KAP STUDY

Use of electronic health records among Saudi and Non – Saudi health providers – a comparative study at a secondary hospital, Saudi Arabia

Khalid Tohami Medani, Syed Meraj Ahmed, Waqas Sami, Elsadig Yousif Mohamed, Sawsan Mustafa Abdalla, Huda Hakim Abdelrahman

Abstract

Objective: Electronic Health Record (EHR) system is now considered the backbone of effective storage and retrieval of patient records in a healthcare setup. This study is an attempt to assess the knowledge, attitude and practice of healthcare professionals in the use of Electronic Health Record system in patient care.

Methods: It was a comparative cross-sectional study, conducted among the clinicians working in King Khaled Hospital, Al-majmaah, Saudi Arabia. The data was collected from 260 clinicians using systematic random sampling technique. A pre-validated questionnaire was used to gather the data. Nineteen items were graded based on the adaptability, usability and knowledge of the participants. The total duration of the study from conception to completion was 6 months.

Results: There were 146 (56.2%) Saudis and 114 (43.8%) non – Saudi participants. Knowledge of computer was slightly more among Saudis 134 (51.5%) than non – Saudis 104 (40.0%) ($p>0.05$). Saudis had an overall positive attitude toward using the EHR as compared to non–Saudis ($p<0.001$).Frequency of accessing computers daily was more among Non-Saudi practitioners 93 (35.8%) as compared to the Saudis 85 (32.7%) which was statistically significant ($p<0.001$).

Conclusion: This study has attempted to correlate that clinician's adaptability with an electronic record system that requires prior expertise in the use of computers. It recommends further foray into researching barriers associated with slow uptake and positive attitudinal change among clinicians using the electronic health records system in healthcare facilities across Saudi Arabia.

Keywords: Electronic health records, clinicians, patient records, EHR training, Saudi Arabia.

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Introduction

Medical records play an important role in the patients'management. The medical records aid to track patient's treatment or follow up visits in a healthcare facility. It's uses in developed countries have steadily increased through gradual policy changes and new recommendations.[1]

Many studies have supported the use of information technology by healthcare providers to be beneficial in improving healthcare services.[2,3] However, other studies showed decreased efficiency in maintaining medical records between inpatient and outpatient services, when compared to traditional and electronic record keeping.[4,5] It is necessary then for the healthcare professionals who are dealing with patients to have knowledge and skills to use technology for the benefits of the patient and their optimum care. Studies have shown there is a gap in the policy maker's expectations and the practitioners experience in using electronic health records for patient care.[6] Multiple authors in their studies have concluded that physicians are satisfied with using EHR and they should work on improving their computer skills to make if more effective.[7-9]

In Saudi Arabia, there is a lack of a unified electronic health record system for patients because the information is scattered across different healthcare institutions.[10] Studies have shown that problems for implementation of the Electronic Health Records (HER) in Saudi Arabia exist in spite of the enthusiasm for its use among healthcare professionals.[11,12] Barriers include:setting up of finances, EHR system installation, physicians training, equipment maintenance and its regular upgradation.[13-15] Multiple studies in Saudi Arabia have focused on such barriers but very few have explored the key factors associated with its use among healthcare practitioners. This study had assessed the knowledge, attitude and practice of Saudi and Non-Saudi physicians towards implementation of EHR in patient care in Majmaah, Saudi Arabia.

Methodology

This comparative cross-sectional study was conducted among the Saudi and Non-Saudi healthcare professionals working in King Khaled General Hospital (KKGH), Al-Majmaah, Saudi Arabia from November 2017 to April 2018. KKGH is a secondary care specialty hospital that provides health care to 150,000 people approximately, from Al-Majmaah city and other neighbouring governorates.[16]

Department of Public Health & Community Medicine, College of Medicine, Majmaah University, AL-Majmaah, Kingdom of Saudi Arabia

Correspondence: Khalid Tohami Medani. e-mail: k.medani@mu.edu.sa

Data Collection: The data was collected from 260 healthcare professionals. All the healthcare workers who were working in the hospital during the study period were included in finalizing the study sample. Any visiting physician, those without a Saudi License to practice, Interns, trainee doctors or medical students and nurses were excluded from the study. Sample size was calculated using the level of precision formula, where z=1.96, p=0.79, 1-p=0.21, d=0.05.[17] Selection of clinicians was done through complete enumeration random sampling technique.The distribution of the questionnaire was done in a stepwise manner. Each department was categorized, and all the faculties included in the list with their contact number and email address. The investigator was entrusted with the task of distribution of the questionnaire to the faculty and following it up with a gentle reminder at least twice within a week to fill it up. The filled-up questionnaire was collected after a gap of a week and queries answered during that time if any. There was some delay in submission by some departments and they were given a grace period of another week to finish the questionnaire.

Questionnaire: A self – validated, close – ended questionnaire was used for data collection. The questionnaire was prepared after intensively reviewing the literature.[18,19] It was originally prepared in English language and later translated into Arabic language to facilitate the participants in understanding the nature of the questions asked. To ensure the validity of the Arabic questionnaire, a backward translation was done by an independent expert. The questionnaire was divided into four sections. Section 1 corresponded to demographic information, whereas, section 2, 3 and 4 comprised of questions related to Knowledge, Attitude and Practice respectively. Internal Consistency Reliability (ICR) of the English version questionnaire was tested through Cronbach Alpha. The ICR value was 0.66 which showed that the questionnaire has acceptable reliability.[20]

A self-explanatory consent form was attached with the questionnaire explaining the rationale of this survey and it was stressed that their participation is purely voluntary. This study was approved by the Ethics Committee, Basic Health Research Center, Majmaah University.

Statistical Analysis: IBM SPSS software version 23.0 was used to enter the data variables and conduct relevant analysis between associated factors and outcome. Mean ± SD was used to calculate quantitative variables. Frequencies and percentages were given for qualitative variables. Normality of the data was checked through one sample Kolmogorov-Smirnov test. A p-value of <0.05 shows deviation from normality. Pearson Chi-Square and Fisher Exact Test were applied to observe association between qualitative variables. A p-value of <0.05 was considered as statistically significant.

Results

As seen in Table – 1, there were 146 (56.2%) Saudis and 114 (43.8%) non – Saudi participants. Most of the participants 151 (58.1%) were in the < 30 years age group. Almost 84 (36%) participants were in between 30 – 50 years of age while rest 16 (6.2%) were more than 50 years old.

The level of knowledge about EHR among the participants is shown in Table – 2. There were 238 (91.5%) participants who were familiar with the use of computer. The Knowledge of computer among Saudis was 134 (51.5%), while in non – Saudis, it was 104 (40.0%), but it was not statistically significant. Around half of the respondents 134 (51.5%) knew about the different components that made

Table-1: Distribution of age and gender.

Age group	Male		Total	Female		Total
	Saudi	Non-Saudi		Saudi	Non-Saudi	
< 30 years	47 (79.7%)	12 (20.3%)	59 (100.0%)	48(52.2%)	44 (47.8%)	92 (100.0%)
30 – 50 years	38 (58.5%)	27(41.5%)	65 (100.0%)	8(28.6%)	20 (71.4%)	28 (100.0%)
> 50 years	5 (33.3%)	10 (66.7%)	15 (100.0%)	0 (0.0%)	1 (100.0%)	1 (100.0%)
Total	90 (64.8%)	49 (36.2%)	139 (100.0%)	56 (46.3%)	65 (53.7%)	121 (100.0%)

Table-2: Distribution of participants according to the knowledge of using EHR.

Knowledge	Saudi		Non – Saudi		Total	p-value
	Yes	No	Yes	No		
Do you know how to use a computer	134 (51.5%)	12 (4.6%)	104 (40.0%)	10 (3.8%)	260 (100.0%)	$X^2 = 0.025$, $p = 0.874$
Have you heard of electronic health records (EHR)	113 (43.5%)	33 (12.7%)	98 (37.7%)	16 (6.2%)	260 (100.0%)	$X^2 = 3.07$, $p = 0.080$
Do you know the components of EHR	58 (22.3%)	88 (33.8%)	76 (29.2%)	38 (14.6%)	260 (100.0%)	$X^2 = 18.6$, $p = 0.000$
Is it easy to use EHR at hospital	97 (37.3%)	49 (18.8%)	68 (26.2%)	46 (17.7%)	260 (100.0%)	$X^2 = 0.533$, $p = 0.465$
EHR saves time at the hospital	114 (43.8%)	32 (12.3%)	74 (28.5%)	40 (15.4%)	260 (100.0%)	$X^2 = 5.545$, $p = 0.019$
Error reporting of EHR gets quickly rectified	73 (28.1%)	73 (28.1%)	68 (26.2%)	46 (17.7%)	260 (100.0%)	$X^2 = 2.401$, $p = 0.121$

Table-3: Distribution of participant according to their attitude towards EHR.

Attitude	Saudi		Non – Saudi		Total	p-value
	Yes	No	Yes	No		
Do you feel that EHR is important	113 (43.5%)	33 (12.7%)	90 (34.6%)	24 (9.2%)	260 (100.0%)	$X^2 = 0.090$, $p = 0.764$
Can EHR replace paper records in hospital	103 (39.6%)	43 (16.5%)	62 (23.8%)	52 (20.0%)	260 (100.0%)	$X^2 = 16.18$, $p = 0.000$
Using EHR is faster than conventional method	101 (38.8%)	45 (17.3%)	67 (25.8%)	47 (18.1%)	260 (100.0%)	$X^2 = 1.273$, $p = 0.259$
EHR is safe for maintaining privacy of patient information	121 (46.5%)	25 (9.6%)	85 (32.7%)	29 (11.2%)	260 (100.0%)	$X^2 = 2.69$, $p = 0.101$
EHR reduces medical errors in the hospital	95 (36.5%)	51 (19.6%)	73 (15.8%)	41 (28.1%)	260 (100.0%)	$X^2 = 0.03$, $p = 0.863$
EHR should be regularly upgraded	117 (45.0%)	29 (11.2%)	96 (36.9%)	18 (6.9%)	260 (100.0%)	$X^2 = 0.717$, $p = 0.397$
Administrative staff shows interest in the functioning of HER	73 (28.1%)	73 (28.1%)	83 (31.9%)	31 (11.9%)	260 (100.0%)	$X^2 = 13.874$, $p = 0.000$

Table-4: Distribution of participants according to the practice of using EHR.

Practice	Saudi		Non – Saudi		Total	p-value
	Yes	No	Yes	No		
Do you use the computer daily	85 (32.7%)	61 (23.5%)	93 (35.8%)	21 (8.1%)	260 (100.0%)	$X^2 = 16.18$, $p = 0.000$
Writes patients notes and reports without any assistance	56 (21.5%)	90 (34.6%)	61 (23.5%)	53 (20.4%)	260 (100.0%)	$X^2 = 5.939$, $p = 0.015$
Attended training program for using EHR at work	26 (10.0%)	120 (46.2%)	40 (15.4%)	74 (28.5%)	260 (100.0%)	$X^2 = 10.091$, $p = 0.001$
Use EHR for reading patient file	59 (22.7%)	87 (33.5%)	45 (17.3%)	69 (26.5%)	260 (100.0%)	$X^2 = 0.023$, $p = 0.878$
Use EHR for reading laboratory reports	60 (23.1%)	86 (33.1%)	52 (20.0%)	62 (23.8%)	260 (100.0%)	$X^2 = 0.023$, $p = 0.878$
Use EHR for prescribing medications	63 (24.2%)	83 (31.9%)	53 (20.4%)	61 (23.5%)	260 (100.0%)	$X^2 = 0.289$, $p = 0.591$

up the EHR of which was significant ($p<0.05$). Similarly, 114 (43.8%) Saudi participants agreed that EHR saves time at the hospital as compared to non-Saudis 74 (28.5%), More than half of the respondents 141 (54.3%) also agreed that any problems encountered in the functioning of the EHR got quickly rectified when reported.

Table – 3 shows that significantly more ($p<0.001$) Saudis 103 (39.6%) believed that EHR can replace paper records in hospitals than Non – Saudis 62 (23.8%). Significantly ($p<0.001$) a greater number of non - Saudi respondents 83 (31.9%) as compared to Saudis 73 (28.1%) agreed that administrative staff were cooperative in assisting with the functioning of the EHR. 203 (> 75%) respondents agreed that the EHR is important in the hospital and 168 (64.6%) gave an affirmative that it is faster than conventional method of maintaining data. 121 (46.5%) Saudis agreed that EHR is safe for maintaining privacy of patient information compared to only 85 (32.7%) Non - Saudis. Almost equal number of respondents had conflict of view that EHR can reduce medical errors. But, 213 (> 80%) were convinced that EHR should be regularly upgraded to maintain the efficiency of its use.

Table – 4 elaborates on the practice of using the electronic health records by the participants. A daily use of the computer ensures that the patient's information is fed into the system by the healthcare professionals. It was seen that a greater number of non – Saudis 93 (35.8%) accessed their computers daily as compared to the Saudis 85 (32.7%) and this difference was statistically significant ($p<0.001$). Also, even though overall, 117 (50%) practiced writing patients notes and reports without any assistance, a greater percentage of non – Saudis 61 (23.5%) as compared to Saudis 56 (21.5%) did this task and this difference was statistically significant ($p= 0.015$). The use of electronic health records requires prior training and it was seen in this study that overall only 66 (25.4%) participants were exposed to it. Again, more non – Saudi participants 40 (15.4%) attended the training programme than Saudi participants 26 (10.0%) and this difference was statistically significant ($p<0.001$).

Majority of the participants 156 (60%) did not use the electronic health records for reading the patient files, and this was similar to most of them 148 (57%) not depending on EHR for reading laboratory reports. Also, while prescribing medications, more than half the participants said that they wrote it rather than use EHR to enter the details.

Discussion

Overall, this study showed that the respondents had a healthy knowledge about EHR in general, but Saudi participants were more prone to favour its usefulness than Non-Saudis. As far as putting it into daily practice was concerned, our study showed that more of the Non-Saudis were involved in its usage than the Saudi participants. In our study, 64.5% respondents agreed that introduction of EHR will benefit both the patients and the healthcare professionals alike. Similar studies have pointed out similar conclusions based on benefits to both patients and healthcare professionals.[21,22] Most of the participants (91.5)

had knowledge of using the computer but more Saudis (43.5%) knew of EHR system than non – Saudis (37.7%). Surprisingly, significantly more (p<0.001) non – Saudis (29.2%) knew about the components of EHR than the Saudis (22.3%). A higher number of Saudi participants (37.3%) acknowledged the ease of using EHR in the hospital as compared to non – Saudis (26.2%). This might explain why there is significantly more (p = 0.019) Saudis (43.8%) agreeing to the use of EHR to save time in the hospital, as compared to non – Saudis (28.5%). But both were equivocal in denying that rectification of any error in the EHR is done quickly. Other studies also showed that there was not much gap between those who were satisfied or not satisfied with the use of the system in a healthcare facility.[23] A similar study done in eastern part of Saudi Arabia found a higher dissatisfaction among the participants as far as IT support was concerned to run the EHR system.[24]

The introduction of a new technology requires an attitudinal change among the users so that it can be accepted as a part of the daily activity to improve the efficiency of the organization. This study showed more acceptance of EHR among Saudis (43.5%) than among the non – Saudis (34.6%). Significantly more Saudis (39.6%) (p <0.001) envisioned EHR replacing paper records eventually as compared to non-Saudis (23.8%).Some studies showed a similar positive attitude of the healthcare professionals to the introduction of new technologies in healthcare[25] while some studies concluded that awareness and training programmes are needed to bring an attitudinal shift among the clinicians in the use of electronic health records.[26] Other areas where opinions of the Saudi participants were higher than the non-Saudis were that the EHR accomplishes tasks faster (38.8%, 25.8%, p = 0.259), privacy of patient information is better (46.5%, 32.7%, p = 0.101), it reduces medical errors (36.5%, 15.8%, p = 0.863) and regular upgrade of EHR is essential (45.0%, 36.9%, p = 0.397). Conversely, more non-Saudis (31.9%) agreed that administrative staff were involved with the smooth function of EHR than Saudis (28.1%) which was statistically significant (p < 0.001). Shaker et al highlighted the administrative problem in their study which showed that 35.1% of the participants agreed that it disrupted the smooth flow of information.[27]

Since utilizing the EHR requires the use of the computer on a daily basis it is interesting to note that non-Saudis (35.8%) use it more than Saudis (32.7%) which was statistically significant (p<0.001). This explains why significantly more (p = 0.015) Saudis (34.6%) denied taking any assistance whatsoever for writing patients notes and reports than non-Saudis (20.4%). This means that a system such as the EHR can be a valuable addition to the daily chores of digitally entering fresh or upgrading patient information to be archived. Unfortunately, more than 75% respondents have yet to attend a training programme for learning how to use the EHR among which the percentage of Saudis was significantly higher than non-Saudis (46.2%, 28.5%, p= 0.001). This could be one of the roadblocks to the success of its daily use. This can also affect the accuracy of the patient information stored in the system. A similar outcome was seen in a study done in Saudi Arabia where the author pointed out the challenges associated with the introduction of hospital information system that included areas such as awareness, training and user friendliness for the faculty concerned.[28] The participants in this study also acknowledged that they do not use the EHR to see patients files (60%), or see laboratory results (57%) or prescribe treatment to the patients (55%). This could be due to lack of training provided to them before the implementation of the EHR system. Similar studies conducted in Saudi Arabia have pointed out the lack of knowledge and experience as the key areas to tackle so that a new system for keeping patient records can be implemented successfully.[29,30]

Strength and Limitation

This study has taken a forward step in identifying the factors associated with the use of EHR by healthcare professionals in a developing region of Saudi Arabia. It has successfully mapped the areas of human interests and disinterests in using newly introduced technology for cumulative benefit. The drawback in our study is that it cannot judge with certainty that other barriers have been identified that can be a roadblock to a healthy and robust system to assist clinicians and patients alike. Further studies both qualitative and follow up are required to identify physical, psychological and technological challenges faced by healthcare professionals in an increasing era of modernistic transformation from man to machine.

Conclusion

The Electronic Health Record system is a step towards introducing technology in healthcare and gradually digitalizing the whole process of data entry, archiving and easy availability throughout the national medical register. Healthcare professionals in our study have the initiative to cross-over to a better and more time saving method of practicing medicine in healthcare facilities. But they require more training and seamless integration with other non – medical departments to cope with myriads of technical difficulties which are not their forte.

Recommendation

It is therefore recommended that further exploratory and follow up studies should be conducted to establish key

areas in knowledge, training, logistical backup, interoperability between different departments, policies and benefits to different stakeholders in reaching a common goal of perfection in healthcare services.

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References

1. Connecting for Health, Data Standards Group, Clinical Data Exchange Efforts in the United States: An Overview. [Online] [Cited 2018 April 01]. Available from: URL: www.connectingforhealth.org/resources/DSWG_ Backgrounder_AppendixA.pdf
2. Hernandez SE, Conrad DA, Marcus-Smith MS, Reed P, Watts C. Patient-centered innovation in health care organizations: A conceptual framework and case study application. Health Care Manage Rev. 2013; 2:166-75.
3. Middleton B, Bloomrosen M, Dente MA, Hashmat B, Koppel R, Overhage JM, et al. Enhancing patient safety and quality of care by improving the usability of electronic health record systems: recommendations from AMIA. J Am Med Inform Assoc. 2013; 20:e2-8.
4. Campanella P, Lovato E, Marone C, Fallacara L, Mancuso A, Ricciardi W, et al. The impact of electronic health records on healthcare quality: a systematic review and meta-analysis. Eur J Public Health. 2015; 1:60-4.
5. King J, Patel V, Jamoom EW, Furukawa MF. Clinical benefits of electronic health record use: national findings. Health Serv Res.2014; 49:392-404.
6. Appari A, Eric JM, Anthony DL. Meaningful use of electronic health record systems and process quality of care: evidence from a panel data analysis of US acute care hospitals. Health Serv Res. 2013; 48:354-75.
7. Heisey-Grove D, Danehy LN, Consolazio M, Lynch K, Mostashari F. A national study of challenges to electronic health record adoption and meaningful use. Med Care. 2014; 2:144-8.
8. Friedberg MW, Chen PG, Van Busum KR, Aunon F, Pham C, Caloyeras J, et al. Factors affecting physician professional satisfaction and their implications for patient care, health systems, and health policy. Rand Health Q. 2014; 4:1
9. Raymond L, Paré G, de Guinea AO, Poba-Nzaou P, Trudel MC, Marsan J, et al. Improving performance in medical practices through the extended use of electronic medical record systems: a survey of Canadian family physicians. BMC Med Inform Decis Mak. 2015; 1:27.
10. Almaiman A, Bahkali S, Alfrih S, Househ MS, El Metwally A. The use of health information technology in saudi primary healthcare centers. Stud Health Technol Inform. 2014; 209-12.
11. El Mahalli AA. Electronic health records: Use and barriers among physicians in eastern province of Saudi Arabia. Saudi J Hlth Sc. 2015; 1:32.
12. Almalki M, FitzGerald G, Clark M. Health care system in Saudi Arabia: an overview. East Mediterr Health J. 2011; 10:784-93.
13. Bah S, Alharthi H, El Mahalli AA, Jabali A, Al-Qahtani M, Al-kahtani N. Annual survey on the level and extent of usage of electronic health records in government-related hospitals in Eastern Province, Saudi Arabia. Perspect Health Inf Manag. 2011; 8:1b.
14. Noureldin M, Mosollom R, Hassan SZ. Quality of documentation of electronic medical information systems at primary health care units in Alexandria, Egypt. East Mediterr Health J. 2014; 13:105-11.
15. Khalifa M. Barriers to health information systems and electronic medical records implementation. A field study of Saudi Arabian hospitals. Proc Comp Sc. 2013; 1:335-42.
16. Cited on 25.03.2019. https://www.moh.gov.sa/en/Ministry/MediaCenter/News/Pages/News-2017-11-20-001.aspx.
17. Sami W, Al-Rukban MO, Almansour M, Waqas T, Afzal K, Asad R. How many subjects should be studied: sample size determination through hypothesis testing and confidence interval. Majmaah J Hlth Sc. 2013; 2:43-8.
18. Jamoom E, Beatty P, Bercovitz A, Woodwell D, Palso K, Rechtsteiner E. Physician adoption of electronic health record systems: United States, 2011. NCHS Data Brief. 2012; 98:1-8.
19. Al-Harbi A. Healthcare providers' perceptions towards health information applications at King Abdul-Aziz Medical City, Saudi Arabia. Int J Adv Comp Sc Ap. 2011; 10:10-3.
20. Taber KS. The use of Cronbach's alpha when developing and reporting research instruments in science education. Res Sc Ed. 2018; 6:1273-96.
21. Klinis S, Markaki A, Kounalakis D, Symvoulakis EK. Monitoring reasons for encounter via an electronic patient record system: The case of a rural practice initiative. Int J Med Sci. 2012; 8:704-7.
22. Gellert GA, Ramirez R, Webster SL. The rise of the medical scribe industry: implications for the advancement of electronic health records. JAMA. 2015; 13:1315-6.
23. Alkureishi MA, Lee WW, Lyons M, Press VG, Imam S, Nkansah-Amankra A, et al. Impact of electronic medical record use on the patient–doctor relationship and communication: a systematic review. J Gen Intern Med. 2016; 5:548-60.
24. Alqahtani A, Crowder R, Wills G. Barriers to the adoption of EHR systems in the Kingdom of Saudi Arabia: an exploratory study using a systematic literature review. J Hlth Info Dev Cntr. 2017; 11:2.
25. Alharthi H, Youssef A, Radwan S, Al-Muallim S, Zainab AT. Physician satisfaction with electronic medical records in a major Saudi Government hospital. J Taib Univ Med Sc. 2014; 3:213-8.
26. Sinha RK, Shetty SR. Attitude of Ayurveda doctors toward the impact of health information technology. J Ayurveda Integr Med. 2015; 6:89-94.
27. Shaker HA, Farooq MU, Dhafar KO. Physicians' perception about electronic medical record system in Makkah Region, Saudi Arabia. Avicenna J Med. 2015; 1:1-5.
28. Khalifa M. Technical and human challenges of implementing hospital information systems in Saudi Arabia. J Hlth Inf Dev Cntrs. 2014; 8:1-4.
29. Aldosari B. Rates, levels, and determinants of electronic health record system adoption: A study of hospitals in Riyadh, Saudi Arabia. Int J Med Inform. 2014; 83:330-42.
30. Alkraiji A, Jackson T, Murray I. Barriers to the widespread adoption of health data standards: an exploratory qualitative study in tertiary healthcare organizations in Saudi Arabia. J Med Syst. 2013; 37:9895.