Original Article

Adoption of Electronic Health Records in Saudi Arabia: A Step Towards Digitalization

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Abstract

For quality decision-making, the provision of accurate information to physicians and consultants is crucial, and this can only be possible by adopting the e-health applications and digitalization of health data. For health information data management, the adoption and implementation of electronic health records (EHRs) is essential. The purpose of this paper is to investigate the factors that are instrumental in the adoption of electronic health records (EHRs) systems in Saudi Arabia. The population of this study was project directors, general managers, directors, analysts, and the Ministry of Health (MOH) in Saudi Arabia. A survey approach research design was used. Non-probability convenience sampling was used. Convenient sampling allows the researchers to have whoever is willing and available participate in the study survey. Data was collected from project directors, directors, analysts, and supervisors. SPSS was used for statistical data analysis. Frequencies, percentages, and mean standard deviation were reported, and correlations were run to test the hypothesis. It was concluded that except for demographic variables, which were not correlated with resources, end-users, technology, knowledge, values and goals, process, management structure, and administrative support, all other constructs correlated significantly. This study is a valuable extension of knowledge regarding the adoption of EHRs in Saudi Arabia's healthcare organizations.

Keywords: Management Structure, Administration Support, Electronics Health Records, Adoption, Healthcare Organizations, Saudi Arabia.

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Introduction

There are three levels of the Saudi health system, the first level is the primary level which consists of primary healthcare centers (PHCCs), followed by the secondary level which consists of general hospitals and the third is the tertiary level which consists of specialist hospitals. Every year, the Saudi government spends billions of riyals to improve the quality of healthcare services. Public insurance policies are also available at nominal prices for health and medical services. The major portion of the budget for health is given by the Ministry of Health (MOH) in Saudi Arabia but other government bodies such as hospitals and clinics of public sector universities, the Ministry of Interior and Defense, National Guard, and Aramco also contributed towards providing health services. Due to variations in health services provided by different organizations, the patient information is scattered except where patients get all treatment from the same healthcare facility. Scattered information it leads to consumption of resources, effort, and time (Hasanain *et al*., 2014). Due to this reason, there is an immense need to adopt and implement electronic health records (EHRs) in Saudi Arabia (Altuwaijri *et al.,* 2008). The use of EHRs is beneficial for all stakeholders such as doctors, nurses, patients, and hospitals, for making quality decisions at the right time. To provide quality services and safety to patients' personal information e-health applications have been developed and for this purpose Saudi Data and Artificial Intelligence Authority (SDAIA) was established. This authority aims to promote the digitalization of health services in the whole country. Patients can book an appointment, request for ambulance, or have a meeting with doctors online. This study aims to investigate the issues and challenges for the adoption of EHRs in the Kingdom by answering the following research question: What are the factors responsible for adopting EHRs in Saudi Arabia?

Problem Statement and Research Gap

The use of advanced technology including a virtual reality platform not only saves time, cost, and human efforts but also provides authentic and accurate information which would help healthcare providers to provide quality care to patients, and ensure the safety of professionals and patients as well moreover, it help the healthcare professionals to make quality decisions on time (Alsahibani & Kundi, 2024; Kundi, 2023; Altuwaijri *et al.,* 2008). Therefore, it is very important to highlight the factors that are responsible for investigating the readiness, adoption, and implementation of electronic health records in Saudi Arabia's healthcare organizations such as primary healthcare centers (PHCCs), general and specialist hospitals. As mentioned in the introduction section majority of the health budget is provided by the MOH and the remaining Aramco, national Guards, and ministry of Education and Defense are also contributing towards providing health services to people of the kingdom due to which patient data is scattered and is very important to bring that data into one database by adopting EHRs so this study has tried to identify those factors who are held responsible for adopting and implementing the EHRs, which is overlooked and left a gap. Which would help the MOH, PHCCs, and hospitals to access the data anytime.

Literature Review on Electronic Health Records (EHRs)

Understanding the significance of EHRs is very important to improve the efficiency of health administration. Adoption and implementation of EHRs reduces healthcare workers and professionals' stress, streamline processes, reduce management burden and workload, improves professionals' efficiency, and help to enhance health operations highlight best practices and challenges (Ayaad *et al.,* 2019). Use of EHRs helps in diagnosing, better treatment, high level of patient satisfaction form health services (Tsianaka & Peramatzis 2024). The safety of patients and quality of healthcare services are the two main areas which are given adequate attention at all times in research (Alomair & Pasha, 2024). Technology changes rapidly therefore there is need to adopt new technology for survival in the industry and those who have already adopted EHRs need to modify the features of their existing EHRs to improve efficiency and effectiveness (Berner et al., 2005). This modification's main aim is to save time and keep the records up to date so that supply of information to physicians should be accurate. EHRs also reduced the mistakes and errors. This new technology is still ignored and needs attention of the decision makers to raise tis awareness among healthcare organizations and health professionals. Developing countries hesitate and are reluctant to adopt EHRs because of cost and limited financial resources. With adequate planning, developing countries can also adopt EHRs to improve their health systems.

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Hypotheses Development

Studies conducted on EHRs have reported a positive and significant relationship between factors impacting the adoption and implementation of EHRs (Ajami *et al.,* 2011). Likewise, Gatiti *et al.,* (2021) also reported a positive and significant association between factors responsible for the adoption of EHRs and its influence on the financial performance of healthcare organizations. In addition, Ayaad et al also confirmed that adopting EHRs improved professionals' performance. Therefore, based on the above arguments following hypotheses have been proposed:

H_1: *There is a significant and positive association between predictors and criterion.*
H_2: *Predictors positively predict criterion variables.*

Figure 1

Conceptual Framework
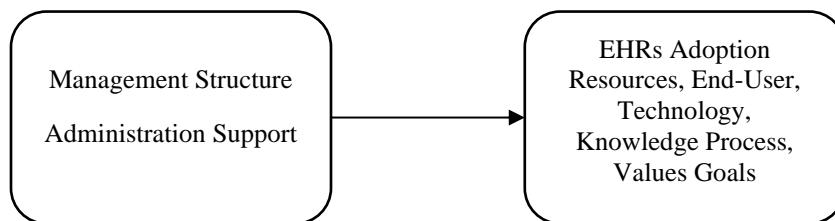
Methods and Materials

Research Design

The survey approach research design was adopted. The nature of the current study is quantitative (Creswell, 2009). The closed ended questionnaire was adopted from past studies and distributed among the respondents. In the questionnaire all items were measured on at 7-point scale ranging from 1 strongly disagree to 7 strongly agree. The nature of the data was cross-sectional and primary. It was collected at one point in time (Hair *et al.,* 2018).

Population and Sampling

The population of this study was employees of the Ministry of Health who were part of the projects for implementing EHRs in Saudi Arabia. Non-probability convenience sampling technique was used. The benefit of this technique is those informants are available, willing and fulfill the criteria included in the data collection. A total of 91 participants have participated in this study.

Data Collection Instrument

The questionnaire for this study was adopted from Snyder Halpern (2002). The first part of the questionnaire was designed to collect the demographic information of the respondents. The second part consists of eight constructs. All the items of eight constructs were measured on a 7-oint Likert scale.

Data Analysis Techniques

SPSS was used to calculate the frequency, percentage, mean and standard deviations. This is descriptive study therefore, descriptive statistics have been used.

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Results and Findings

Table 1
Demographic Information

Variable	Category	n	%
Gender	Male	51	56.04
	Female	40	43.95
Designations	Projector Director	32	35.16
	Directors	21	23.07
	Supervisor	34	37.36
	Analyst	4	4.39
Involvement in EHR Projects	Yes	67	73.62
Adoption	No	24	26.37

Data analysis revealed that male respondents were 51(56.04%) and female were 40(43.95%). Regarding designations there were 32 project directors (35.16%), 21 (23.07%) directors, 34(37.36%) supervisors and 4 (4.39%) analysts. 67 officials claimed to be involved in EHRs adoption projects while 24 (26.37%) said no they were not involved (Table 1).

Table 2
Compare Means

Gender		R	EU	Tech	K	P	VG	MS	AS
Male	M	5.981	5.49	5.473	5.393	5.926	6.073	6.266	6.32
	n	51	51	51	51	51	51	51	51
	SD	.9206	.850	.8202	1.003	1.44	.9192	1.240	.674
Female	M	5.333	5.333	4.7667	4.9667	5.5333	5.9333	5.3000	5.866
	n	40	40	40	40	40	40	40	40
	SD	1.207	.9204	1.372	1.1080	1.3914	1.436	1.6807	.9888

R; Resources; EU>End-User; Tech> technology; K>Knowledge: P>Process; VG>Values Goals; MS> Management Structure; AS> Administrative Support.

Table 2 presents the findings of compare means. Regarding resources, end-user, technology, knowledge, process, values and goals, management structure, and administration support male respondents score higher on all constructs as compared to female counterparts.

Table 3
Compare Means

Involvement		R	EU	Tech	K	P	VG	MS	AS
	M	6.08	5.28	5.26	5.23	5.41	5.78	6.14	6.25
YES	n	67	67	67	67	67	67	67	67
	SD	.68832	1.078	.948	.914	1.778	1.329	1.381	.970
	M	5.56	5.50	5.26	5.37	6.20	6.14	5.82	5.98
NO	n	24	24	24	24	24	24	24	24
	SD	1.220	.876	1.206	1.168	.995	.904	1.506	.883

R; Resources; EU>End-User; Tech> technology; K>Knowledge: P>Process; VG>Values Goals; MS> Management Structure; AS> Administrative Support.

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Table 3 presents the findings of involvement in EHRs adoption and implementation of the projects. Majority of the respondents claimed to be involved in the implementation and adoption of EHRs projects and they score higher than those who were not involved before. Table 2

Table 4
Correlation

Variables	1	2	3	4	5	6	7	8	9	10
Gender	1									
Position	-.103	1								
Resources	-.246	.081	1							
End user	-.018	.114	.489**	1						
Technology	-.214	-.008	.552**	.768**	1					
Knowledge	-.142	.180	.203	.439*	.666**	1				
Process	-.062	-.033	.229	.746**	.703**	.637**	1			
Values goals	-.001	-.113	.281	.655**	.608**	.502**	.747**	1		
Mgt structure	-.223	.148	.623**	.814**	.762**	.499**	.745**	.732**	1	.873**
Admin support	-.134	.035	.550**	.746**	.771**	.543**	.660**	.748**	.873**	1

**. Correlation is significant at the 0.01 level (2-tailed). *. Correlation is significant at the 0.05 level (2-tailed).

Table 4 presents the findings of Bivariate correlation; it is evident that based on gender and position no variable is significantly correlated. Resources, knowledge, process, and values goals are not correlated remaining all constructs correlated with each other positively and significantly at $p<0.01$ level. Hypotheses 1 is substantiated

Table 5
Regression Analysis

DV	IV	R	R²	F	β	p
EHRs Adoption	Constant	0.891	0.794	54.068		0.000
	MS				0.602	0.002
	AS				0.317	0.082

Regression analysis was run in SPSS. Management structure and administration support explained 79.4% variance upon adoption of EHRs. The model was found fit F= 54.068, $p<0.01$. Moreover, a one percent change in management structure could enhance EHR adoption by up to 60.2% while administration support is insignificant. This implies that hypothesis 2 is partially substantiated.

Discussion and Conclusion

Due to the significance and importance of such EHR systems, the excessive use and adoption of EHRs by health organizations has been noticed (Ajami *et al.,* 2011). Physicians and consultants need accurate information to provide quality healthcare to patients and make decisions (Ross *et al.,* 2016). Quality decisions and timely provision of

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accurate information depend on information provided by EHRs. Healthcare providers work under great stress, and they have a shortage of time and over burden (Gatiti *et al.,* 2021). From the findings of this study, it is evident that to adopt electronic health records resources are required, the system must be friendly so that end-users may feel ease of use while using. User-friendly, technology and knowledge are also required to handle such technology and systems. Management structure and administration support are also crucial to initiate such huge projects in the whole country. It is concluded that to manage the information in healthcare organizations, a health information management system is essential. For this purpose, the adoption of electronic health records (EHRs) is the most recommended one. It would help the practitioners and organizations to save cost, and time and make quality decisions. But for this purpose, financial resources and administration support are required to provide such latest technology, and training for employees to use such new applications and software.

Practical Implications

Healthcare professionals can access the factors that are more dominant and can play a significant role in easily adoption of electronic health records in Saudi Arabia. To adopt the EHRs support of the administration is very crucial. To initiate such a project, the provision of budget, implementation, installation, training, and maintenance needs huge financial resources. Policy makers can make policies to adopt EHRs so that low-cost health services can be provided to patients.

Limitations and Future research Directions

The sampling technique is the first limitation which may cause generalizability issues. It is therefore recommended to use probability sampling in future studies. Moreover, the sample size is small therefore, researchers may use big sample size in future studies.

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Declaration of Interest

We the authors declare that there is no clash of interest.

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