Explore of Patients Satisfaction with the Implementation of Electronic Medical Records in the Riyadh Saudi Arabia2022

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Abstract:

Background:

Patient satisfaction has gained the focal position in well-planned healthcare delivery systems. The implementation of the Electronic Medical Record (EMR) system initiated a significant transition in the healthcare system from traditional paper-based medical records to a digital version. Though EMR offers several benefits compared to Paper Medical Records (PMR), patient satisfaction with the EMR has been an area of concern. Facilitators and barriers to satisfaction after implementation of the electronic medical/health record (EMR/EHR) are important to understand as patient satisfaction is linked with improvement in health care and meaningful use of EMR/EHR. ‒Empirical studies of the [electronic medical Records] have increased‖ recently, but few studies have explored the impact of electronic medical Records on patients' satisfaction and the physician-patient relationship.

Aim of the study: To explore of Patients satisfaction with the implementation of electronic medical Records in the Riyadh Saudi Arabia2022.

Method: A cross-sectional survey was conducted with patients who attended AL-Yamamah Hospital in Riyadh city in the Riyadh Saudi during 2022. A sample of 400 participants was invited to complete a self-developed structured questionnaire with multiple choice and Likert Scale questions. The questionnaire was distributed to participants in the AL-Yamamah Hospital waiting areas.

Results: shows regarding the participants' General Satisfaction with Medical Care Received after Implementation of Electronic Medical Record System were while a significantly associated were P=0.001 and X^2 (290.333), regarding The medical care I have been receiving is just about perfect majority of our participant Satisfaction were (85.0%), regarding I am very satisfied with medical care I received the majority of our participant Satisfaction were (67.0%), regarding There are something about the medical care received that could be better the majority of our participant Satisfaction were (75.0%).

Conclusion: Patient satisfaction with electronic medical Records is a complex phenomenon, Patient satisfaction as an outcome variable is difficult to be measured precisely. There are many factors that influence patient satisfaction with electronic medical Records, research can help to refine theoretical models of patient satisfaction with electronic medical Records and aid in the development of an effective instrument for assessing and understanding such satisfaction.

<u>**Keywords:**</u> Explore, Patients, satisfaction, implementation, electronic, medical Records Riyadh

Introduction

The Patient Medical Record is a central system in any healthcare center as it incorporates all the data of the patient, the health and medical history, and detailed documentation of every consultation. It affects all healthcare workers associated with providing healthcare services, and the patient receiving the care (1). Patient records play a significant role in the accuracy and quality of the healthcare services as it is the primary system for storing and documenting patient data, improves communication, and following up investigations.(2) Although traditional paper-based medical records had been used for decades, flaws include missing data, illegible handwriting, inability to access data simultaneously, the weight of the paper, and the need for a large storage unit in each medical facility to store the files)3)

Patient satisfaction has gained the focal position in modern-day, well-planned healthcare delivery systems. Much attention within the healthcare industry is focused on patients' satisfaction with the quality of healthcare services.(4) Several lines of research have converged on the finding that care providers' interactions with patients and their families have remarkably strong effects on clinical outcomes, functional status, and even physiologic measures of health.(5) Measurement of such interactions is used as a key indicator of healthcare quality by many physicians and consumer groups. It gives useful feedback to clinicians and managers on perceived performance and satisfaction with care that may not be apparent through more traditional audit measures.(6) However, patient satisfaction has not been widely studied with respect to implementation of EHRs.(7)

The electronic medical Records support outcomes of patients' care. With electronic medical Records, there is less potential for medical errors as well as improved quality and safety in patient care (8). The electronic medical Records may improve health care delivery by facilitating physician communication about medications, enhancing documentation, increasing efficiency, and fostering information sharing and responsibility with patients (9). Electronic medical Records provides an obvious advantage over paper-based records because it allows providers to access patient records anytime and anywhere as long as they are able to log into the system. (10) It completely changes the manner of information collection as well as the medical office paradigm. Both the physician and the patient are affected by an electronic medical Records (11) .

Information technology can be used to facilitate and augment strategies for improving patients satisfaction)12(

Electronic medical record systems (EMRS) have great potential to improve the quality of health services and reduce the cost of care. The use of electronic health records for hospital and primary health care and integrated care is one of the most interesting characteristics of health care in Saudi Arabia. However, the development of electronic patient record systems has not reached the level where they can substitute paper-based file systems.(13(

Satisfaction is generally considered as the extent to which the patients feel that their needs and expectations are being met by the services provided.(14) Patient satisfaction predicts both compliances and utilization (15) and may even be related to improved health.(16) It also contributes to the atmosphere prevailing in hospitals and primary health care .(17) It is associated with continuity of care, the doctor's communication skills,(18) the degree of his or her patient centeredness (19) and the congruence between intervention desired and that received by the patient.(20) Other factors influencing satisfaction with medical care include confidence in the system and a positive outlook on life in general.(21) Finally, satisfaction is the judgment of the patient on the care that has been provided.(22) The physician remains a key element in patient satisfaction.(18)

Literature Review

Both as keepers of the Islamic holy sites and in agreement with Islam's historical commitment to the preservation and development of knowledge in scientific and medical fields, the Kingdom of Saudi Arabia has always had a keen eye on improving health services. In fact, KSA is ranked by the World Health Organization as 26th in the world in terms of health systems . The primary idea behind implementing electronic medical record systems in hospitals is to enhance efficiency and improve healthcare quality. (23)

Al-Hanawi et al (2019) reported that providing these extensive medical services, there has only been a small push for the greater use of technology to raise the standard of health services in KSA. Worldwide, electronic medical records system (EMR) has become a fundamental basis for healthcare improvement and is a key benchmark for enriching the quality of health care, enhancing patient management, and extending excellent results in the delivery (24). A study conducted in the USA, emphasizing that the physician and patient had more time todiscuss self-care topics and to explain health issues and medication use (2). In addition, active listening by the physician improved after implementing the EMR, and the participants felt it was convenient to ask questions about their health status and concerns this can be due to less time spent in writing and trying to fill the documents. (25)

Aldahiri, et al.(2021),found that in providing these extensive medical services, there has only been a small push for the greater use of technology to raise the standard of health services in KSA. Worldwide, electronic medical records system has become a fundamental basis for healthcare improvement and is a key benchmark for enriching the quality of health care, enhancing patient management, and extending excellent results in the delivery.(26)

A qualitative study where physicians were observed during the clinical consultation indicated that the physicians were more able to take an active role, such as encouraging questions and explaining health topics, but less effective in terms of exploring a patient-centered agenda, for example, the effect of the health problem on the patient's life, ideas and concerns compared to PMR (27). A study conducted in Kuwait to measure the level of satisfaction of PHC attendees reported overall satisfaction with the services except for two aspects, including explaining the medical procedure and being able to choose the physician they prefer (28).

Despite current handwritten documentation in patient charts by nurses, there is delayed communication to the medical provider (29). There is a lapse of time from when the nurse documents in the chart to when the doctor is receiving the information, unless the nurse takes an additional step and contacts the provider via the phone. This creates a 3-step process in the handwritten patient record method: Data collection, data charting and data transfer to provider. Current methods used by nurses to capture documentation of patient's physical health assessment are not complete or accurate, leading to potential medical errors because charts are used as a guide by providers to establish treatment plans . Lack of complete and timely documentation, limited accessibility, lack of analysis features, and inconsistent charting style are currently occurring at assisted living facilities (30).

In systematic literature review, six papers reported EMR/EHR systems (31–32), and other two papers did not descript EMR/EHR systems. Only one study offered descriptions of the structure or

core function of EMR/EHR (33). These studies did not take into account the different types of EMR/EHR (at least at the basic/advanced level). EMR/EHR may vary in content, function and usability, and experiences with this system may not be representative of other systems. One of the major challenges in identifying the level of EHR and EMR adoption and use is the lack of consensus on their definition, functionalities and capabilities (34).

Rationale:

Patient satisfaction as an outcome variable is difficult to be measured precisely. There are many factors that influence patient satisfaction with electronic medical Records, research can help to refine theoretical models of patient satisfaction with electronic medical Records and aid in the development of an effective instrument for assessing and understanding such satisfaction, implementation of electronic medical Records has some limitations in the implementation. There is a possibility that study reflecting patient satisfaction with electronic medical Records, countries may have been missed. Allowing the systematic storage of data and information were mentioned high Percentage of the interview respondents (physicians) in one study. In another study, participants (nurses and aged care staff) reported the convenience of data storage, as digital records in EHRs were stored on servers with backup.

Aim of the study:

To explore of Patients satisfaction with the implementation of electronic medical Records in the Riyadh Saudi Arabia 2022 .

Objectives:

This study explore of Patients satisfaction with the implementation of electronic medical Records in the Riyadh Saudi Arabia 2022.

Methodology:

Study design:

This study is a cross sectional study

Study Area

Patients aged <20 to >50 years and above, the patients who attended to AL-Yamamah Hospital in Riyadh city in the Saudi Arabia the study was conducted over 2 months, from November 1 ,2022 to December 31, 2022. AL-Yamamah Hospital in Riyadh city in Saudi Arabia .

Study Population

The study has been conducted among patients aged <20 to >50 years and above both male and female patients older than 20 years were included. The participants were patients who had an appointment at the AL-Yamamah Hospital in Riyadh city in 2022 and who used the AL-Yamamah Hospital before and after the implementation of the electronic medical Records. However, participants who were in severe pain, in an emergency condition, could not understand Arabic or English, or unable to communicate with the research personnel were excluded, study from November 1 ,2022 to December 31, 2022.

Selection criteria:

Inclusion criteria

- In this study, the inclusion criteria included the following: patients aged 20 to >50 years attended hospital with implementation of electronic medical Records

Exclusion criteria :

- Patients aged less than 20 years

- The patients not attended AL-Yamamah Hospital in Riyadh

- Patients refuse to participate in the study

Sample size :

The sample size has been calculated by applying Raosoft sample size calculator based on (The margin of error: 5%, Confidence level: 95%, and the response distribution was considered to be 20%) accordingly the Sample size is 400 of patients attending AL-Yamamah Hospital and adding 10 more to decrease margin of error. After adding 5% oversampling, the minimum calculated sample has been (400). Computer generated simple random sampling technique was used to select the study participants..

Sampling technique :

Systematic random sampling technique is adopted. By using systematic sampling random as dividing the total population by the required sample size; (400)

Data collection tool

The data were collected through a self-report structured questionnaire, which was self-developed and piloted with 20 participants, the questionnaire development was guided by the own researcher's

expertise in the subject matter in addition to the literature search about the EMR and quality of care from the patients' prospective. The questionnaire was distributed to the patients in the waiting areas patients attending AL-Yamamah Hospital. After adding 5% oversampling, the minimum calculated sample has been (400), the research personal to guarantee that all queries were answered, and no blank items were left..

Data collection technique :

Researcher has been visits the selected AL-Yamamah Hospital after getting the approval from the ministry of health. She has been explained the purpose of the study to all participants attending the clinic. The data has been collect through the November 1 to December 31, 2022.

Data entry and analysis:

Patient satisfaction was explored with Likert scale responses indicate the degree of satisfaction per item. Descriptive statistics (e.g., number, percentage), the data were entered in a workplace computer and analyzed using SPSS (Statistical Package Social Sciences) version 24.0. Continuous data are presented as a mean and standard deviation, and categorical variables as frequency and percentage. A p-value < 0.05 was considered significant. For inferential statistics, the Chi-Square test was used for comparing the categorical variables. The overall satisfaction was assessed on a Likert scale of 1 to 5. The comparison of both overall satisfaction methods was assessed before and after the implementation of EMR by using the paired t-test.

The dependent variables .

Were patient satisfaction with the EMR and the quality of services provided to the patients during the visit (waiting time, improved health services, prescription process, the appointment system, and the referral system). The independent variables were age, gender, educational level, and the number of visits to the PHC during the year. The questionnaire consisted of three sections. The first section gathered demographic information. The second section contained multiple-choice questions exploring the participant's satisfaction with the quality of the physician-patient relationship. The third section focused on the participant's satisfaction with the quality of services provided.

Pilot study:

A pilot study has been conducted to test the methodology of the study, the questionnaire has been clear .

Ethical considerations:

- Permission has been obtained, and has been Verbal consents from all participants in the questionnaire were obtained.

- All information was kept confidential, and a result has been submitted to the department as feedback.

Budget:

Self-funded .

Results

Table 1. Distribution of the demographic characteristics of the participants (n=400)

	N	%
Age		
< 20	100	25
20-30	88	22
30-40	128	32
>50	84	21
Gender		
Male	148	37
Female	252	63
Education		
Illiterate & Read and write	72	18
Basic	196	49
Secondary school and higher	132	33
Nationality		
Saudi	152	38
Non-Saudi	248	62
Marital status		
Divorced	116	29
Married	156	39
Widow	128	32
Monthly income		
Less than 5000	104	26

From 5000 to 10000	148	37
From 10000 to 15000	88	22
More than 15000	60	15
Waiting time before exam (minutes)		
<10	40	10
10-20.	60	15
21-30	176	44
>30	124	31
Having children		
Yes	340	85
No	60	15
Spending time with physician(minutes)		
<5	80	20
5-10.	136	34
10-15.	124	31
>15	60	15
Time of visiting the center		
Morning	296	74
Evening	104	26
Registered at the center		
Yes	312	78
No	88	22
Frequency of visits per year		
≤4	48	12
>4	352	88

Table 1 show regarding the age majority of the study groups were in the age 30-40 (32.0%) years followed by age < 20 years were(25.0%) but the 20-30 years were (22.0%), regarding the gender most of the respondents were female (63.0 %) while male were (37.0%). Regarding the education status, the majority of the respondents had basic were (49.0%) followed by Secondary school and higher were(33.0%) but Illiterate & Read and write were(18.0%), regarding the Nationality, the majority of the respondents Non-Saudi were (62.0%) followed by Saudi were (38.0%), regarding the Marital status, the majority of the respondents Married were (39.0%) followed by widow were

(32.0%), regarding the Monthly income, the majority of the respondents from 5000 to 10000 were (37.0%) followed by Less than 5000 were (26.0%), regarding waiting time before exam (minutes) the majority of the respondents from 21-30 minutes were (44.0%) followed by from >30 minutes were (31.0%), regarding having children, the majority of the respondents answer Yes were (85.0%) followed by No were (15.0%), regarding the Spending time with physician(minutes), the majority of the respondents 5-10 minutes were (34.0%) followed by 10-15 were (31.0%), regarding the Time of visiting the center the majority of the respondents morning were (74.0%) followed by evening were (26.0%), regarding the Registered at the center the majority of the respondents answer Yes were (78.0%) followed by No were (22.0%), regarding the Frequency of visits per year the majority of the respondents >4 were (88.0%) followed by ≤4 were (12.0%),

Table (2): Distribution the regarding Service Improvement after implementation of Electronic Medical Record System .

Service improved	Agree		disagree		Chi-square	
	No	%	No	%	X^2	P-value
Overall services at the center in general	340	85	60	15	196.000	0.000
Physician performance	272	68	128	32	51.840	0.000
Physician selection	176	44	224	56	5.760	0.016
Waiting time	152	38	248	62	23.040	0.000
Arrangement of patient's turn	176	44	224	56	5.760	0.016
Dispense medication from pharmacy	276	69	124	31	57.760	0.000
Written guidance of medication	312	78	88	22	125.440	0.000
Accuracy and easier follow up for health status	352	88	48	12	231.040	0.000
Time spent to retrieve medical record	260	65	140	35	36.000	0.000
Time spent for receiving medication	340	85	60	15	196.000	0.000
Physicians more interested in file than the patients	352	88	48	12	231.040	0.000

Table (2) shows the Service Improvement after implementation of Electronic Medical Record System regarding overall services at the center in general majority of our participant agree were

(85.0%) while disagree were(15.0%) were a significantly associated were P=0.000 and X^2 (196.000). Regarding the Physician performance the majority of our participant agree were (68.0%) while disagree were(32.0%) were a significantly associated were P=0.000 and X^2 (51.840), regarding Physician selection the majority of our participant disagree were (56.0%) while agree were(44.0%) were no significantly associated were P= 0.016 and X^2 (5.760). Regarding the Waiting time majority of our participant disagree were (62.0%) while agree were(38.0%) were a significantly associated were P= 0.000 and X^2 (23.040), regarding the Arrangement of patient's turn majority of our participant disagree were (56.0%) while agree were(44.0%) were no significantly associated were P= 0.016 and X^2 (5.760), regarding Dispense medication from pharmacy the majority of our participant agree were (69.0%) while disagree were(31.0%) were a significantly associated were P= 0.000 and X^2 (57.760), regarding Written guidance of medication majority of our participant agree were (78.0%) while disagree were(22.0%) were a significantly associated were P= 0.000 and X^2 (125.440), regarding Dispense medication from pharmacy the majority of our participant agree were (69.0%) while disagree were(31.0%) were a significantly associated were P= 0.000 and X^2 (57.760), regarding Accuracy and easier follow up for health status majority of our participant agree were (88.0%) while disagree were(12.0%) were a significantly associated were P= 0.000 and X^2 (231.040), regarding Time spent to retrieve medical record the majority of our participant agree were (62.0%) while disagree were(35.0%) were a significantly associated were P= 0.000 and X^2 (36.000), regarding Time spent for receiving medication majority of our participant agree were (85.0%) while disagree were(15.0%) were a significantly associated were P= 0.000 and X^2 (196.000), regarding Time spent for receiving medication majority of our participant agree were (88.0%) while disagree were(12.0%) were a significantly associated were P= 0.000 and X^2 (231.040).

Table (3): Distribution of the patients' Satisfaction with the Primary Health Care Services Received After Implementation of Electronic Medical Record System

Service improved	Agree		Neutral		Disagree		Chi-square	
	No	%	No	%	No	%	X^2	P-value
Overall services at the center in general	136	34	176	44	88	22	29.120	0.000
Improved physician-patients relationship	232	58	80	20	88	22	109.760	0.000
Reduced waiting time	268	67	120	30	12	3	247.760	0.000

Improved services	308	77	72	18	20	5	353.360	0.000
More efficient prescription process	196	49	140	35	64	16	65.840	0.000
Easier appointment booking	300	75	44	11	56	14	313.040	0.000
Improved referral system	328	82	60	15	12	3	434.960	0.000
Reassurance and support offered by physicians and staff	240	60	132	33	28	7	168.560	0.000
Respect shown by physicians and attention to your privacy	348	87	36	9	16	4	519.920	0.000
Personal interest in you and your medical problems	260	65	88	22	52	13	185.360	0.000
Number of physicians at the center	136	34	180	45	84	21	34.640	0.000
Advice you about ways to avoid illness and stay healthy	108	27	248	62	44	11	163.280	0.000

Table (3) shows the patients' Satisfaction with the Primary Health Care Services Received After Implementation of Electronic Medical Record System regarding Overall services at the center in general majority of our participant Neutral were (44.0%) while disagree were(22.0%) were a significantly associated were P=0.000 and X^2 (29.120). Regarding the Improved physician-patients relationship the majority of our participant agree were (58.0%) while Neutral were(20.0%) were a significantly associated were P=0.000 and X^2 (109.760), regarding Reduced waiting time the majority of our participant agree were (67.0%) while disagree were(3.0%) were a significantly associated were P= 0.000 and X^2 (247.760). Regarding the Improved services majority of our participant agree were (77.0%) while disagree were(5.0%) were a significantly associated were P= 0.000 and X^2 (353.360), regarding More efficient prescription process majority of our participant agree were (49.0%) while disagree were(14.0%) were a significantly associated were P= 0.00 and X^2 (65.840), regarding Easier appointment booking the majority of our participant agree were (75.0%) while Neutral were(11.0%) were a significantly associated were P= 0.000 and X^2 (313.040), regarding Improved referral system majority of our participant agree were (82.0%) while

disagree were(3.0%) were a significantly associated were P= 0.000 and X^2 (434.960), regarding Reassurance and support offered by physicians and staff the majority of our participant agree were (60.0%) while disagree were(6.0%) were a significantly associated were P= 0.000 and X^2 (168.560), regarding Respect shown by physicians and attention to your privacy majority of our participant agree were (87.0%) while disagree were(4.0%) were a significantly associated were P= 0.000 and X^2 (519.560), regarding Personal interest in you and your medical problems the majority of our participant agree were (65.0%) while disagree were(13.0%) were a significantly associated were P= 0.000 and X^2 (185.360), regarding Number of physicians at the center majority of our participant Neutral were (45.0%) while disagree were(21.0%) were a significantly associated were P= 0.000 and X^2 (34.640), regarding Advice you about ways to avoid illness and stay healthy majority of our participant Neutral were (62.0%) while disagree were(11.0%) were a significantly associated were P= 0.000 and X^2 (163.282).

Table (4): Distribution of participants' General Satisfaction with Medical Care Received after Implementation of Electronic Medical Record System .

Statement		No	%
The medical care I have been receiving is just about perfect		340	85
I am very satisfied with medical care I received		268	67
There are something about the medical care received that could be better		300	75
I am dissatisfied with some things about the medical care I receive		152	38
Chi-square	X^2	290.333	
	P-value	<0.001*	

Table (4) shows regarding the participants' General Satisfaction with Medical Care Received after Implementation of Electronic Medical Record System were while a significantly associated were P=0.001 and X^2 (290.333), regarding The medical care I have been receiving is just about perfect majority of our participant Satisfaction were (85.0%), regarding I am very satisfied with medical care I received the majority of our participant Satisfaction were (67.0%), regarding There are something about the medical care received that could be better the majority of our participant

Satisfaction were (75.0%), regarding I am dissatisfied with some things about the medical care I receive majority of our participant Satisfaction were (38.0%)

Figure (1) Distribution of participants' General Satisfaction with Medical Care Received after Implementation of Electronic Medical Record System .
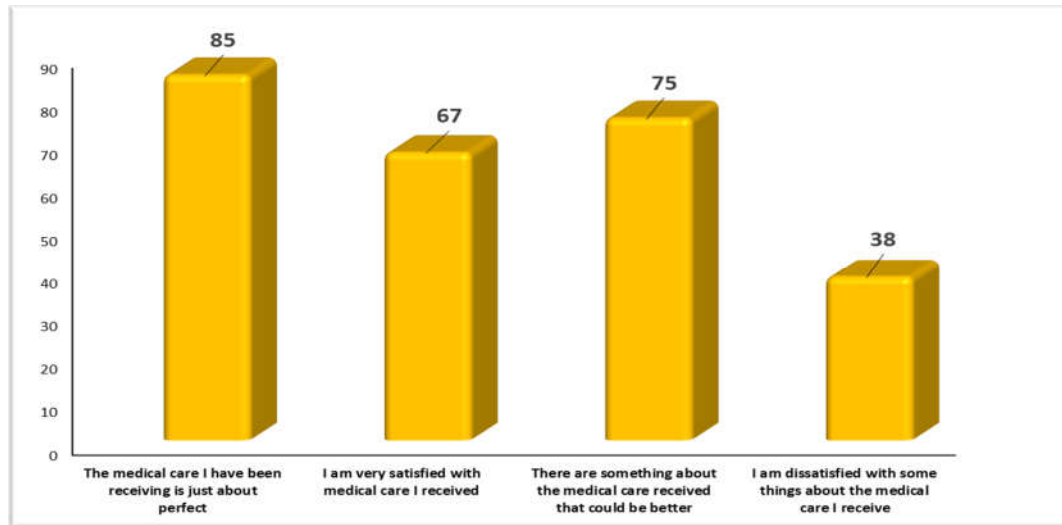
Discussion

Many "hoped for" outcomes are associated with use of electronic medical records. These outcomes include excellent quality of care, improved patient outcomes, enhanced careers, patient satisfaction, and increased rates of patient/member retention.(21) Research into patient attitudes towards the use of technology in health care needs to be given much greater attention within health informatics.(30) Patients can participate in the evaluation of quality of health care in three ways: by defining what is desirable or undesirable (i.e. setting standards of care), by providing information that permits others to evaluate the quality of care; and by expressing satisfaction or dissatisfaction with care.(23) in our study shows regarding the age majority of the study groups were in the age 30-40 (32.0%) years regarding the gender most of the respondents were female (63.0 %) the majority of the respondents Non-Saudi were (62.0%) waiting time before exam (minutes) the majority of the respondents from 21-30 minutes were (44.0%) regarding the Spending time with physician(minutes), the majority of the respondents 5-10 minutes were (34.0%) regarding the Time of visiting the center the majority of the respondents morning were (74.0%) .(See table 1)

Findings from this study demonstrated an overall improvement in patient satisfaction due to the implementation of EMR Compared to PMR. Similar findings have been reported (30) the

participants experienced that the physicians were more attentive during the medical consultation, a finding also reported in the literature(15). According to the participants, the physician explained the reason for tests and management options and that there was more time available to discuss various health topics. Support for the statement is provided by a study conducted in the USA, emphasizing that the physician and patient had more time to discuss self-care topics and to explain health issues and medication use (25). In addition, active listening by the physician improved after implementing the EMR, and the participants felt it was convenient to ask questions about their health status and concerns this can be due to less time spent in writing and trying to fill the documents.(16)

A qualitative study where physicians were observed during the clinical consultation, indicated that the physicians were more able to take an active role, such as encouraging questions and explaining health topics, but less effective in terms of exploring a patient-centered agenda, for example, the effect of the health problem on the patient's life, ideas and concerns compared to PMR (22). A similar study conducted in Kuwait to measure the level of satisfaction of PHC attendees reported overall satisfaction with the services except for two aspects, including explaining the medical procedure and being able to choose the physician they prefer (19). (See Table 2,3)

This study showed positive participant's perception about primary health care services after implementation of the EMR in all of the aspects; it improved information access, health care professional productivity, quality of provided health care, and overall patient satisfaction, which is similar to a study conducted in Australia which demonstrated similar results (35).

Writing in the PMR is time-consuming; information may be left out, and it interrupts the communication between the physician and the patient. A study found that physicians spent 40% of the consultation time typing on the computer, though this can improve with practice and attending appropriate training courses and a better designed EMR system (36). It should be noted that time constraints are a reality in a clinic with a high number of patients, and only a short time is available for the consultation. However, after the implementation of the EMR, more time is available for discussion of various health concerns, explaining the investigations, and discussing treatment options as reported in the current study(32). The majority of the participants in the current study agreed that the overall physician-patient relationship improved with the implementation of EMR, as well as the total waiting time and the overall quality of services, the appointment booking time, and referral system.(36)

The prescription process is another area of improvement with the implementation of EMR. Support for the result is available from a study conducted in Finland, showing additional benefits due to the implementation of EMR such as safety and drug interaction and the patient's medical history (37).

Conclusions

This review has contributed to a better understanding of patient satisfaction after implementation of electronic medical Records and has aimed to identify recurring themes and to offer preliminary guidelines and future directions for electronic medical Records Patient satisfaction during the clinical consultation and overall satisfaction in AL-Yamamah Hospital in Riyadh services improved with the implementation of electronic medical Records, increased satisfaction of patients, could lead to significant changes in design electronic medical Records. Patients' views may be taken into account as electronic medical Records is being developed.

References:

1. Rodriguez Llorian, E., & Mason, G. (2021). Electronic medical records and primary care quality: Evidence from Manitoba. *Health Economics*, *30*(5), 1124-1138.

2. Wali, R. M., Alqahtani, R. M., Alharazi, S. K., Bukhari, S. A., & Quqandi, S. M. (2020). Patient satisfaction with the implementation of electronic medical Records in the Western Region, Saudi Arabia, 2018. *BMC family practice*, *21*(1), 1-6.

3. Das, A. V., Kammari, P., Vadapalli, R., & Basu, S. (2020). Big data and the eyeSmart electronic medical record system-An 8-year experience from a three-tier eye care network in India. *Indian Journal of Ophthalmology*, *68*(3), 427.

4. Tanwar, S., Parekh, K., & Evans, R. (2020). Blockchain-based electronic healthcare record system for healthcare 4.0 applications. *Journal of Information Security and Applications*, *50*, 102407.

5. Nalleballe, K., Onteddu, S. R., Sharma, R., Dandu, V., Brown, A., Jasti, M., ... & Kovvuru, S. (2020). Spectrum of neuropsychiatric manifestations in COVID-19. *Brain, behavior, and immunity*, *88*, 71-74.

6. Mao, L., Jin, H., Wang, M., Hu, Y., Chen, S., He, Q., ... & Hu, B. (2020). Neurologic manifestations of hospitalized patients with coronavirus disease 2019 in Wuhan, China. *JAMA neurology*, *77*(6), 683-690.

7. Abdullah, S. S., Rostamzadeh, N., Sedig, K., Garg, A. X., & McArthur, E. (2020). Multiple regression analysis and frequent itemset mining of electronic medical records: a visual analytics approach using visa_m3r3. *Data*, *5*(2), 33.

8. Sultana, M., Hossain, A., Laila, F., Taher, K. A., & Islam, M. N. (2020). Towards developing a secure medical image sharing system based on zero trust principles and blockchain technology. *BMC Medical Informatics and Decision Making*, *20*(1), 1-10.

9. Ganiga, R., Pai, R. M., & Sinha, R. K. (2020). Security framework for cloud based electronic

health record (EHR) system. *International Journal of Electrical and Computer Engineering*, *10*(1), 455.

10. Uslu, A., & Stausberg, J. (2021). Value of the electronic medical record for hospital care: update from the literature. *Journal of medical Internet research*, *23*(12), e26323.

11. Janssen, A., Donnelly, C., Elder, E., Pathmanathan, N., & Shaw, T. (2021). Electronic medical record implementation in tertiary care: factors influencing adoption of an electronic medical record in a cancer centre. *BMC health services research*, *21*(1), 1-9.

12. Burgener, A. M. (2020). Enhancing communication to improve patient safety and to increase patient satisfaction. *The health care manager*, *39*(3), 128-132.

13. Hazazi, A., & Wilson, A. (2021). Leveraging electronic health records to improve management of noncommunicable diseases at primary healthcare centres in Saudi Arabia: a qualitative study. *BMC Family Practice*, *22*(1), 1-6.

14. Thapa, S., Nielsen, J. B., Aldahmash, A. M., Qadri, F. R., & Leppin, A. (2021). Willingness to use digital health tools in patient care among health care professionals and students at a university hospital in Saudi Arabia: quantitative cross-sectional survey. *JMIR medical education*, *7*(1), e18590.

15. Wright, J. M., Raghavan, A., Wright, C. H., Shammassian, B., Duan, Y., Sajatovic, M., & Selman, W. R. (2020). Back to the future: surgical rehearsal platform technology as a means to improve surgeon-patient alliance, patient satisfaction, and resident experience. *Journal of Neurosurgery*, *1*(aop), 1-8.

16. Yousef, C. C., Salgado, T. M., Farooq, A., Burnett, K., McClelland, L. E., Esba, L. C. A., ... & DeShazo, J. P. (2021). Health Care Providers' Acceptance of a Personal Health Record: Cross-sectional Study. *Journal of Medical Internet Research*, *23*(10), e31582.

17. Rawaf, S., Allen, L. N., Stigler, F. L., Kringos, D., Quezada Yamamoto, H., van Weel, C., & Global Forum on Universal Health Coverage and Primary Health Care. (2020). Lessons on the COVID-19 pandemic, for and by primary care professionals worldwide. *European Journal of General Practice*, *26*(1), 129-133.

18. Tonmoy, F. N., Cooke, S. M., Armstrong, F., & Rissik, D. (2020). From science to policy: Development of a climate change adaptation plan for the health and wellbeing sector in Queensland, Australia. *Environmental Science & Policy*, *108*, 1-13.

19. Hassoun-Kheir, N., Stabholz, Y., Kreft, J. U., De La Cruz, R., Romalde, J. L., Nesme, J., ... & Paul, M. (2020). Comparison of antibiotic-resistant bacteria and antibiotic resistance genes abundance in hospital and community wastewater: A systematic review. *Science of the Total Environment*, *743*, 140804.

20. Belizario, J. A., Lopes, L. G., & Pires, R. H. (2021). Fungi in the indoor air of critical hospital areas: a review. *Aerobiologia*, *37*(3), 379-394.

21. Ye, P., & Liu, L. (2021). Factors Affecting User Intention to Pay via Online Medical Service Platform: Role of Misdiagnosis Risk and Timeliness of Response. *International Journal of Healthcare Information Systems and Informatics (IJHISI)*, *16*(4), 1-26.

22. Wong, M. C., Wong, E. L., Huang, J., Cheung, A. W., Law, K., Chong, M. K., ... & Chan, P. K. (2021). Acceptance of the COVID-19 vaccine based on the health belief model: A population-based survey in Hong Kong. *Vaccine*, *39*(7), 1148-1156.

23. Yang, Y. C., Islam, S. U., Noor, A., Khan, S., Afsar, W., & Nazir, S. (2021). Influential usage of big data and artificial intelligence in healthcare. *Computational and Mathematical Methods in Medicine*, *2021*.

24. Al-Hanawi, M. K., Khan, S. A., & Al-Borie, H. M. (2019). Healthcare human resource development in Saudi Arabia: emerging challenges and opportunities—a critical review. *Public health reviews*, *40*(1), 1-16.

25. Burns, J., Ciccarelli, S., Mardakhaev, E., Erdfarb, A., Goldberg-Stein, S., & Bello, J. A. (2021). Handoffs in Radiology: Minimizing Communication Errors and Improving Care Transitions. *Journal of the American College of Radiology*, *18*(9), 1297-1309.

26. Aldahiri, A., Alrashed, B., & Hussain, W. (2021). Trends in using IoT with machine learning in health prediction system. *Forecasting*, *3*(1), 181-206.

27. Al-Alawi, K., Al Mandhari, A., & Johansson, H. (2019). Care providers' perceptions towards challenges and opportunities for service improvement at diabetes management clinics in public primary health care in Muscat, Oman: a qualitative study. *BMC health services research*, *19*(1), 1-17.

28. Biresaw, H., Mulugeta, H., Endalamaw, A., Yesuf, N. N., & Alemu, Y. (2021). Patient satisfaction towards health care services provided in Ethiopian health institutions: a systematic review and meta-analysis. *Health services insights*, *14*, 11786329211040689.

29. Humphries, C., Jaganathan, S., Panniyammakal, J., Singh, S. K., Goenka, S., Dorairaj, P., ... & Manaseki-Holland, S. (2019). Patient and healthcare provider knowledge, attitudes and barriers to handover and healthcare communication during chronic disease inpatient care in India: a qualitative exploratory study. *BMJ open*, *9*(11), e028199.

30. Selby, N. M., & Pannu, N. (2022). Opportunities in digital health and electronic health records for acute kidney injury care. *Current Opinion in Critical Care*, *28*(6), 605-612.

31. Alageel, S., & Gulliford, M. C. (2019). Health checks and cardiovascular risk factor values over six years' follow-up: Matched cohort study using electronic health records in England. *PLoS*

medicine, *16*(7), e1002863.

32. Zylla, D. M., Gilmore, G. E., Steele, G. L., Eklund, J. P., Wood, C. M., Stover, A. M., & Shapiro, A. C. (2020). Collection of electronic patient-reported symptoms in patients with advanced cancer using Epic MyChart surveys. *Supportive Care in Cancer*, *28*(7), 3153-3163.

33. Carini, E., Villani, L., Pezzullo, A. M., Gentili, A., Barbara, A., Ricciardi, W., & Boccia, S. (2021). The impact of digital patient portals on health outcomes, system efficiency, and patient attitudes: updated systematic literature review. *Journal of Medical Internet Research*, *23*(9), e26189.

34. Kang, H., Wang, J., Yao, B., Zhou, S., & Gong, Y. (2019). Toward safer health care: a review strategy of FDA medical device adverse event database to identify and categorize health information technology related events. *JAMIA open*, *2*(1), 179-186.

35. Lafata, J. E., Miller, C. A., Shires, D. A., Dyer, K., Ratliff, S. M., & Schreiber, M. (2018). Patients' adoption of and feature access within electronic patient portals. *The American journal of managed care*, *24*(11), e352.

36. Bisrat, A., Minda, D., Assamnew, B., Abebe, B., & Abegaz, T. (2021). Implementation challenges and perception of care providers on Electronic Medical Records at St. Paul's and Ayder Hospitals, Ethiopia. *BMC medical informatics and decision making*, *21*(1), 1-12.

37. Almezaal, E. A. M., Elsayed, E. A. H., Javed, N. B., Chandramohan, S., & Mohammed, A. M. (2021). Chronic disease patients' satisfaction with primary health-care services provided by the second health cluster in Riyadh, Saudi Arabia. *Saudi Journal for Health Sciences*, *10*(3), 185.