due to inherent limitations in information processing and transmission, do not meet the vital needs of the health care system in various fields of science, education-research and especially management(1). To upgrade this software and properly manage electronic health records and move toward the implementation of the Electronic Health Record System (EHRS), developed countries have taken important steps over the years. The United States, for example, began a program to implement a patient electronic record system in 2004 in the order of the then-president. To this end, the Office of the National Coordinator for Health Information Technology was established at the U.S. Department of Health and Human Services (HHS), and the National Health Information Network (NHIN) program was announced(2). In the United Kingdom, the NPfIT program was introduced in 2002 as a measure for establishing an electronic health record system(3). In fact, the EHRS is critical to providing quality, cost-effective and customer-oriented care services, as well as

timely access to complete and accurate information (4), and includes an electronic lifelong collection of information that is recorded, verified, and shared by healthcare providers at various locations (5). Several potential and actual benefits, including healthcare system promotion, increasing patient participation in the care process, higher productivity at lower cost, and higher patient satisfaction, have been expressed in the research literature for using the EHRS (6-9). Despite the potential benefits of EHRS, its implementation and exploitation have been challenged by several limitations and barriers, the most important of which are cost limitations, technical issues, standardization, limitations due to individuals' attitude behavior, and organizational constraints. Related research literature indicates that attitudes-behavioral limitations or resistance to change have a greater role than other limitations (10). Studies indicate that in developing countries, the lack of policies and comprehensive plans for data management and health information systems are among the significant shortcomings of their healthcare systems, and consequently, their healthcare systems face significant challenges (11). The healthcare system in Iran faces several challenges, including increasing demand for healthcare services, introducing new expensive technologies, increasing desire to provide public health services, and the growing need for efficiency improvement, justice, availability, and quality. Meanwhile, health information technology can play a key role in addressing these challenges (12). In this regard, in IRAN, a movement toward integrated health information systems began in the 2013s, with the ultimate goal of creating electronic health records and using them as managerial and health assistant tools (13). For this purpose, according to the Fourth, Fifth, and Sixth Sections of the Comprehensive Development Plan of Iran, the Ministry of Health and Medical Education were required to continuously improve the quality of health services, promote the performance of clinical services, increase productivity and optimally use the country's healthcare facilities by designing and establishing a health information system for citizens. The focus of this project is to create a suitable platform for storing and retrieving citizens' health information, which is known as the SEPAS project (14). The policies and decisions of Iran's Ministry of Health and Medical Education to launch and implement the EHRS attracted more attention from healthcare organizations. However, studies show that the use of EHRS by users, on the one hand, requires extensive investment in infrastructure and important alterations in the healthcare services system and, on the other hand, requires user compliance, teaching how to work with the system, and familiarity with its objectives and missions. The present study was designed to evaluate the factors affecting the readiness of employees for the use of EHRS in health centers affiliated with Neyshabur University of Medical Sciences.

METHODS

The present study is a cross-sectional study that was conducted in 2020 in Neyshabur city in the northeastern region of Iran. The study population included all healthcare providers (physicians, nurses, midwives, and paramedical staff covering clinical laboratories, radiology, and general health technicians) in health centers affiliated with Neyshabur University of Medical Sciences (Hakim Medical Educational Center, 22 Bahman Medical Educational Center, and Medical Bureau of Health) who were working with the EHRS. The sample size was calculated as 383 by considering $Z = 1.96, d = 0.05, P = 0.5$. The sampling was performed using a random classification method and sample classes composed of the Medical Bureau of Health, Hakim Hospital, and 22 Bahman Hospital. Then, proportional to the number of employees who worked with the EHRS, the samples were randomly selected using Microsoft Excel software from each category according to users' usernames in the EHRS (Hakim = 114, 22 Bahman = 140, and Medical Bureau of Health = 129). The data gathering was conducted using a reliable and valid researcher-made questionnaire. This questionnaire, which consisted of two main parts, was designed based on several questionnaires that were used in similar studies (1, 15-17). The first part of the questionnaire included individual factors, while organizational factors were included in the second part. Individual factors were as follows: personal-social characteristics (6 items), computer skills (8 items), level of user knowledge about the EHRS (14 items), and the user's attitude toward the use of EHRS (18 items). Depending on the type of questions, different options were used for each of the individual factors' questions. Some items included yes or no questions, and answers to some other items were presented by absolutely disagree, disagree, no idea, agree, and absolutely agree options. The organizational factors included human factors (7 items), technical factors (5 items), and managerial factors (6 items). The questions in this section were designed on a 5-point Likert scale with very low, low, medium, high, and very high scales, and scores from 0 to 4 were assigned to each scale. The validity of measurements was confirmed with respect to content validity, facts and concepts presented in the credible scientific texts, and the opinions of experts. The reliability of the questionnaire was also determined by calculating the internal correlation ($\alpha = 0.85$). This study was approved by the Research Ethics Committee of Neyshabur University of Medical Sciences under Opinion number IR.NUMS.REC.1398.033 and was funded by Neyshabur University of Medical Sciences (Grant No. 98/01/109). After receiving the consent of the research community, the questionnaires were distributed electronically among them. All methods were carried out in accordance with relevant guidelines and regulations. All participants provided informed consent. The extracted data were analyzed using SPSS V.22, Pearson correlation coefficient, t test, and ANOVA at the $\alpha = 0.05$ significance level.

FINDINGS

In the present study, 175 (45.7%) participants were male, and 208 (54.3%) were female. The mean age of the study

population was 37.2 ± 8.9 years, and the mean work experience of the participants was 14.0 ± 10.0 years. Most participants had personal computers at home and office, which included 375 (98.0%) and 368 (96.0%), respectively, while 23 (6.0%) and 27 (7.0%) participants did not work with computers at home and office. Others were using a computer for at least one hour at home or office. Additionally, 345 (90.1%) participants were using the Internet for more than one hour, and the mean of Internet use by them was 1.1 ± 0.6 hours a day (Table 1).

Table 1. Demographic characteristics of the participants

characteristics		**Sex**		Job						workhouse			Total
		Male	Female	HIT	Physician	Village health worker	Nurse	Laboratory	Radiology	Health Deputy	22 BAHMAN Hospital	HAKIM Hospital	
NO. (%)		175 (45.7)	208 (54.3)	102 (26.6)	26 (6.9)	106 (27.7)	109 (28.5)	24 (6.3)	16 (4.2)	129 (33.7)	140 (36.6)	114 (29.7)	383 (100)
Mean Age (SD)		40.5 (7.8)	34.4 (8.6)	31.6 (7.6)	33.4 (6.7)	40.8 (8.0)	38.7 (9.3)	39.8 (6.3)	42.3 (2.4)	40.32 (8.6)	38.0 (8.6)	32.7 (7.6)	37.2 (8.9)
Duration of work Experience (Year) (SD)		16.6 (9.3)	11.8 (10.0)	9.7 (8.5)	5.1 (5.3)	20.0 (10.6)	14.2 (9.3)	12.5 (7.0)	17.3 (2.4)	18.8 (10.8)	12.8 (8.5)	10.0 (8.6)	14.0 (10.0)
PC (At Home)	Have	177 (100	198 (96.2)	98 (96.1)	26 (100)	102 (96.2)	109 (100)	24 (100)	16 (100)	121 (93.7)	140 (100)	114 (100)	375 (98.0)
	Haven't	0 (0.0)	8 (3.8)	4 (3.9)	0 (0.0)	4 (3.7)	0 (0.0)	0 (0.0)	0 (0.0)	8 (6.2)	0 (0.0)	0 (0.0)	8 (2.0)
PC usage rate (At Home) (Hour)	0	15 (8.5)	8 (3.8)	4 (3.9)	0 (0.0)	15 (14.2)	4 (3.7)	0 (0.0)	0 (0.0)	19 (14.7)	4 (2.9)	0 (0.0)	23 (6.0)
	1	106 (60.6)	139 (66.8)	38 (37.3)	18 (69.3)	72 (67.9)	89 (81.7)	24 (100)	4 (25.0)	87 (67.5)	82 (59.3)	76 (66.7)	245 (63.9)
	2	50 (28.6)	57 (27.4)	53 (52.0)	8 (30.7)	19 (17.9)	15 (13.7)	0 (0.0)	12 (75.1)	23 (17.8)	46 (32.1)	38 (33.3)	107 (27.9)
	3	4 (2.3)	4 (2.0)	7 (6.8)	0 (0.0)	0 (0.0)	1 (0.9)	0 (0.0)	0 (0.0)	0 (0.0)	8 (5.7)	0 (0.0)	8 (2.2)
Computer (At Office)	Have	171 (97.9)	197 (94.5)	91 (88.9)	22 ()85.7	106 (100)	109 (100)	24 (100)	16 (100)	129 (100)	129 (91.9)	110 (96.7)	368 (96.0)
	Haven't	4 (2.1)	11 (5.5)	11 (11.1)	4 (14.3)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	11 (8.1)	4 (3.3)	15 (4.0)
Computer usage rate (At Office) (Hour)	0	18 (10.3)	9 (4.3)	0 (0.0)	7 (26.9)	0 (0.0)	16 (13.8)	4 (16.7)	0 (0.0)	0 (0.0)	19 (13.6)	8 (7.0)	27 (7.0)
	>0-1	82 (46.8)	92 (44.2)	23 (22.5)	19 (73.1)	38 (35.9)	82 (76.1)	8 (33.3)	4 (25.0)	46 (35.7)	76 (54.3)	53 (46.5)	174 (45.4)
	>1-2	52 (29.7)	49 (23.6)	11 (10.8)	0 (0.0)	55 (51.9)	11 (10.1)	12 (50.0)	12 (75.0)	61 (47.3)	26 (18.6)	15 (13.2)	101 (26.4)
	>2-3	1 (0.7)	7 (3.4)	4 (3.9)	0 (0.0)	4 (3.8)	0 (0.0)	0 (0.0)	0 (0.0)	4 (3.1)	0 (0.0)	4 (3.5)	8 (2.1)
	>3	22 (12.5)	51 (24.5)	64 (62.8)	0 (0.0)	9 (8.4)	0 (0.0)	0 (0.0)	0 (0.0)	18 (13.9)	19 (13.5)	34 (29.8)	73 (19.1)
Using Internet	Yes	149 (85.0)	197 (94.5)	98 (96.3)	26 (100)	80 (75.0)	101 (93.1)	24 (100)	16 (0.0)	102 (79.4)	133 (94.9)	110 (96.7)	345 (90.1)
	No	26 (15.0)	11 (5.5)	4 (3.7)	0 (0.0)	27 (25.0)	8 (6.9)	0 (0.0)	0 (0.0)	27 (20.6)	7 (5.1)	4 (3.3)	38 (9.9)
Using Internet Rate (Hour)	0	26 (15.0)	11 (5.5)	4 (3.7)	0 (0.0)	27 (25.0)	8 (6.9)	0 (0.0)	0 (0.0)	27 (20.9)	8 (5.7)	4 (3.5)	38 (9.9)
	>0-1	126 (72.1)	158 (76.1)	57 (55.9)	26 (100)	68 (63.2)	98 (89.9)	24 (100)	12 (57.0)	91 (70.5)	106 (75.7)	87 (76.3)	284 (74.2)
	>1-2	23 (13.1)	34 (16.4)	41 (40.2)	0 (0.0)	8 (7.5)	3 (2.8)	0 (0.0)	4 (25.0)	7 (5.4)	26 (18.6)	23 (20.2)	57 (14.9)
	>2-3	0 (0.0)	4 (1.9)	0 (0.0)	0 (0.0)	4 (3.8)	0 (0.0)	0 (0.0)	0 (0.0)	4 (2.9)	0 (0.0)	0 (0.0)	4 (1.0)

The study findings (Table 2) indicate that the average International Computer Driving License skill score (ICDL) is higher for women (15.4 ± 3.8) than men (14.3 ± 4.1), and there was a statistically significant difference between them ($p = 0.002$). The highest and the lowest average scores were identified for skills in basic computer concepts (18.1 ± 1.9) skills in Microsoft Access software (6.7 ± 7.7), respectively. Concerning occupation, HIT experts had the highest ICDL score (17.9 ± 2.8), while the lowest scores were recorded for health workers (12.6 ± 4.1); the differences between these scores in different occupants were statistically significant ($P \leq 0.001$). Regarding the workplace, the highest ICDL score was recorded from Hakim Hospital staff (16.0 ± 3.1), and the lowest score belonged to the Medical Bureau of Health personnel (13.2 ± 4.3). There was no significant difference

between the mean scores of the two hospitals (*P = 0.496*), but this difference was significant between hospital staff and the Bureau of Health (*P≤ 0.001*), and the mean ICDL score for the entire study population was 14.9 ± 4.0 (Table 2). The findings concerning the users' knowledge about EHRS objectives and missions showed scores of 10.2 ± 2.5 and 10.3 ± 2.7 for men and women, respectively; the difference was not significant (*P = 0.730*). The highest level of knowledge was identified for HIT experts, with an average score of 12.3 ± 2.4, while radiology technicians showed the lowest level of knowledge, with an average score of 1.6 ± 8.9. The difference in knowledge score was significant between different occupations (*P≤0.001*). Regarding the workplace, the staff of the Medical Bureau of Health with a score of 9.4 ± 2.9 had lower knowledge about the goals and missions of EHRS compared to 22 Bahman (10.5 ± 2.5) and Hakim 11.0 ± 2.1 hospital personnel. The difference between 22 Bahman and Hakim hospitals was not statistically significant (*P = 0.367*), and it was significant between hospitals and the Medical Bureau of Health (*P = 0.007*). The mean total score for research community knowledge about the objectives and missions of EHRS was 10.3 ± 2.6. There was also a direct and significant relationship between ICDL skill and staff knowledge scores (*P <= 0.001, r = 0.503*) (Table 2).

Table 2. Computer Skill Grad (Self-Declaration) (From 20)

skills / **Characteristics**		**Basic Concepts**	**Windows**	**Word**	**Excel**	**Access**	**Power Point**	**Internet**	**Mean (SD)**	**Awareness score about of the EHR**
Sex	Male	17.7 (2.1)	17.4 (2.2)	16.1 (3.7)	12.8 (5.2)	5.7 (7.0)	13.9 (5.5)	16.3 (2.3)	14.3 (4.1)	10.2 (2.5)
	Female	18.4 (1.7)	18.0 (1.9)	17.3 (2.6)	14.8 (4.8)	7.7 (8.2)	15.8 (3.9)	16.0 (3.6)	15.4 (3.8)	10.3 (2.7)
	P Value	0.003	0.020	0.001	0.001	0.023	0.001	0.312	0.002	0.730
Job	HIT	19.1 (1.6)	18.9 (1.8)	18.3 (2.3)	17.6 (4.0)	16.3 (4.2)	18.0 (1.9)	17.2 (3.8)	17.9 (2.8)	12.3 (2.4)
	Physician	19.0 (0.9)	18.6 (1.1)	16.9 (1.7)	14.3 (2.2)	2.1 (3.7)	16.3 (2.2)	16.7 (1.5)	14.8 (1.9)	9.7 (1.5)
	Village health worker	16.7 (2.1)	16.2 (2.3)	15.2 (4.2)	11.6 (5.4)	2.6 (4.6)	11.5 (6.6)	14.5 (3.6)	12.6 (4.1)	9.3 (2.7)
	Nurse	18.1 (1.7)	17.7 (1.8)	16.4 (2.9)	12.4 (4.9)	4.3 (6.3)	14.7 (3.6)	16.5 (1.7)	14.3 (3.3)	9.7 (2.1)
	Laboratory	18.5 (0.8)	18.0 (0.8)	17.6 (1.3)	15.2 (2.8)	2.5 (5.8)	15.8 (1.6)	17.0 (1.2)	15.0 (2.0)	9.7 (1.6)
	Radiology	19.0 (0.7)	19.0 (0.7)	18.5 (0.5)	13.5 (1.7)	2.5 (4.5)	16.8 (1.9)	16.5 (1.7)	15.1 (1.7)	8.9 (1.6)
	P Value	≤0.001	≤0.001	≤0.001	≤0.001	≤0.001	≤0.001	≤0.001	≤0.001	≤0.001
Workplace	Health Deputy	17.0 (2.2)	16.4 (2.3)	15.4 (4.0)	12.1 (5.8)	4.2 (6.0)	12.6 (6.4)	14.9 (3.5)	13.2 (4.3)	9.4 (2.9)
	22 BAHMAN Hospital	18.7 (1.6)	18.3 (1.7)	17.3 (2.7)	14.2 (5.2)	7.3 (8.1)	15.8 (3.6)	17.2 (2.0)	15.5 (3.7)	10.5 (2.5)
	HAKIM Hospital	18.6 (1.4)	18.5 (1.7)	17.6 (2.7)	15.5 (5.2)	9.0 (8.1)	16.6 (3.6)	16.3 (2.0)	16.0 (3.1)	11.0 (2.1)
	P Value	≤0.001 0.952	≤0.001 0.705	≤0.001 0.845	0.005 0.170	0.007 0.222	≤0.001 0.381	0.005 0.170	≤0.001 0.496	0.007 0.367
	Total	18.1 (1.9)	17.7 (2.1)	16.8 (3.2)	14.0 (5.1)	6.7 (7.7)	15.0 (4.8)	16.1 (3.1)	14.9 (4.0)	10.3 (2.6)
Pearson Correlation(α=0.01)									*r=0.503, P≤0.001*	

As the findings of the research indicate (Table 3), the average score for employees' attitudes toward the need for EHRS and its application as a work tool was 17.5 out of 20 (18th row of Table 3). Some items, including "EHRS improves the quality of health services" and "EHRS has established good relations between service providers", scored 16.9 and 15.6, respectively, while items such as "EHRS exposes staff weaknesses and inadequacies in the acquisition of new skills" and "EHRS increases the need for acquisition of new skills" scored 11.1 and 11.0, respectively. A notable finding was the item "Lower flexibility and information modification capability in the EHRS compared to paper records", which scored 1.0 in this study (Table 3).

Table 3. Employees' Attitudes toward Features of EHRS

Scale Items	Absolutely agree No. (Score=2)	Agree No. (Score=1)	No Idea No. (Score=0)	Disagree No. (Score= -1)	Absolutely Disagree No. (Score= -2)	Total (Score) ±766	Score from (20)
The EHRS has improved the quality of health services.	288 (576)	84 (84)	0 (0)	6 (-6)	5 (-10)	644	16.9
The EHRS has established a good relationship between service providers.	220 (440)	159 (159)	4 (0)	0 (0)	0 (0)	599	15.6
Reminders and warnings in the EHRS help prevent medical errors.	150 (300)	229 (229)	5 (0)	0 (0)	0 (0)	529	13.8
The EHRS has prevented duplications, unnecessary and repetitive tasks.	125 (250)	258 (258)	0 (0)	0 (0)	0 (0)	508	13.3
EHRS has increased the speed of service delivery.	144 (288)	239 (239)	0 (0)	0 (0)	0 (0)	527	13.8
The EHRS has helped improve documentation.	125 (250)	258 (258)	0 (0)	0 (0)	0 (0)	508	13.3
The EHRS provides timely access to information.	137 (274)	238 (238)	8 (0)	0 (0)	0 (0)	512	13.4
Information in the EHRS is more secure and confidential than paper files.	95 (190)	178 (178)	99 (0)	11 (-11)	0 (0)	357	9.3
The accuracy of the information in the EHRS is greater.	99 (198)	262 (262)	15 (0)	8 (-8)	0 (0)	452	11.8
EHRS has less flexibility and data correction than paper records.	30 (60)	102 (102)	156 (0)	65 (-65)	30 (-60)	37	1.0
The EHRS has made the job more satisfying and easier.	129 (258)	174 (174)	72 (0)	8 (-8)	0 (0)	424	11.1
The EHRS has jeopardized the job position of employees.	99 (198)	167 (167)	95 (0)	15 (-15)	7 (-14)	336	8.7
The EHRS has exposed the weaknesses and inadequacies of employees in acquiring new skills.	114 (228)	201 (201)	64 (0)	4 (-4)	0 (0)	425	11.1
The EHRS imposes a high degree of work discipline and has resulted in tight controls.	102 (204)	193 (193)	84 (0)	4 (-4)	0 (0)	393	10.3
EHRS creates new responsibilities and raises expectations.	72 (144)	250 (250)	53 (0)	8 (-8)	0 (0)	386	10.1
EHRS increases the need to acquire new skills.	80 (160)	262 (262)	42 (0)	0 (0)	0 (0)	422	11.0
Given all the advantages and disadvantages of EHR, does its' existence considered necessary as a tool?	295 (590)	80 (80)	8 (0)	0 (0)	0 (0)	670	17.5

The study findings (Table 4) indicate that the most influential factor among the human factors was the familiarity of users with the existing capabilities of the EHRS, which scored 17.8, and the factor with the least impact among human factors was "Ensuring the information security and confidentiality in the EHR", which scored 16.4. The "Learning EHRS related software" had the highest score (16.0) among the technical factors, while the lowest score, with 13.9, was for the "Problems in EHRS". "Lack of medical informatics expert and health management specialist in the center, prevents the effective use of electronic health records" was an item among the management factors with the highest score (15.9), and "Since the process of using the EHRS is slow, it prevents its application" had the lowest score (12.5). In general, human factors with a score of 16.9 had the most powerful influence among all other parameters, while management factors with a mean score of 14.4 were the least effective factors concerning the use of EHRS capabilities (Table 4).

Table 4. Organizational factors affecting the participants' use of the EHRS

Factors		Scale Items	Very High No. (No.*4)	High No. (No.*3)	Moderate No. (NO.*2)	Low No. (No.*1)	Very Low No. (No.*0)	Total (Score) 383(1532)	Score from (20)
human	1	The familiarity of users with EHRS facilities will increase their utilization of EHR.	224 (896)	148 (444)	11 (22)	0 (0)	0 (0)	1362	17.8
	2	Training the skills needed to work with the EHRS will increase their utilization of the EHR.	186 (744)	182 (546)	15 (30)	0 (0)	0 (0)	1320	17.2
	3	Involving employees in debugging and designing the EHRS increases their utilization of the EHR.	159 (636)	205 (615)	19 (38)	0 (0)	0 (0)	1289	16.8
	4	Administrators' support for EHRS users and experts increases their utilization of the EHR.	159 (636)	205 (615)	15 (30)	4 (4)	0 (0)	1285	16.8
	5	Encouraging users and experts to work with the EHRS will increase their use of the EHR.	163 (652)	209 (627)	11 (22)	0 (0)	0 (0)	1301	17.0
	6	The user-friendliness of the EHRS increases its utilization of EHR.	129 (516)	239 (717)	11 (22)	4 (4)	0 (0)	1259	16.4
	7	The fact that users and experts are united in EHRS security increases their utilization of EHR.	144 (576)	209 (627)	27 (54)	4 (4)	0 (0)	1261	16.4
	Score Mean		(665.1)	(598.7)	(31.1)	(1.7)	(0)	(1296.7)	16.9
Technical	1	Computer equipment and hardware prevent me from making more use of electronic health records in my work	87 (348)	269 (807)	23 (46)	4 (4)	0 (0)	954	15.7
	2	Lack of access to information (for example due to slow internet or disruption of the web network) prevents effective use of electronic health records?	87 (348)	277 (831)	19 (38)	0 (0)	0 (0)	963	15.9
	3	To make better use of the features of electronic health records, I need special programs or software	129 (516)	214 (642)	32 (50)	4 (4)	4 (0)	971	16.0
	4	Problems in the hospital information system prevent the effective use of electronic health records?	57 (228)	231 (693)	87 (174)	8 (8)	0 (0)	873	14.4
	5	Problems in the electronic health record system (SEPAS) prevent effective use of electronic health records?	68 (272)	174 (522)	133 (266)	4 (4)	4 (0)	843	13.9
	Score Mean		(342.4)	(699.0)	(117.6)	(4.0)	(0)	1163.0	15.2
Organizational	1	Is there a need to change the organizational structure and care delivery processes in order to use the benefits of electronic health records?	46 (184)	277 (831)	61 (122)	0 (0)	0 (0)	1137	14.8
	2	With the implementation of the electronic health record system, the processes of providing care have become more complicated and this has prevented the effective use of the electronic health record?	23 (92)	222 (666)	115 (230)	19 (19)	4 (0)	1007	13.2
	3	Does the lack of support of managers prevent the effective use of electronic health records?	80 (320)	258 (774)	46 (92)	0 (0)	0 (0)	1186	15.4
	4	Does the lack of medical informatics and health management specialists in the center prevent effective electronic health records?	121 (484)	209 (627)	53 (106)	0 (0)	0 (0)	1217	15.9
	5	Lack of budget and insufficient investment in implementing and completing the electronic health record system prevents the effective use of electronic health records?	46 (184)	254 (762)	83 (166)	0 (0)	0 (0)	1112	14.5
	6	Because using electronic health records does not have a quick return, does it prevent the use of electronic health records?	27 (108)	152 (456)	193 (386)	11 (11)	0 (0)	961	12.5
	Score Mean		(252.8)	(732.0)	(143.2)	(3.8)	(0.0)	1131.8	14.4

DISCUSSION

Findings related to the demographic characteristics of the research community indicated that most subjects of the study had a personal computer at home. The average ICDL computer skills score of the participants was also in an acceptable range; there was also a direct correlation between ICDL skill scores and the personnel awareness scores of EHRS objectives. These findings indicate that the necessary conditions of computer skill awareness are already established in the study population so that it improves the research community's attitude and awareness of the goals and missions of the EHR. In this regard, Lorenzi and Riley in *"Organizational Aspects of Health Informatics: Managing Technology Change"* (2013) acknowledge that one of the major challenges in implementing and using hospital information systems is the resistance of users, especially physicians and nurses, to adopting these systems as work tools. They point to the users' worry about incapability in learning computer skills, being imposed by work discipline, wasting of the time, assignment of unwanted responsibilities and strict control, the fear of new demands creation, lack of competition and efficiency (9) as reasons. One of the important points in the present study regarding individual factors influencing the improvement of EHRS implementation is that the study population had suitable computer skills for some reasons. This characteristic was more prominent for hospital staff than for health center personnel. Since holding an ICDL certificate is one of the requirements for employment in Iran, employees usually have to learn these skills as a prerequisite for a job. Another item that is essential for better and more effective use of information systems by users is their knowledge about the objectives, benefits, and capabilities of information systems (15, 18). The present study showed that considering the workplace parameter, the staff of Medical Bureau of Health compared to 22 Bahman and Hakim hospitals had significantly lower knowledge about the goals and missions of EHRS, while the difference for 22 Bahman and Hakim hospitals was not statistically significant. These findings were consistent with the Amanda L. Terry et al. results; they showed that EHRS users did not have sufficient knowledge of EHRS processes (10). In a cross-sectional study, Lippert and Kverneland showed that the main reasons for the failure to implement the EHRS were lower resources allocated to the users' preparation for adopting the program and their unfamiliarity with the goals and missions of the EHRS (19). In terms of the attitude of the users toward the features and functions of HER, if EHRS users have a good perspective of the information system or electronic file, this favorable perspective will increase effectiveness and enhance system adoption and utilization (16, 17). In the present study, the assessment of the research community's attitude revealed that the scientific community as a whole has a favorable view of the EHRS functions. Despite these favorable sentiments, Table 3 shows that users of information systems, including the EHR, have a negative attitude toward the system, which originates from a fear of consequences for their job position. This is also demonstrated in the present study (Table 3). According to the current study, after five years of implementation and operation of the system, employees believe that the existence of the EHRS weakens their job position by imposing new skills and duties and producing additional expectations. In a paper titled "Electronic Health Record: Assessing Staff Preparation," JEBRAEILI et al. found that the most negative attitude of employees toward the adoption of EHRS is related to job position risks (2.12 of 5), wasted time and increased workload (2.49 of 5) (17). In this regard, hospital and healthcare officials must take the necessary measures for job security improvement, as well as modifying the staff beliefs and familiarizing them with the skills required for optimal use of the EHRS. The three identified organizational components that influenced the adoption of EHRS in this study were human, technological, and managerial factors. According to scientific sources and research, various human, technical, and managerial (organizational) aspects all have a part in the success or failure of the health information technology system (9). In their investigations, Yusof (2008), Kuziemsky (2015) and Zarghani et al. (2021) highlighted certain key technological, organizational, and human components of health information technology. Financing, leadership, organizational structure, personnel training, care delivery processes, user-friendliness of health information technology, and continuous and uninterrupted communication in health information systems are some of the topics they discuss (20-22).

According to the findings of our study, the most influential human element based on scores was users' familiarity with EHRS capabilities, while with the same criteria, the least significant human element was "Ensuring information security and confidentiality in the EHR". The element "learning software related to the EHRS" received the highest score among the technical factors, while the component "problems of the EHRS" received the lowest score. Among the management factors, the component "lack of medical informatics and health management experts at the medical center inhibits the efficient use of the electronic health record system" received the highest score. In other words, one of the most critical problems highlighted by the research community about the adoption of EHRS in terms of technological elements has been the availability of suitable software. The research community has focused on funding and, in particular, providing human resources with the necessary expertise from a management standpoint. The results of the present study support the findings of Lovita and Andriyani, demonstrating the need for staff training regarding the adoption and operation of information systems (23). The lack of healthcare practitioners' engagement, as well as dominant organizational culture, are the most significant impediments to the implementation of electronic health records, according to Thakkar and Davis (24). The analysis

of users' viewpoints in the current study revealed that, from their perspective, engaging in debugging procedures and encouraging active users by managers plays an important role in their adoption and implementation of this system, and it appears that the required organizational culture to utilize the information systems has established its place in the analyzed medical centers. The present study also revealed that a shortage of medical informatics expertise is one of the contributing factors to the inefficiencies of EHRS users. Despite the fact that enough medical informatics professionals are currently being trained, this issue remains one of the barriers to adopting EHR. Naghipour and Ahmadi (25) and Nasiripour et al. (26) reported a scarcity of specialists and difficulties in hiring medical informatics professionals as barriers to adopting e-health and increasing staff productivity through the EHRS, confirming our findings in the research.

Conclusion

In general, and according to the analysis of the current study's findings, individual and organizational elements are beneficial in adopting the electronic health record. Our findings revealed that users were mentally prepared to utilize the EHRS. In practice, there was a significant gap between employee computer literacy and understanding of EHRS goals and missions, and since the adoption of EHRS by staff is directly impacted by computer skills as well as EHRS goals and missions, careful planning to increase personnel' educational activities is critical for designing and operating the EHRS. The most significant element to consider in order for more employees to adopt and use the EHRS is the amount to which it can be beneficial for staff in carrying out their day-to-day duties and strengthening their job position. The scarcity of medical IT professionals in the human resources chart is another aspect that should be considered and needs planning to attract such professionals.

What is already known on the subject

- The previous studies were focused more on pre-implementation requirements of EHRS.
- Factors affecting the implementation and pre-implementation of the EHRS can be different.
- Useful use of EHRS is much more important than its implementation.

What this study adds

- What are the factors affecting the optimal use of EHRS by users?
- Factors affecting the optimal use of EHRS by users include human factors, technical factors and organizational factors.
- Identifying the problems of users in order to use the EHRS optimally can reduce the cost of treatment and improve the level of health in the community.

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Conflicts of Interests

The author(s) declare no conflicts of interest.

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