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Evaluation of Integrated Health System Technology Acceptance among the users of Health Centers of Zahedan University of Medical Sciences; Iran

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ABSTRACT

Background: The integrated health system (IHS) entitled "SIB" was launched in 2016 aimed to electronic health record (EHR) in the field of health. Given that, in addition to deploying the system, its acceptance criteria by users has a significant effect on its effectiveness and benefits: therefore, the present study was carried out aimed to determine the acceptance rate of IHS technology in health centers.

Methods: This study as a cross-sectional survey and applied research was conducted in Zahedan University of Medical Sciences (ZAUMS) in 2017. The population in the present study consisted of all users of SIB system affiliated ZAUMS. Of these, 285 users were selected (physician, health care provider, Behvarz) in five counties affiliated with ZAUMS using multistage cluster sampling. In this study, standard technology acceptance questionnaire was used for data collection. The data were analyzed by $SPSS_{22}$ software and analyzed using descriptive statistics, one-way Anova, T test and other related tests.

Results: About 77.9 % of users used the system for several times a day. The SIB system acceptance rate by 49.5 % of users was moderate and 38.9 % of the users had excellent acceptance of this system. There was a significant relationship between the acceptance rate of SIB system among the users with age, gender, city, level of education, type of employment, place of work and organizational position ($P < 0.05$).

Conclusion: The results of this study show that, most users have accepted and confirmed the SIB system. Modification of the system with regional approach with the opinion and participation of specialists in comprehensive health service centers is suggested. .

Keywords: Technology Acceptance, Integrated Health System, Users, Zahedan University of Medical Sciences

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Introduction

Nowadays, Information and communications technology (ICT) is an extensional term for information technology (IT) that stresses the role of unified communications and the integration of telecommunications (telephone lines and wireless signals) and computers, as well as necessary enterprise software, middleware, storage, and audiovisual systems, that enable users to access, store, transmit, and manipulate information has had a significant effect on many fields, especially healthcare. The development of CT in health care centers is considered as one of the most important advances in health system, which is referred to as the great revolution in the healthcare industry (1, 2). Increased awareness and expectations of consumers have led health care providers to use new technologies to improve the quality of healthcare services (3). So that the healthcare system has taken effective steps in order to benefit from the latest achievements and technologies, including electronic health records (HER) can to improve health and its clinical and financial outcomes (4). So, technology acceptance models are used to identify the effective factors to prevent failure and waste of resources and in order to implement new systems and technologies, that these models are complete, reliable, accurate, timely, safe and accessible (3,4). For many years, technology acceptance has been used as the basis for many studies to investigate and identify the effective factors on the new technology's acceptance. For example, two factors of perceived usefulness and perceived ease of use along with users' institutional characteristics (age, sex, work experience, degree of technology) are effective on how people make decisions for using technology (5). Also, the acceptance rate of EHR technology among users is of utmost importance in increasing its anticipated positive achievements in the health care system (6). Vinco et al. during a similar study in Slovenia concluded that there is a positive attitude towards modern information technologies among health professionals (7). Also, Kabir et al. conducted a study on the SIB system in Fars and Mazandaran provinces and evaluated that the employee's satisfaction with family physician program is lower than average (8).

According to the results of studies, the application of IT in the healthcare system in different countries has many benefits such as improved service provided, reduced medical errors and improved effectiveness of healthcare (reducing waiting time and improving the quality of patient care) (3). In this regard, the IHS known as the "SIB system" was launched in 2016 by the Ministry of Health aimed to increase productivity. According to this plan, it was forbidden to record, collect, and report paper-based information nationwide and it should only be done through the SIB system. According to statistics and reports provided by the end of 2017, EHR has been saved for 68 million Iranians, by the end of 2017. The SIB system was launched aimed to valuable goals such as implementation of an EHR, establishing a national health information database, providing a referral system, and providing services in the field of family physician (3). Information which should be recorded by health care providers on the SIB system include: demographic information, disease progression-related reports, physician visits, patient's case history, medications, vital signs, medical history, vaccinations, radiology and lab results (9,10).

It should be noted that deploying this system is not enough to take advantage of it, but the conditions for acceptance of its' use should be considered, as more motivated people use the new technology (11, 12). Few studies have conducted SIB system technology acceptance by Iranian users after two years of implementing this plan and its importance in achieving the major goals of the health system, so the present study was carried out aimed to determine the IHS technology acceptance among the users of the health centers of Zahedan University of Medical Sciences (ZAUMS). The results of the present study can be a useful guide for the development of the e-health services by the health system policymakers.

Materials and Methods

This study is a descriptive-survey research that was carried out in ZAUMS in 2018. The population

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of the present study was all users of the SIB system (physician, healthcare provider, Behvarz) in five cities, affiliated with ZAUMS (Zahedan, Mirjaveh, Khash, Saravan, Sib Soran), in Sistan and Baluchestan province as the most southeastern province of Iran. Inclusion criteria included: being users of the SIB system for at least one month and have recorded information in the system on a daily basis and willingness to cooperate and have informed consent about the research objectives. The sample size was estimated to be 285 people based on a total of 1082 people using the Morgan Table.

Multi-stage clustering method was used for sampling and according to the number of system users from each city. Each county was considered as a cluster, then in each county, comprehensive health service centers were randomly assigned as one class and users were randomly selected in each class.

Technology Acceptance Questionnaire, developed by Mahdi Pour et al., was used as data collection tool. The questionnaire included 27 questions, the quality of system (3 questions), information quality (3 questions), service quality (3 questions), perceived usefulness (3 questions), perceived ease of use (4 questions), usefulness (2 questions), user satisfaction (4 questions), behavioral intention (3 questions) (11). The items on this questionnaire were scored on a five-point Likert scale (A Likert scale is a psychometric scale commonly involved in research that employs questionnaires. It is the most widely used approach to scaling responses in survey research, such that the term is often used interchangeably with rating scale, although there are other types of rating scales), (5 completely disagree, 4 disagree, 3 I have no idea, 2 agree, 1 strongly disagree), and it was scored in this way (27 to 63 poor acceptance, 64 to 99 as moderate acceptance and 100 to 135 excellent acceptance). Validity of the questionnaire was confirmed using face and content method. Also, its reliability was confirmed by re-test with 80 % coefficient (13).

After the project approving in the University Ethics Committee (IR.ZAUMS.REC.1397.168) and the necessary permits were obtained, the researchers referred to the comprehensive health services centers and health houses affiliated with ZAUMS in the first half of 2018. The participants were first identified based on sample size and sampling method. After that the participants were selected (Physicians, Health care providers, Behvarz), and the researchers explained the study objectives in the place where the services were provided (comprehensive health service centers, health bases, and health homes) while communicating face to face with each person was done. Also, they provided the necessary explanations about the confidentiality of information and voluntary participation in the study.

After the questionnaires were collected, their contents were recorded manually using $spss_{22}$ software and analyzed using descriptive statistics such as mean, standard deviation, range of variations, and one-way ANOVA and T-test were used to investigate the relationship between variables.

Results

About 285 users of the SIB system were studied. The responsiveness rate was 100 %. The majority of participates were female, 199 persons (69.8 %), had the bachelor degree (106.2 %) and 150 persons (52.6 %) were health care providers. The most age frequency distribution was 30-40 years (121 users, 42.4 %) and working experience of 92 users (32.3 %) was less than 5 years. The population covered by most of the users, 131 health workers (46.0 %) was cover 2500 people and the average most used system by 222 users (77.9 %) was several times a day.

The acceptance rate of the SIB system was calculated at three levels of low, medium and excellent and listed in Table 1.

As shown in Table 1, the acceptance rate of the SIB system by 141 users (49.5 %) was average and also 111 users (38.9 %) had excellent acceptance.

As shown in Table 2, there is a significant relationship between the acceptance rate of the SIB system with age, gender, city, level of education, type of employment, location of providing services and organizational position. So that the female

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users, corporate employees, city of Zahedan, bachelor degree and Behvarzes had the highest acceptance rate of the system. On the other hand, no significant relationship was observed between work experience and population (P-value > 0.05).

Table 1. The frequency of the participant in the study according to job and city

Zahedan (81 users)			Saravan (63 users)			Mirjaveh (42 users)			Suran (51 users)			Khash (48 users)		
*D	**B	***O	*D	**B	***O	*D	**B	***O	*D	**B	***O	*D	**B	***O
12	27	42	7	22	34	5	13	24	6	15	30	7	14	27

*Physician
**Behvarz
***Health care providers

Table2. SIB system acceptance rate from the perspective of users covered by ZAUMS

Acceptance rate	Frequency	Percentage (%)
Excellent (score 100 to 135)	111	38.9
Moderate (score 64 to 99)	141	49.5
Poor (score 27 to 6)	33	11.6
Total	285	100

Table 3. The frequency distribution of as many of the SIB system acceptance rate with the demographic variables of the users

Variable	Dimensions	Acceptance rate of apple system			Frequency(%)	P
		Poor Frequency(%)	Moderate Frequency(%)	Excellent Frequency(%)		
Age	Under 30 years	12 (12.8)	57 (60.6)	25 (26.6)	94 (33)	0.004*
	30 to 40 years	10 (8.3)	61 (50.4)	50 (41.3)	121 (42.4)	
	Over 40years	11 (15.7)	23 (32.9)	36 (51.4)	70 (24.6)	
Gender	Female	22 (11.1)	23 (32.9)	67 (33.7)	199 (68.8)	0.009*
	Man	11 (12.8)	31 (36.0)	44 (51.2)	86 (30.2)	
City	Zahedan	3 (9.1)	45 (34.9)	33 (29.7)	81 (28.4)	0.001*
	Khash	2 (6.1)	21 (14.9)	26 (23.4)	49 (17.2)	
	Mirjave	1 (3.0)	22 (15.6)	18 (16.2)	41 (14.4)	
	Saravan	8 (24.3)	35 (24.8)	19 (17.1)	62 (21.8)	
	Sib and Suran	19 (57.6)	18 (12.8)	15 (13.5)	52 (18.2)	
Level of Education	Diploma	7 (7.3)	37 (38.5)	52 (54.2)	96 (33.6)	0.001*
	Associate Degree	7 (7.3)	37 (38.5)	52 (54.2)	96 (33.6)	
	Bachelor	6 (26.2)	63 (59.4)	37 (34.9)	106 (37.1)	
	MA and PhD	11 (26.2)	23 (54.8)	8 (19.0)	42 (14.7)	
Experience	Less than 5 years	14 (15.2)	52 (56.5)	26 (28.3)	92 (32.2)	0.086
	6-10 years	6 (9.7)	34 (54.8)	22 (35.5)	62 (21.7)	
	11-15 years	5 (8.8)	25 (43.9)	27 (47.4)	57 (20)	
	16-20 years	5 (12.8)	19 (48.7)	15 (38.5)	39 (13.6)	
	More than20years	3 (8.6)	11 (31.4)	21 (60.0)	35 (12.2)	
Type of employment	Corporate and design	12 (18.8)	40 (62.5)	12 (18.8)	64 (22.5)	0.003*
	Under -a-contract	7 (14.9)	24 (51.1)	16 (34.0)	47 (16.5)	
	Contractual	1 (4.2)	9 (37.5)	14 (58.3)	24 (8.4)	
	Permanent	13 (8.7)	68 (45.3)	69 (46.0)	150 (52.6)	

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Place of work	Comprehensive Urban Health Center	5 (9.3)	34 (63.0)	15 (27.8)	54 (18.9)	0.002*
	Urban base	11 (12.1)	52 (57.1)	28 (30.8)	91 (31.9)	
	Comprehensive Rural Health Center	9 (21.4)	19 (45.2)	14 (33.3)	42 (14.7)	
	Health House	8 (8.2)	36 (36.7)	54 (55.1)	98 (34.4)	
Organizational position	Physician	8 (21.6)	22 (59.5)	7 (18.9)	37 (13.0)	0.001*
	Health care providers	17 (10.6)	84 (55.8)	49 (33.6)	150 (52.6)	
	Behvarz	8 (8.2)	35 (35.7)	55 (56.1)	98 (34.4)	
Population	Less than1000people	1 (6.7)	9 (60.6)	5 (33.3)	15 (5.3)	0.437
	1000 to 1500 people	6 (8.7)	29 (42.0)	34 (49.3)	69 (24.2)	
	1500to2000 people	7 (10.0)	38 (54.3)	25 (35.7)	70 (24.6)	
	More than2000people	19 (14.5)	65 (49.6)	47 (35.9)	131 (46.0)	

* Significance level < 0.05

Discussion

The main purpose of this research was to determine the acceptance rate of the SIB system from the perspective of the users. The results of this study show that, many users accepted this system and used it in their work process, and the users are interested in using new and modern technology-based systems that leads to increase performance reduce error and increase information processing speed. Mehdi Pour et al during their study confirmed the results of this research and concluded that acceptance of e-Health is evaluated as moderate based on the conceptual model; therefore, most users are interested to use e-Health services to provide health services (13). However, Kabir et al. during their study in 2016 concluded that the health employees' satisfaction with the SIB system was poor (8). It can be concluded that their research time was at the beginning of introducing the SIB system into the health system, certainly, it faced problems that led to reduce satisfaction; however, after two years, many problems were resolved and users were interested to use the system.

According to the results, Behvarzes and physicians had the highest and lowest acceptance rate of the SIB system, respectively. It seems that frequency of data that should only be entered by the physicians is the main reason. In contrast, most of the physician's time is spent for patients examination and treatment, and they may don't have time to complete all data with current system characteristics. Kabir et al. during their study concluded that the average physicians' satisfaction with the SIB system was below average and satisfaction of health care providers was moderate (8).

Also, Abdkhah et al. during a study concluded that the support of healthcare managers is considered as one of the effective factors on the acceptance of IT and electronic records, and users feel that they are benefitted from comprehensive support in all stages of designing, implementing and analyzing electronic records. In this way, acceptance and using electronic records will be more welcomed (14).

In the present study, a significant relationship was observed between the acceptance rate of SIB system with age, gender, place of employment, education level and type of employment. So that, younger people, especially persons aged under 30 years, have had a better acceptance of the system. According to the result, these users were willing to work with modern technology to improve their

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work quality. According to the results reported by Esmaeili et al, there was a significant relationship with age with system acceptance rate and concluded that in the average age of the units under study was young, according to the acceptance model, most units accepted working with IT and did it without challenge, but they encountered resistance at the middle ages and above (15).

The results of this study show that female users had better acceptance rate, and it seems that men spent more time for working and visiting outside the centers and upon returning to the center, they were reluctant to record information on the system. Baratpour et al. during a study concluded that men have good acceptance rate of information technology, which was inconsistent with the results of this study (16).

The users of healthcare centers in Zahedan have had more acceptance rate than Sib Suran city. According to users, some scores are considered for recording information in the system, which has increased their acceptance rate. Tavakoli et al. during a study concluded that the organizational support and technical supports of a system will increase motivation and users' willingness to use the system (17). On the other hand, the likelihood of entering unrealistic information can be increased by applying penalties, which it is recommended that the accuracy of the data entered to be verified.

The results of this study show that persons with work experience of less than 5 years had the highest acceptance rate. It seems that older persons were reluctant to use new computer systems and technologies and resist to acceptance technology. Abdekhdaet al during a study concluded that the resistance of health sector users, especially those who had been working with the traditional paper system for many years, is considered as a barrier for implementing expanding health information systems, especially EHRs (5).

Given that this system is considered as an emerging system and there is no proper infrastructure, some users stated that the system was not available at any time and recording information was not easy. Ameri et al. during a study concluded that there are many barriers to implement an EHR, that among them, technical and behavioral limitations have higher priority (18). Technical expertise and computer skills of the employees, along with limitations in IT infrastructures, including equipment shortage and Internet outage, especially in rural areas, are considered as some of the most barriers to implement this system.

Given that information technology in Iran is mainly used based on the structure of imported technology and has no related infrastructure, it will probably not be very satisfying (1).

In the present study, the user satisfaction in is not a good indicator for continuing to use the SIB system, and if applying the required modifications in the system do not lead to increased satisfaction, the comprehensiveness and quality of data recordings are unreliable and it is not possible to the necessary performance.

Also, it should be noted that two years after implementation of this system, use of the system has become a law, and it is recommended that a qualitative study to be carried out to discover the hidden problems and limitations of the system and necessary measures to be taken to resolve the problems by system managers and planners .Because, in order to increase user acceptance, the system needs to have any error and mistakes and to have minimum limitations from the perspective of the users.

The vastness of the province and the dispersal between comprehensive healthcare service centers and health homes, the lack of collaboration between users and authorities in permitting implementation of the plan in some comprehensive health centers were considered as some of the most important limitations of this study, which these limitations can be partly overcome by collaborating with higher levels of services such as the Deputy Health and County Health Center. The present study was conducted among health workers at ZAUMS and it seems necessary to be careful about generalizing the results to other universities.

Conclusion

According to the results of present study, the users have a good view about the SIB system; however, believed that using this system leads to

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reduce the efficiency of their performance due to the large amount of information the system and using the traditional paper system. Software and information systems are designed and upgraded using a localized approach with participation of specialists working in comprehensive health service centers and health homes to improve their willingness to use the system properly in order to avoid wasting resources. Some of the most important practical recommendations in this regard include holding training courses for new users and generating the skills needed to use the health information system, continuous and comprehensive evaluation of these systems based on the needs and requirements of the Ministry of Health and the needs of system users.

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Conflict of interests

The authors declared no conflict of interests.

Author's contribution

Khammarnia M, SotoudeZadeh F and Peyvand M designed research; Setayesh AH, Rezaei K, Najmjahandide M, KordTamini A and Vahedi M conducted research; Khorram A and Peyvand M analyzed data; Peyvand M had primary responsibility for final content. All authors read and approved the final manuscript.

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