

The challenges of implementing electronic health records (EHR) in family physician plan from health providers' perspective

Mahdi Kahouyi¹, Sedigheh Fouladiyan², Soheila Bayat³, Mina Kouhestaniyan², Sara Abbaspour²

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1. Associate Professor, Center for Research on Social Determinants of Health, Department of Paramedical Sciences, Semnan University of Medical Sciences, Semnan, Iran

2. Health Information Technology expert, Student Research Committee, School of Nursing and Paramedical Sciences, Semnan University of Medical Sciences, Semnan, Iran

3. **Correspondence to:** Health Information Technology Expert, School of Nursing and Paramedical Sciences, Semnan University of Medical Sciences, Semnan, Iran

Tel/Fax: +98 23 33448998

Email: s.bayat313@yahoo.com

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Abstract

The plan of family physician is considered as a solution for health delivery. Today, these services are offered in the form of electronic health records (EHR). Usually, the implementation of this project is encountered potential challenges. Because health care workers are EHR users, attention to their views is effective in the success of this project. This study was conducted to identify challenges and solutions of the implementation of electronic health records in family physician plan. This descriptive study was conducted physicians, administrators, faculties and nurses in affiliated hospitals of Semnan, Iran. In this study, census was used and sampling method was not used. Measurement tool was a researcher made, valid and reliable questionnaire. Data were analyzed by descriptive statistics. The findings showed 63.5% Lack of people's culture, 72.7% lack of cooperation physician and patient, 73% worry about unauthorized access and 3/27% clinical staff's resistance reported as the most important barriers of the implementation of electronic health records. Also 58.8% of the subjects chose role of government and 15.2% role of people as first priority in progress of the implementation of electronic health records. It is concluded that the subjects believed that there are cultural, social, infrastructure and clinical challenges in the implementation of electronic health records. It is necessary In addition to solving technical problems, activities such as social marketing, culture promoting in popular and pioneering of government are performed to reduce finally cultural resistance of society and increase users' acceptance towards it.

Keywords: Challenge, Family, Physician, View

Introduction

The healthcare system in Iran has experienced numerous problems for many years, including: people's inadequate and unequal access to healthcare, the high cost of healthcare, lack of coordination among different service levels, failure to do preventive care, failure to perform interventions in the society, limiting healthcare services to doctors' offices and disregarding other places providing healthcare,

the imbalance among patients' interests and healthcare system's interests, and lack of social responsiveness [1]. According to pundits and experiences of other countries, the strategy of family physician, which is the service leveling and referral system, is a major solution for many healthcare system problems [2]. The family physician is a medical specialty providing comprehensive continuous healthcare services for patients

and families. The healthcare service involves people of any age and sex, all diseases, and all body systems regarding behavioral, clinical, and environmental sciences [3]. In this electronic era, organized healthcare, specialized treatment, lack of public funds, identity frauds, difficult insurance claims, and the governments' demand for maintaining the security of patients' confidential information have resulted in applying a new technology of electronic health records (EHR) in the family physician plan [4]. EHR is an electronic collection of patients' information developed throughout their life by one or more healthcare centers [5]. The records include extensive information, such as identity information, patients' reasons for going to healthcare centers, vital signs, diagnoses, prescribed medications, physician's notes, medical test results, radiology reports, allergies, and generally, patients' medical history. All the above information is included in EHR in healthcare centers and submitted to patients' family physicians [5,6]. Although the information technology (IT) has developed increasingly in healthcare in recent years, access to patients' medical information and statistics is difficult, and EHR may be the proper solution in this regard [7]. The use of EHR within the family physician plan promised to both promote the quality and functionality of healthcare service and provide a safe and suitable medium for storage of medical data and the connection among them [8]. However, the implementation of this technology in national healthcare systems and information technological strategies are still accepted rather slowly and stopped by some restrictions [8]. The United Kingdom is one of the pioneers of the family physician plan and has 70 years of experience in this regard [2]. Generally, Western Europe was leading in design and implementation of EHR using the electronic health card. Germany was the first country implementing EHR in 1994, and has distributed the highest number of records of this kind among its people up to now [9]. McGinn et al. found that the contribution of end users in implementing the plan and the

interaction between patients and healthcare personnel were effective in implementing EHR [10]. However, previous studies showed that the implementing EHR encountered with various limitations, including the high costs, difficult integration of hospital systems, lack of national guidelines, uncontrolled access to patients' data, and the mechanism for paying treatment costs [11-13]. Safdari and Farajollah also found the failure to respect patients' rights during exchange of information as another problem of EHR [14]. The implementation status of family physician plan and EHR in Iran revealed that the plan started in the cities and villages with fewer than 20,000 people in 2005 and in some other cities with fewer than 50,000 people (as a pilot plan in 3 provinces) in 2010 [1]. The family physician plan is more effective with EHR implementation although it seems HER implementation is challenging. Considering previous studies in many countries, that clinical personnel and healthcare centers' managers were among HER users, and that there were few studies on the challenges facing the implementation of the strategic plan of EHR within the family physician plan, questions arouse that what personnel's attitudes toward the challenges were, and according to them, which organization was more effective in implementing EHR. These questions motivated the researchers to conduct a study with the aim of examining the attitudes of clinical personnel and healthcare centers' managers toward the challenges facing the implementation of the strategic plan of EHR. The researchers believe that reflection of this study results can contribute to identifying strategies and challenges, probably solve those challenges, and facilitate the implementation of the plan.

Method

This cross-sectional study was conducted with 320 personnel working in 3 hospitals affiliated to Semnan University of Medical Sciences in 2012, using the census method. The data were collected using a researcher-

made inventory prepared according to the scientific texts in this regard. The inventory consisted of 4 parts of which the first part included demographic information such as sex, age, occupational position, years of service, type of ward, and the amount of computer work. The second part measured the amount of the statistical population's awareness of the advantages and strategic programs of EHR in the family physician plan. The third part was related to challenges facing the implementation of EHR. In the fourth part, the statistical population was requested to prioritize the most influential organizations or individuals in progress of HER implementation from 1 to 5. To determine face and content validity of the inventory, it was given to health information managers and clinical experts and specialists and revised according to their comments. In this respect, 10 items of the initial 37-item inventory were omitted due to their inconsistency with the objective of the study, and 3 other items were also omitted due to their overlap with other items. The final inventory consisted of 24 items. To determine reliability of the inventory, it was randomly given to 30 personnel as a pilot test, and Cronbach's alpha test was run. The alpha coefficient for the second part, third part, and the entire inventory was 88.4%, 72.8%, and 76.2%, respectively. The inventory was given to the statistical population upon adopting the permission for collecting data and respecting ethics, such as discussing the objective of the study for the statistical population, their authority to/not to participate in the study, and confidentiality of their information. The researchers called up those participants who failed to complete the inventory, twice with one week interval. The data were analyzed using descriptive statistics in SPSS-12 software.

Results

Of the 320 inventories distributed among the statistical population, only 200 (response=62.5%) inventories were returned. Therefore, 112 nurses, 32 physicians, 24 faculty members, 6 health information managers, and 22 people of other clinical personnel participated

in this study. Table 1 shows characteristics of the participants.

Table 2 shows the attitudes of personnel working in hospitals affiliated to Semnan University of Medical Sciences toward various challenges facing the implementation of EHR within family physician plan. Furthermore, results revealed that 58.5%, 15.2%, and 8.9% of the statistical population respectively prioritized the government, people, and insurance companies as the most influential organizations and individuals in implementation of EHR within family physician plan (Table 3).

Discussion

This study was conducted to examine the attitudes of clinical personnel of healthcare centers affiliated to Semnan University of Medical Sciences toward the challenges facing the implementation of EHR within family physician plan. Based on the results, half of the statistical population found the failure to culturalize EHR among people as an important challenge facing the EHR implementation. They might believe in the effectiveness of culturalization for acceptance of a new technology and reduction of beneficiaries' resistance. In this regard, previous studies showed that one barrier to accepting the IT, especially for EHR, was the cultural resistance against it [15,16]. Nasirpour concluded that the biggest problem in EHR was the organizational culture, or in other words, users' resistance [17].

Based on the results of the present study, two thirds of the statistical population introduced the lack of integrated networks and equipment as an important challenge facing the EHR implementation. They might believe that there were not enough integrated networks and infrastructure in Iran, as Paschali et al. stated that technological development required technical infrastructures [18]. However, those infrastructures are ambiguous and complex in Iran [17]. Lanham et al. also found that the information and communication technology for EHR could solve health-

Table 1 Demographic specifications of healthcare personnel (N=200)

Specifications	Groups	N	%
Occupational position	Manager	6	3%
	Physician	32	16.3%
	Nurse	112	57.1%
	Faculty member	24	12.2%
	Other clinical personnel	22	11.3%
Sex	Female	128	64.3%
	Male	71	35.7%
Age (year)	1- Below 30 years	72	42.9%
	2- 30-50 years	86	51.2%
	3- Over 50 years	10	6%
Years of service	1- Below 5 years	76	43.9%
	2- 5-15 years	60	34.7%
	3- 15-30 years	37	21.4%
Type of ward	Surgery	22	15.1%
	Internal	24	16.4%
	Pediatric	12	8.2%
	Emergency	18	12.3%
	Laboratory	8	5.5%
	Radiology	7	4.8%
	Medical document	9	6.2%
	University	26	17.8%
	ICU	8	5.5%
	NICU	1	0.7%
	CCU	7	4.8%
ENT	4	2.7%	
Educational level	High school diploma	3	1.5%
	Associate diploma	13	6.6%
	BS	123	62.1%
	MS	13	6.6%
	PhD	46	23.2%
Computer work (years)	Below 5 years	28	18.9%
	5-10 years	73	49.3%
	10-15 years	29	19.6%
	15-30 years	18	12.2%

Table 2 Distribution frequency of attitudes of the hospital personnel toward various challenges facing the EHR implementation within the family physician plan

	Managers N (%)	Physicians N(%)	Nurses N(%)	Members N(%)	Personnel N(%)	Total (%)
Failure to culturalization	5(83.3)	18(58.1)	63(63)	13(68.4)	13(61.9)	115(63.5)
Inaccessible facilities	1(16.7)	13(41.9)	37(37)	6(31.6)	8(38.1)	66(36.5)
Concerns about unauthorized access to information	4(66.7)	12(40)	41(39)	7(33.3)	7(33.3)	73(39)
Lack of governmental financial support	2(33.3)	18(60)	64(61)	14(66.7)	14(66.7)	114(61)
High cost of the project	4(80)	20(62.5)	64(62.1)	13(61.9)	13(61.9)	116(62.7)
Incomplete coverage of patients' information in the records	1(20)	12(37.5)	39(37.9)	8(38.1)	8(38.1)	69(37.3)
Lack of expert human resources	1(20)	12(37.5)	33(31.7)	7(33.3)	6(30)	59(32)
Lack of integrated networks and equipment	4(80)	20(62.5)	71(68.3)	14(66.7)	14(70)	126(67.7)
Lack of patient-physician cooperation	6(100)	18(57.1)	82(82)	9(45)	16(72.7)	133(72.7)
Clinical personnel's resistance	0	13(41.9)	18(18)	11(55)	6(27.3)	50(27.3)
Low level of information literacy of the society	5(100)	4(12.9)	10(9.5)	3(13.6)	4(19)	21(11.2)
Failure to inform and train people	0	27(87.1)	95(90.5)	19(86.4)	17(81)	167(83.5)

Table 3 *Prioritization of the organizations effective in progress of EHR implementation within the family physician plan from the viewpoint of the personnel of hospitals*

	First priority	Second priority	Third priority	Fourth priority	Fifth priority
Hospital managers	15(9)	8(4.8)	30(18)	54(50.3)	90(18)
Insurance companies	15(8.9)	32(18.9)	70(41.4)	34(20.1)	18(10.7)
Health Ministry	46(26.4)	81(46.6)	30(17.2)	9(5.2)	8(4.6)
Government	97(58.8)	23(13.9)	18(10.9)	13(7.9)	14(7.5)
People	25(15.2)	20(12.2)	16(9.8)	17(10.4)	86(52.4)

related problems [19]. In this study, less than half of the participants chose the lack of expert human resources as a challenge facing the implementation of EHR. They might think there were not enough educated and expert human resources for applying new technologies in the health system. The reason is that the inadequate human resource is the major barrier to the application of IT [20]. Moreover, another important problem of the health system is the poor planning and human resource development [21]. Dünnebeila et al. also found human resources as an important factor in application of IT [22]. Furthermore, less than half of the statistical population in this study was concerned about unauthorized access to their information in EHR. It seemed that they thought their information might be stolen, lost, or abused. Information security is a reason of clinical personnel's unwillingness to use IT [15]. Haas et al. also mentioned that one barrier to the spread of EHR technology was the concern about confidentiality, security, accessibility, and accuracy of the information in EHR [23]. Eley et al.'s study agreed with results of the present study. According to them, some clinical personnel believed that IT would decrease patients' information security [15]. Based on the results of the present study, over half of the participants thought that the high cost of the implementing the plan was an important challenge in HER implementation within the family physician plan. Those participants might find the equipment required

for the plan expensive. In this regard, Orszag discussed the costs of transferring equipment to far cities and villages and also costs of registration and use of EHR [24]. Goldzweig et al. found the high costs a barrier to implementation of IT in health [25]. Henry also introduced the high cost and complexity of the plan implementation as a challenge facing implementation of IT in health [26]. According to the results of this study, two thirds of the statistical population believed that lack of doctor-patient cooperation was the most significant barrier to EHR implementation within the family physician plan. Zlabek et al. introduced the initial high costs and uncertain costs paid to physicians as the major barrier to HER implementation and other clinical applications of the IT [27]. Tuffs' results conformed to those of the present study. Tuffs found that physicians' resistance resulted in delayed provision of infrastructures required for telemedicine and electronic health projects [28]. Furthermore, patients' failure to cooperate may be due to their unawareness of the advantages and the way of using EHR. The reason is that users' resistance is one barrier to acceptance of the IT [23]. The results revealed that a few participants introduced the society's low level of information literacy as a significant challenge in implementation of EHR. They might think that patients' level of information literacy for using the IT was low. In this regard, Sadoughi et al. explained that new

technologies in the area of health should be implemented through increasing patients' technological literacy by planning [29]. Kaye et al. found that the inadequate information was a barrier to the use of health IT, and one solution to this problem was to empower individuals in using IT, and consequently, facilitate access to this technology [30]. Based on the results, one fourth of the participants chose the personnel's resistance as an important challenge in implementation of EHR. They might believe that the clinical personnel did not cooperate with the implementation of the plan. According to Ditsa, the culture of using modern technology is promoted through mutual cooperation of health personnel and IT personnel [31]. Angst found that various uses of the IT in the area of healthcare had not been implemented due to beneficiaries' resistance [32]. Based on the results, over half of the participants considered the lack of governmental financial support as a significant challenge facing the implementation of EHR. They might think that the plan would not be efficient enough regarding the economical status of the society. To Goldzweig, the lack of perceived return on investment inhibits the acceptance of health IT [35]. Furthermore, over half of the participants prioritized the effectiveness of the government in progress of the implementation of EHR. They might believe that the government was of special importance in securing the health information and allocating sufficient funds for the implementation of the operational projects. Smith stated that governments have played an important role in most of security threats and supported, guided, and controlled the codification of rules and regulations in holistic professional policy-making for dealing with cyber crimes [33]. Furthermore, governments should allocate certain funds and loans for acceptance of such technologies [25]. According to the results, a few number of the participants prioritized the effectiveness of insurance companies in progress of the implementation of EHR. Those participants might think that EHR would facilitate insurance repayments and increase the security of insurance services.

The reason is that EHR reduces misuses of insurance services and facilitates access to these services. According to DeVore, the failure to allocate governmental funds for implementation of EHR and the necessary cooperation of insurance beneficiaries with other relevant organizations are two barriers to implementation of EHR [34]. A few participants of this study prioritized the role of people in implementation of EHR. They might believe that people's expenses for new technologies and the culture of using them had a great effect on implementation of EHR. Henry found that people's expenses for EHR were not low, and the plan would deviate and fail from the very beginning if the people were not modified [26]. However, in an attempt to decrease costs for accepting EHR and integrated clinical systems, Amatayakul found that people's contribution was not significant [35]. Based on the results of this study, one fourth of the participants prioritized the effectiveness of Health Ministry in implementation of EHR. They probably thought that the Health Ministry played a major role in progress of new technologies. Hosseini explained that the Health Ministry should hold training courses and monitor the development of IT [36]. Furthermore, Asadi stated that the Health Ministry should draw policy-makers' attention to the IT as the basis of investment [37]. Nasiripour also found that rapid changes of managers, especially in the Health Ministry and Welfare Ministry, were of main barriers to development of the electronic health, including EHR [17]. A few participants of this study prioritized the role of hospital managers in implementation of EHR. They might believe that managers' opinions for using IT were of special importance. In this regard, Asadi mentioned that the use of IT was included in organizational goals of all hospitals, and hospital managers determined IT strategies with cooperation of IT experts and Medical Council, considering the organizational strategies and information needs [37]. Corrocher found that the decisions made for the development of IT

depended on managers' understanding of the benefits of using technologies and equipment already established [38]. It is noteworthy that the results of this study should be interpreted cautiously. Firstly, because the study was performed using a researcher-made inventory, and consequently, some potential problems, such as the poor understanding of the items and possible bias answers might skew study results. However, considering the validity and reliability of the inventory, the above problems had a slight effect on the results. Secondly, about 40% of the statistical population did not participate in the study, and the results could not be generalized because the study was conducted in one city. However, some results of this study agreed with those of other studies. More comprehensive studies should be performed in this regard in order to be able to generalize the results.

Conclusion

According to the results, the participants believed that the technical, cultural, social, and economical infrastructures and inter-organizational coordination were of the most significant challenges in implementing EHR. The results of this study are of special importance for those involved in EHR project. It is necessary to develop an insight in those involved in EHR in order to take actions toward culturalizing EHR in the society through mass media, social marketing, and governmental financial support, reduce the cultural resistance of the society and costs of the project and increase users' acceptance of the project.

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Contributions

Study Design: MK

Data collection and analysis: SD, SB, MK, SA

Manuscript preparation: MK, SD, SB

Conflict of Interest

"The authors declare that they have no competing interests."

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