

Factors Influencing Healthcare Professionals' Perception towards EHR/EMR Systems in Gulf Cooperation Council Countries: A Systematic Review

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ABSTRACT

Electronic health and medical records are widely adopted in many healthcare settings worldwide to improve the quality of care. Users' perception is a significant factor influencing the successful implementation and use of e-health technologies. This systematic review aimed to identify factors influencing the perceptions of healthcare professionals towards the adoption and use of electronic health and medical record systems to improve the quality of healthcare services in the countries of the Gulf Cooperation Council. We identified primary studies evaluating healthcare professionals' perception towards electronic health records and/or electronic medical records in the Gulf region. Seven electronic databases, including Medline, CINAHL, Informit Health Collection, Science Direct, ProQuest, PubMed, and Scopus were used to search for the relevant articles published between January 2007 and December 2016. Thirteen articles met the inclusion criteria and were included in this systematic review. Both individual and system-related factors were found to positively or negatively influence healthcare providers' perceptions towards the systems. Understanding the impact of healthcare professionals' perception of health information technology is important for policymakers involved in the implementation programs to ensure their success. Future studies should evaluate other individual characteristics such as age, gender, and profession of the healthcare providers on their perceptions towards e-health technologies.

The implementation of health information technology (HIT) has been associated with improved quality of healthcare services, increased efficiency, and reduced costs of healthcare as well as provider satisfaction.^{1,2} Electronic medical records (EMRs) and electronic health records (EHRs) are the most common e-health technologies used in many healthcare settings today.³ Lu and colleagues noted that these computer-based record systems help healthcare professionals to manage patients' health information and improve care.⁴ The healthcare outcomes of EHR/EMR are mainly attributed to the systems' enormous benefits, including but not limited to the elimination of redundant paper-based processes,^{5,6} elimination of time-consuming procedures in recording and retrieving patient data,⁷ easy access to patient information,⁸ and improved communication between the multidisciplinary

teams.^{9,10} Therefore, electronic health information systems (HISs) are crucial for the sustainability of healthcare organizations as the provision of high-quality care services likely to attract more clients resulting in increased profitability and growth.¹¹

As the adoption of EHR/EMR systems is fast gaining pace in many healthcare settings worldwide, those in the Gulf Cooperation Council (GCC) countries are no exception.¹¹ The governments and private players in the health sector of these nations have shown a great interest in EHR and made significant strides in promoting their adoption in healthcare as a means of improving patient care, controlling costs, and meeting other health needs and priorities.¹² For instance, in Saudi Arabia, the Ministry of Health has promoted the introduction and adoption of modern technological systems to improve care quality.¹³ Despite these efforts, the use of EHR in these settings has met several

challenges mainly attributed to governmental and organizational factors resulting in low acceptance and adoption rates.¹¹ The government is a major player in the healthcare sector and may influence EHR implementation through complex policy frameworks and inadequate funding.

Similarly, healthcare organizations in the Gulf region continue to encounter challenges related to resource constraints such as finances and trained healthcare professionals to promote the implementation of information systems.¹¹ Like most problems associated with new technology, healthcare facilities in the GCC countries also experience disparities in skills and knowledge of the EHR and EMR that affect their ability to implement electronic health systems fully.^{14,15} The perception of healthcare professionals who are the end-users of e-health technologies has also been found to influence the adoption and implementation of such systems.^{16,17} The providers may have varied perceptions of the tools based on personal skills, knowledge, and experience, among other factors. The system features (such as perceived usefulness and perceived ease of use) have also been linked with healthcare providers' perception of electronic information systems.¹⁸ Therefore, perception appears as a significant determinant of user acceptance and use of HIT and satisfaction.¹⁹ However, the factors influencing health professionals' attitude towards the use of health technology applications, particularly in the Gulf context is not clearly understood given that the countries in this region are newcomers in the area of HIT.¹¹ We sought to review factors that influence the perception of healthcare professionals towards acceptance and use of EHR/EMR systems in GCC countries.

METHODS

In this systematic review, we searched for all the relevant articles published between January 2007 and December 2016 in Medline, CINAHL, Informit Health Collection, Science Direct, ProQuest, PubMed, and Scopus databases. The search terms included: [perception OR attitude OR perspective OR beliefs] AND [electronic health record OR EHR OR electronic medical record OR EMR OR electronic record OR digital record OR digital medical record OR digital health record OR digitized record OR digitized record OR electronic

health information system OR health information system OR HIS OR e-health OR digital health] AND [GCC OR Gulf Cooperation Council OR Gulf countries OR Bahrain OR Kuwait OR Oman OR Qatar OR Saudi Arabia OR United Arab Emirates OR UAE OR Middle East]. Two independent researchers reviewed titles and abstracts of all the identified papers. Additional studies were obtained by manually searching the reference lists of the identified papers. We selected empirical studies that met the inclusion criteria: 1) evaluated the perceptions of healthcare professionals towards the use or adoption of EHR or EMR technologies; 2) conducted in any type of healthcare facilities including primary, secondary, tertiary, private, and public as well as those located in urban and rural areas; 3) conducted in one or more of the Gulf countries; and 4) published in English. Full texts of the studies that met these criteria were retrieved and independently reviewed by the researchers, and disagreements were solved through a consensus.

The data were independently extracted from each of the included studies by the reviewers. The extracted information included the author, year of publication, country, study design, sample size, the type of HIS evaluated (EHR or EMR), the implementation setting, and the period from implementation to evaluation. The extracted data were entered into the MS Excel Spreadsheet. We assessed the quality of selected papers with the aid

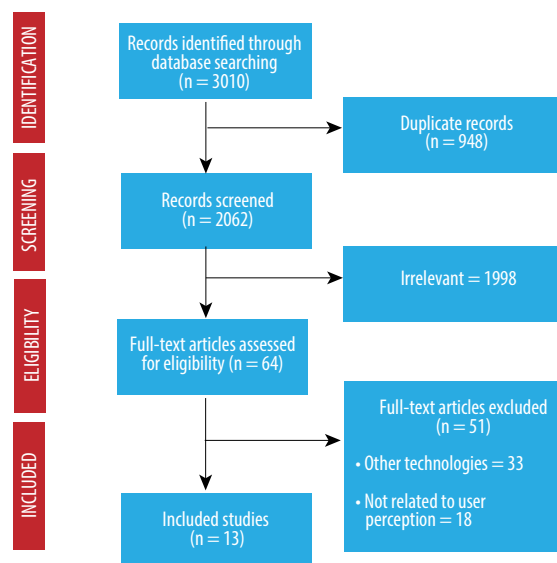


Figure 1: Study selection process.

Table 1: Overview of the included studies.

Authors	Name of system	Domain	Period from implementation to evaluation	Study design	Country	Study objective	Participants and sample size
Abdulla et al. 2016 ¹	EHR	Primary health care	N/A	Cross-sectional online survey	Bahrain	Users' satisfaction with the EHR.	152 users
Al-Azmi et al. 2008 ²³	EMR	Primary health care	2000-2012	Cross-sectional study	Kuwait	Physicians perceptions about EMR systems at primary healthcare centers.	321 physicians
Alasmay et al. 2014 ²⁷	EMR	Primary care	N/A	Cross-sectional survey (questionnaires)	Saudi Arabia	The association between computer literacy and training on clinical productivity and user satisfaction in using the EMR.	112 health care providers
Al Alawi et al. 2014 ²¹	EMR	Primary care	N/A	Cross-sectional survey (interviews)	UAE	Physician user satisfaction with an EMR system in primary health care centers.	23 physicians
Al-Mujaini et al. 2011 ¹⁴	EMR	Various specialties	6 months	Cross-sectional survey (questionnaires)	Oman	Satisfaction and perceived quality of an EMR system in tertiary hospitals.	141 physicians
Alharthi et al. 2014 ¹⁹	EMR	Inpatient department	< 12 months	Cross-sectional	Saudi Arabia	Physician satisfaction with EMR in a healthcare facility.	115 physicians
Alsaleh et al. 2008 ¹³	EMR	Primary care	N/A	Cross-sectional survey (questionnaires)	Kuwait	Care providers experience with EMR system at the primary health care centers.	321 physicians, 186 pharmacists, and 332 receptionists
Alzobaidi et al. 2016 ²⁴	EMR	Secondary-care	4 weeks	Cross-sectional survey (questionnaires)	Saudi Arabia	Attitudes towards implementing an EMR system among Saudi physicians.	129 physicians
Hasanain et al. 2015 ¹⁵	EMR	Public healthcare	N/A	Cross-sectional survey (questionnaires)	Saudi Arabia	Knowledge and preferences of EMR systems by healthcare professionals.	333 participants
Khalifa 2013 ²⁸	EMR	Public care	N/A	Cross-sectional survey (questionnaires)	Saudi Arabia	Barriers to HIS and EMR implementation.	158 health care professionals
El Mahalli 2015 ²⁵	EHR	24-hour inpatient care	N/A	Cross-sectional (questionnaires)	Saudi Arabia	Adoption and barriers to adoption of EHR by nurses.	185 nurses
Asiri et al. 2014 ²⁶	EMR	Direct patient care	> 12 months	Cross-sectional survey (questionnaires)	Saudi Arabia	Nurses attitude, acceptance, and use of EMR.	333 nurses
Shaker et al. 2015 ²²	EMR	Direct patient care	< 12 months	Cross-sectional survey	Saudi Arabia	Care providers experience with EMR system.	317 physicians

EHR: electronic health record; EMR: electronic medical record; HIS: health information system.

of the Covidence tool for managing systematic reviews.²⁰ A narrative synthesis was used to summarize the findings. The study selection process is presented in Figure 1.

RESULTS

The electronic database search identified 3010 articles. After removing duplicates and ineligible studies, 13 studies qualified for inclusion in this systematic review. All the studies were of a cross-sectional design. Most of the studies (61.5%) were conducted in Saudi Arabia and the rest in other Gulf countries (Kuwait, Oman, Bahrain, and the UAE). The sample size of the included studies ranged from 23 to 839 subjects. Whereas some studies involved participants from a single profession such as physicians^{14,19,21–24} and nurses,^{25,26} others used a mix of healthcare professionals. The overview of the included studies is presented in Table 1.

Analysis of the selected studies identified several factors related to individual or system characteristics to influence the perceptions of healthcare professionals towards EHR/EMR in the Gulf region. Moreover, it was found that the perception can be positive or negative. The major individual factor reported by the studies to affect the attitude of healthcare providers towards EHR/EMR was a lack of computer literacy skills.^{1,14,22,27,28} This personal characteristic resulted in a negative perception of the systems, fear to use them, and low satisfaction levels. On the other hand, most of the factors were related to the system, and were associated with positive perception and high user satisfaction. They mainly involved factors related to the perceived ease of use and the perceived usefulness. Health professionals who had a positive perception of EHR/EMR felt that the systems offer several benefits and are useful. The reported benefits included easy access to patient information and other health records by providers and patients,^{15,23,26–28} enhanced ease of writing referral letters,^{15,23} increased use of practice guidelines,¹⁴ enhanced communication between healthcare providers and patients,^{1,21} better decision-making,¹⁴ reduced medical errors,^{1,21,24,27,28} and improved quality of patient care.^{24,26,27} The systems were also reported to save time in health documentation processes,^{14,21,22} eliminate paperwork,²² increase efficiency in work operations,^{19,22,25,28} increase user

productivity,²⁸ and reduce overall healthcare cost.²⁷ One study also reported that the providers felt that the tools are easy to use and therefore improves work efficiency within health facilities.¹³

EHR and EMR systems were also found to have disadvantages that result in a negative perception that is likely to derail the acceptance and use among healthcare professionals. Some healthcare professionals reported that the systems require a longer time to document health data,^{14,21,25} lack the ability to procure lab results,^{15,23} increase risk of error,¹³ and do not guarantee patient confidentiality.²⁶ They were also perceived to be complex, making them difficult to use,^{19,24,25} unreliable due to the risk of power failure,²⁵ and costly.²⁸ These findings on the factors influencing the perception of healthcare professionals are presented in Table 2.

DISCUSSION

Evidence from this systematic review showed a positive correlation between EHR/EMR characteristics (perceived usefulness and perceived ease of use) and a positive attitude. Conversely, lack of computer skills and system deficiencies were negatively associated with the healthcare professionals' perception. These findings suggest that both individual or system factors may influence healthcare professionals' perception towards EMR/EHR whereby technology benefits and the users' ability to use the systems are associated with positive perception. In contrast, disadvantages and challenges are associated with negative perceptions. Therefore, system features, as well as personal characteristics, appear as significant determinants of acceptance and use of the systems and other HITs. The perceived usefulness, represented by the benefits of using EHR/EMR in healthcare and perceived ease of use, appeared as the motivating factors to adopting these technologies among healthcare professionals from the Gulf countries. The attributes result not only in positive perception but also increase user satisfaction associated with high likelihood of accepting and using the systems within healthcare practice. These findings are in tandem with those reported in other studies.^{17,29–31} For instance, Mitzner and colleagues found that positive attitudes were associated with the activities supported by technology in general, its convenience, and useful features.²⁹ Significant positive correlations have also been found between

Table 2: Individual and system factors affecting healthcare professionals' perception of EHR/EMR.

Author	Factors affecting healthcare professionals' perception of the use of EHR/EMR in improving the quality of healthcare services in healthcare organizations			Study recommendations
	Benefits/positive factors	Challenges/negative factors	Key findings	
Abdulla et al. 2016 ¹	<ul style="list-style-type: none"> Facilitates easy communication. Reduces medical errors. 	<ul style="list-style-type: none"> Low familiarity with computers creates a problem for healthcare providers when using EHR/EMR. 	Low satisfaction and perceived quality of work with the use of EMR among healthcare professionals due to inappropriate and inadequate system use.	There needs to be the appropriate and adequate usage of EHR/ EMR systems.
Al-Azmi et al. 2008 ²³	<ul style="list-style-type: none"> Easy to access the history of the patient. Instrumental in reviewing the details of the patients. Makes it easy for the medical professionals to write referral letters for consultation. 	<ul style="list-style-type: none"> The system's inability to procure lab results electronically. 	Health professionals exhibited a positive perception and were satisfied with the EHR/EMR.	It is vital to improving the system so that it is possible to procure lab results electronically.
Alasmary et al. 2014 ²⁷	<ul style="list-style-type: none"> Reduces costs by improving risk management. Minimizes medical errors. Improves the quality of patient care. Offers more organized notes on patient information and rapid access to patient details. 	<ul style="list-style-type: none"> EHR/EMR brings problems to health professionals with poor computer literacy. 	Highly computer literate users exhibited positive perception and high satisfaction than those with low computer literacy skills.	There is a need to improve on computer literacy skills among users.
Al Alawi et al. 2014 ²¹	<ul style="list-style-type: none"> Reduces errors. Saves time. Improves communication and patient outcomes. 	<ul style="list-style-type: none"> The longer time required to do documentation hindered users' practice and patient communication. 	The users were satisfied with the EMR and perceived it as a useful tool.	Need to enhance computer literacy and training in order to minimize documentation time.
Al-Mujaini et al. 2011 ¹⁴	<ul style="list-style-type: none"> Offers support in medical decision making. Promotes the use of guidelines. Increases coordination between the different multidisciplinary healthcare providers. 	<ul style="list-style-type: none"> Not worth due to the time required to use it. Low familiarity with computers creates a problem for healthcare providers when using EHR. 	Low satisfaction and negative perception work among users.	Need for appropriate and adequate usage of EHR/EMR systems.
Alharthi et al. 2014 ¹⁹	<ul style="list-style-type: none"> The system brings out increased speed, timeliness, completeness, and accuracy in processing patient information, and integration with workflow. 	<ul style="list-style-type: none"> Perceived as not an easy tool to use. 	Users' perception was poor and was not satisfied with the system.	Need to improve the ease of use of the system.
Alzobaidi et al. 2016 ²⁴	<ul style="list-style-type: none"> Brings benefits to the health organization by minimizing medical errors, improves the quality of patient care, and offers more organized notes on patient information. 	<ul style="list-style-type: none"> Requires intensive training to enhance ease of use. 	Positive towards EMR.	Training is important.
Alsaleh and Al-Azmi 2008 ¹³	<ul style="list-style-type: none"> Easy to use, therefore they improve functioning within the health facility. 	<ul style="list-style-type: none"> Possible occurrence of a system error. 	Positive perception.	Adequate training is required to help health care providers from make more errors due to lack of experience.

Table 2: Individual and system factors affecting healthcare professionals' perception of EHR/EMR.*-continued*

Author	Factors affecting healthcare professionals' perception of the use of EHR/EMR in improving the quality of healthcare services in healthcare organizations			Study recommendations
	Benefits/positive factors	Challenges/negative factors	Key findings	
Hasanain et al. 2015 ¹⁵	<ul style="list-style-type: none"> Increases the ease of accessing the medical history of the patient. Easy to write referral letters. 	<ul style="list-style-type: none"> Criticized for inability to procure lab results electronically. 	Positive perception as an effective and easy to use tool.	To improve active cooperation is required.
Khalifa 2013 ²⁸	<ul style="list-style-type: none"> Improves access to information between patients and caregivers. Increases users' productivity. Enhances the efficiency and accuracy of coding and billing. Reduces medical errors. 	<ul style="list-style-type: none"> EMR/EHR is feared because of the costs associated with them. 	Negative perception.	There is need to overcome human and financial barriers, which are the two major categories of barriers and challenges that hinder successful implementation of EMRs.
El Mahalli 2015 ²⁵	<ul style="list-style-type: none"> Enhances effective and efficient data processing. 	<ul style="list-style-type: none"> There is fear that health professionals cannot access the health records if the power fails. Complexity of the technology. More time required to feed the data. 	Negative perception.	There is a need to improve the utilization of EHRs, including training on computer literacy.
Asiri et al. 2014 ²⁶	<ul style="list-style-type: none"> Improves the quality of healthcare. Increases the ease of accessing patient information. 	<ul style="list-style-type: none"> Patient confidentiality. 	Positive perception.	Management buy-in and changing the attitude of healthcare professionals.
Shaker et al. 2015 ²²	<ul style="list-style-type: none"> Smoothens the workflow. Saves time. Eliminates paperwork. 	<ul style="list-style-type: none"> Computer literacy. 	Majority appreciated EMR with the overall perception being positive.	It is important to increase the ease of use of EHR and reduce workflow disturbance.

EHR: electronic health record; EMR: electronic medical record; HIS: health information system.

positive perceptions of perceived usefulness and perceived ease of use of EHR and EMR and acceptance of the technologies among nurses.^{30,31} It is important to note that this systematic review identified computer literacy as the only personal factor influencing perceptions of healthcare professionals in the GCC countries, which is consistent with Al-Mujaini and peers' finding of a significant association between low level of computer knowledge and low satisfaction and reduced performance among physicians following the implementation of an EMR system.¹⁴ However, this finding was surprising because of the influence of other demographic characteristics such as age, gender, and EHR/EMR experience on the perception of perceived usefulness, perceived ease of use, and attitude towards the systems' adoption and use, which have been widely investigated in the literature,^{14,17,30}

seem to be lacking in the GCC context. This could be explained by the fact that HITs are still new in the region, and few studies have been conducted in this area.

Conversely, the finding of negative associations between the disadvantages or challenges of using EHR/EMR technologies and perceptions of the healthcare professionals was not surprising. The systems are expected to be easy to use, make healthcare processes easier, and improve the quality of health outcomes.^{8,32,33} Therefore, any deviation from these objectives would result in dissatisfaction, negative attitude, and increased risk of rejection. Previous studies have similarly shown that the challenges encountered while using HIT may act as perceived barriers and threats to adopting the systems in hospitals.^{14,34} Therefore, understanding the factors that contribute to technology acceptance

is important for successful implementation. The lack of computer literacy skills, which emerged as the most personal characteristic resulting in a negative perception of EHR/EMR systems, could be related to increased risk of errors while entering the patients' data into the system. It also suggests that healthcare professionals in the region and beyond should be adequately trained on these technologies. Training is important because it improves the knowledge and computer skills of the user which is associated with positive perception and acceptance of new technology.^{15,35,36} Training should also focus on other areas, such as ensuring patient privacy and confidentiality while using the systems. Other challenges, such as complexity, can be overcome by developing systems that meet the users' needs and engaging the healthcare professionals at all stages of implementation. The management and tool developers should also offer adequate support to the healthcare professionals to improve their attitude towards EMR/EHR systems.

CONCLUSION

Factors influencing healthcare professionals' attitude towards EHR/EMR systems are mainly related to their perceived ease of use, usefulness, and needs of the user as well as personal factors. The benefits of the systems and ease of use are associated with positive perceptions. Therefore, successful implementation of HIT should consider the healthcare providers' preferences, needs, and perceptions. Health professionals and particularly those in the Gulf region need to be trained about EHR/EMR to equip them with the necessary knowledge and skills to achieve the systems' desired outcomes in improving the quality of healthcare services. Future studies should investigate more demographic factors that may influence healthcare professionals' perception and adoption of HIT in Gulf countries.

Disclosure

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