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Original Research Article

Satisfaction of Health Care Workers from the Electronic Health Recording System in Najran General Hospital, Southern Saudi Arabia

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Abstract

Background: An EMR is a medical record in a digital format. One of the important trends is the move towards a universal electronic patient record. Saudi Arabia has prioritized the development of e-health as well as the transition from paper-based health records to electronic health records. ***Study Objectives:*** to assess the satisfaction, and diffeculties influencing the implementation of electronic medical recording system among healthcare workers in Najran General Hospital, Southern Saudi Arabia. ***Methods:*** A descriptive cross sectional study design was adopted. A predesigned questionnaire was submitted through the social media platforms, comprising (WhatsApp, Facebook, and Twitter) to all healthcare workers in the hospital (Doctors, Nurses, and the employee who deal with hospital recording system). ***Results:*** The majority of the participants found the performance of some tasks easier when utilizing EMR. Most (73.6%) reported that it is easier to seek out specific information from patient electric records, 71.9% reported that it is easier to review the patients problems, 76.2% stated that it is easier to obtain the results from laboratory analyses, 69.7% reported that it is easier to obtain the results from X-Ray, Ultrasound or CT investigations, 71.4% stated that it is easier to review currently received medications, 64.5% stated that it is easier to find patients with certain characteristics, 68.8% stated that it is easier to order x-ray, ultrasound, or CT investigations and 65.4% reported that it is easier to write prescriptions. ***Conclusion:*** Most of the pparticipants agreed to be satisfied with the system's technical support and service and ease of use. The majority of the participants found the performance of some tasks easier when utilizing EMR and expressed EMR systems' positive impact on quality of care.

Keywords: Satisfaction, Health Care Workers, Electronic Health Recording System, Najran, Saudi Arabia.

INTRODUCTION

Like any other organization, the nature of the healthcare organization has changed over time from a relatively stable organization to a dynamic one. Nowadays, the widespread use of information and communication technologies (ICT) has permeated almost all aspects of life including the healthcare sector [1]. Health information systems (HIS) were introduced to fully utilize the Internet in providing better healthcare. Health information systems frequently refer to the interaction between people, processes, and technology to support operations and management in delivering essential information in order to improve the quality of healthcare services [2].

Health Informatics is the field that concerns itself with the cognitive, information processing, and communication tasks of medical practice, education, and research including the information science and technology that support those tasks [3].

Another important term in HIS is Electronic Medical Records (EMR). It resides at

the center of any health information system. An EMR is a medical record in a digital format, whereas electronic health record (EHR) refers to an individual patient's medical record in a digital format. EHR systems coordinate the storage and retrieval of individual records with the aid of computers, which are usually accessed on a computer, often through a computer network. One of the important trends is the move towards a universal electronic patient record (EPR) [4, 5].

EPR is defined as electronically stored health information about one individual uniquely identified by an identifier. Essentially EPR technology entails capturing, storing, retrieving, transmitting, and manipulating patient- specific, healthcare-related data singly and comprehensively, including clinical, administrative, and biographical data. Ideally, EMR should be on a single platform nationwide to enable interoperability and portability horizontally and vertically across the referral chain [6].

Medical records have a history of 4000 years in evolution and, in some form, have existed since the beginning of the practice of medicine. Some of the first medical records date back to Hippocrates in the 5th century BC and medieval physicians. Formal medical records appeared in the nineteenth century in Europe in major teaching hospitals and were quickly adopted across the world [7].

The modern medical record was developed in the 20th century – data about each patient, including clinical data, was recorded, organized in a standardized format and stored. Major problems with traditional paper medical records include lack of standardization across physicians and healthcare facilities, poor search ability and loss of information [8].

EMR is considered potentially one of the drivers for the transformation of healthcare. From a patient care perspective, EMR is expected to improve the accuracy of the information, support clinical decision-making and improve the accessibility of information for continuity of care. From an operational perspective, EMR should generate essential health care statistics crucial to the planning and management of health care services [9, 10].

User expectations from a good EMR are several as meticulous patient documentation, common templates and order sets, disease coding and billing, regulatory compliance, prevention of medication errors, clinical pathway utilization, optimized workflow, medico-legal defensibility, adaptive learning capability, simplicity, multiple input interfaces, incorporation of clinical images, seamless connectivity with clinical investigation platforms, input speed at the point of entry, and most importantly, data compilation for analysis and research, all with time-efficiency, and a user- and patient-friendly interface [11- 13].

The chief complaint against EMR is that it has undermined personalized face-to-face patient care and the vital doctor-patient interaction into a new check box-based doctor-computer-patient interaction. EMR was never designed to facilitate a personalized human narrative, logical thinking, and experience-based clinical analysis. Clinical reasoning being the backbone of a traditional doctor-patient interaction, a medical record must preserve the information that the physician carefully and thoughtfully elicits from the patient in a form that, above all, facilitates clinical reasoning [14, 15].

Saudi Arabia has prioritized the development of e-health as well as the transition from paper-based health records to electronic health records. The Saudi government has adopted "a safe quality healthcare system based on patient-centric care guided by standards, enabled by e-health" as its e-health mission. As a result, several Saudi hospitals have adopted EMR systems [15, 16].

A cross-sectional study was conducted across selected hospitals in the four cities of Al-Ahsa, Dammam, Medina, and Riyadh in Saudi Arabia to investigate the perceptions and practices of healthcare workers toward implemented EMR systems included a total of 2684 healthcare providers. The study found that, high experience with computer use was observed among 38.3% of participants, while 54.3% attended EMR training activities. The performance scores of EMR's compared to previous routines had a median of 24. Older participants, non-Saudis, and those who attended EMR training had statistically significant higher scores of both EMR performance and EMR satisfaction. General practitioners and females had statistically significant higher scores of EMR satisfaction alone. EMR systems' positive impact on quality of care was the highest agreed-upon benefit reported, while the temporary loss of access to patient records if computers crashed or power failed was the highest agreed-upon barrier [17].

Another Saudi study was conducted to assess the readiness of the physicians in Al-Hada Military Hospital in Taif city toward implementing EMR reported that, most of the physicians showed an encouraging awareness and beliefs about the potential benefits of implementing EMRs. About two- third of physicians believe in easiness of using EMRs, and only 4% expressed their need for intensive training [16].

In Jeddah, a cross sectional analytic study was carried out across all sectors, departments, centers, and clinics of a tertiary hospital to assess performance, satisfaction, and barriers influencing the implementation of EMR systems in different

departments and centers of a tertiary hospital. The study included 1010 health care providers. Overall, 64.8% of the participants found the performance of some tasks easier when utilizing EMR compared to previous routines. Participants agreed to be satisfied with the system's information and terminology (68.6%), screen design and layout (72.9%), system capabilities (41.7%), technical support and service (50.7%), and ease of use (72.7 %). Health care providers who have attended EMR training expressed higher significant scores concerning the performance of EMR [18].

Aim of Study

Getting the most health care workers in the hospital (doctors, nurses and the employee who deal with hospital recording system) to effectively use an electronic medical record (EMR) system is essential to improving the quality of healthcare it provides.

Study Objective

This study aimed to assess the satisfaction, and diffeculties influencing the implementation of electronic medical recording system among healthcare workers in Najran General Hospital, Southern Saudi Arabia.

METHODOLOGY

Study Design

A descriptive cross sectional study design was adopted.

Study Setting

The study was carried out among healthcare workers and admin staff in Najran General Hospital, Southern Saudi Arabia.

Study Period

The data was collected during a period of two months from October 1st 2022 to March 31st, 2023.

Study Population

All (Total coverage) of healthcare workers and admin staff of all specialties, who are willing to participate in the study. So, we included all persons who deal with hospital recording system, working at the Najran General Hospital, Southern Saudi Arabia during the study period.

Data Collection Tool and Technique

The questionnaire was submitted through the social media platforms, comprising (WhatsApp, Facebook, and Twitter) to all healthcare workers in the hospital (Doctors, Nurses, and the employee who deal with hospital recording system). The aim of the research and the security confidentiality of the information were explained to prospective participants in order to secure a high response rate. The first section of the questionnaire inquired about healthcare workers' demographics, such as age, gender, nationality, job title, specialty, self-rating of experience with computer, and history of attending EMR training courses. The second part included multiple-choice closed-ended questions with Likert scale responses assigned with a number range of one to five to indicate the degree of satisfaction with the item. This part included axes of ease of use, technical skills, satisfaction, from the electronic medical recording system.

The participant's information and answers were reviewed one by one by the research team, re-assuring that they will not repeat filling up.

Pilot Study

A pilot study was conducted on 20 individuals of the target population to test reliability and applicability and clarity of the tool, and any modifications was done. Participants in the pilot study were excluded from the study.

The study tool was revised by the research advisor. The reliability of the scale was done using Alpha Cronbach's coefficient test.

Statistical Analysis

Data Management and Analysis Plan

All data was entered and analyzed using SPSS 23 Descriptive statistics was applied (e.g., frequency, percentage, mean and standard deviation).

Ethical Considerations

The questionnaire included a brief introduction explaining the nature of the research and confidentiality of the information. No personal data was recorded in the questionnaire. Secrecy of information was assured that the data was confidential and the participants have the right to leave the study whenever they need it. Data was kept safe in a computer with personal password. Returning the completed Google form was considered as implied consent to participate.

Administrative Design

The research proposal was approved by the Regional Research and Ethics committee in Najran.

RESULTS

Table (1) shows the socio-demographic characteristics of the participants. The study included 231 health care providers. About half (45.9%) of the participants aged 31-40 years, 27.7% aged 20- 30 and only 3% aged 51 – 60 years. Male constituted 49.4%and 94.8% were Saudi. Regarding the speciality, 51.9% were nurses, 10.8% were administrative, 1.3% was Lab technicians and the rest were physicians from different specialties.

Table (2) illustrates the performance, satisfaction, and barriers influencing the EMR system among the study participants. Most of the pparticipants agreed to be satisfied with the system's technical support and service and ease of use. The

majority of the participants found the performance of some tasks easier when utilizing EMR. Most (73.6%) reported that it is easier to seek out specific information from patient electric records, 71.9% reported that it is easier to review the patients problems, 76.2% stated that it is easier to obtain the results from laboratory analyses, 69.7% reported that it is easier to obtain the results from X-Ray, Ultrasound or CT investigations, 71.4% stated that it is easier to review currently received medications, 64.5% stated that it is easier to find patients with certain characteristics, 68.8% stated that it is easier to order x-ray, ultrasound, or CT investigations and 65.4% reported that it is easier to write prescriptions.

Table (1): Socio-demographic characteristics of the participants (n=231)

Parameter		**No.**	**%**
Age	20- 30	64	27.7
	31- 40	106	45.9
	41 - 50	49	21.2
	51 - 60	7	3.0
	more than 60	5	2.2
Gender	Male	114	49.4
	Female	117	50.6
Nationality	Saudi	115	49.8
	Non-Saudi	116	50.2
Speciality	Administrative	25	10.8
	Anesthesia	1	.4
	Cardiology	2	.9
	Dentisitry	1	.4
	Emergency medicine	5	2.2
	Family medicine	2	.9
	General Practitioners	8	3.5
	Internal medicine	9	3.9
	Lab technician	3	1.3
	Nephrology	3	1.3
	Nurse	120	51.9
	Obstetrics and gynecology	1	.4
	Opthalmology	1	.4
	Other Medical Specialities	21	9.1
	Pediatrics	1	.4
	Pharmacist	6	2.6
	Physiotherapist	13	5.6
	Radiology	6	2.6
	Surgery	3	1.3

Table (2): Performance, technical skills, satisfaction, and barriers influencing the EMR system among the study participants (n=231)

	Easier	**More Difficult**	**No Change**	**Not Applicable**
To seek out specific information from patient records	170 73.6%	22 9.5%	27 11.7%	12 5.2%
To review the patients problems	166 71.9%	27 11.7%	25 10.8%	13 5.6%
To obtain the results from laboratory analyses	176 76.2%	24 10.4%	20 8.7%	11 4.8%
To obtain the results from X-Ray, Ultrasound or CT investigations	161 69.7%	29 12.6%	27 11.7%	14 6.1%
To review currently received medications	165 71.4%	27 11.7%	25 10.8%	14 6.1%
To enter daily notes	175 75.8%	23 10.0%	22 9.5%	11 4.8%
To find patients with certain characteristics	149 64.5%	35 15.2%	27 11.7%	20 8.7%
To make an appointment	150 64.9%	32 13.9%	24 10.4%	25 10.8%
To order x-ray, ultrasound, or CT investigations	159 68.8%	27 11.7%	20 8.7%	25 10.8%
To write prescriptions	151 65.4%	25 10.8%	24 10.4%	31 13.4%

DISCUSSION

An electronic medical record (EMR) system is defined in literature as an electronic record of health-related information on an individual that can be created, gathered, managed, and consulted by authorized clinicians and staff within one healthcare organization [19]. In the last two decades, advances in information communication technologies prioritized the conduct of EMR systems not only in developed countries but also in several developing countries [20].

Users of EMR systems include administrative staff, medical staff, and even patients. However, the main users of EMR's are the medical staffs of physicians and nurses who use the EMR system to electronically access patients' health information [21]. Awareness and perception of healthcare providers and especially physicians toward the transition from conventional paper medical records to electronic medical records have been studied extensively [22]. The results of these studies can be classified as studies with positive attitudes and views and studies with negative attitudes and views [23]. These attitudes and views were shown to be affected by several common expectations, such as the ease of use, availability of useful extra features, costs, need for training, and confidentiality and security concerns [24].

EMR systems have been noted in a number of studies to improve the healthcare sector's workflow through minimizing medical errors, reducing cost and treatment time, improving patient care by creating a better linkage to all healthcare providers, and reducing file storage space, supplies, and workers needed for the filing of physical medical records and paper charts [25, 26]. Researchers have also demonstrated that EMR systems contribute to medical error prevention by improved communication, accessible knowledge and access to required information such as drug dosages, timely checks, monitoring assistance, decision-making support, and both rapid tracking of and response to adverse outcomes [27].

This cross sectional study aimed to investigate the satisfaction and difficulties of healthcare workers toward implemented EMR system in Najran general hospital in southern Saudi Arabia. All healthcare workers and admin staff of all specialties who deal with hospital recording system were included in the study.

In our study we have found that 73.6% out of 231 participant found it easier to seek out specific information from patient records, 9.5% found it more difficult, 11.7% developed no change and 5.2% found it not applicable. To review the patients' problems, 71.9% found it easier, to obtain the results from laboratory analyses 76.2% found it easier, to obtain the results from X-Ray, Ultrasound or CT investigations 69.7% found it easier, to review currently received medications 71.45% found it easier, to enter daily notes 75.8% found it easier, to find patients with certain characteristics 64.5% found it easier, to write prescriptions 65.4% found it easier.

Another study conducted across selected hospitals in the four cities of Al-Ahsa, Dammam, Medina, and Riyadh in Saudi Arabia [28], the study included a total of 2684 healthcare providers, it was found that a considerable proportion of the healthcare workers agreed that the EMR system has a positive influence on the quality of care, improves productivity, and enhances the ability of healthcare workers to finish their work considerably faster than before [29, 30]. Furthermore, compared to previous routines, more than half of the respondents in this study found that EMR's are easier in seeking out specific information from patient records, reviewing patients' problems, obtaining results from laboratory analyses and imaging, reviewing current medications, and entering daily notes. However, they were less satisfied with finding patients with certain characteristics and writing prescriptions. Quite similar findings have been reported previously by others in Saudi Arabia and the United States [31-33]. Similarly, in a previous study carried out in Jeddah, most of the healthcare workers agreed that the output of the screen is presented in a useful format, information is clear, screen organization is clear, and sequence of screens is clear [34]. As for system capabilities, half of the subjects in Jeddah's study agreed that they rarely experienced difficulty in opening a patient's file in the EMR system and that unscheduled downtime rarely occurs. However, the speed of the system was a concern in Jeddah's study, and half of the subjects agreed that the information technology department provides excellent ongoing technical support and services and that system reference materials are available. Concerning ease of use, most of them agreed that the system is user- friendly, and they rarely used the paper-based medical record as an information source in their daily clinical work. Other local and global studies also documented that most physicians were satisfied with EMR services. [35-37], However, there are others who reported dissatisfaction with the EMR system.

Another study conducted in the United Arab Emirates [38], to assess the current satisfaction among health-care providers (HCPs) with the use of electronic health records (EHRs), specifically their impact on quality indicators including access/viewing, documentation and medication administration. Findings from this study suggested that HCPs were generally satisfied with the EHR system as part of their daily clinical practice a few years following its implementation. As expected, these findings align closely with the available literature in which HCPs have reported satisfaction with EHRs in different countries, such as the USA, [39-42] Australia, [43] UK, [44] Turkey, [45] China, [46] the Kingdom of Saudi Arabia, [47] Kuwait and Kenya [48]. On the other hand, a recent cross-sectional study to measure HCPs'

satisfaction with the EHRs in low-resource setting hospitals in Ethiopia indicated their dissatisfaction with the implemented system because of poor service quality and only partial use of the system by departments [49]. Variations in levels of satisfactions of HCPs with EHRs suggest the utmost importance of adopting a socio-technical model in implementing EHRs. The socio-technical approach considers characteristics of users and the social and organizational structure of each hospital, along with technical aspects in the design of the system. Aptness of fit between the system and other external factors contributes to greater cost-effectiveness and value for users, patients and stakeholders [50].

Study Limitations

This study has a few limitations that should be addressed. Inclusion of healthcare workers at one healthcare facility utilizing one EMR system could impact the generalizability of findings over the total of healthcare workers in Saudi Arabia. Online data collection is considered a limitation. Moreover, the inclusion of all categories of healthcare workers led to a high rate of inconclusive responses to many questions.

CONCLUSION

Most of the participants agreed to be satisfied with the system's technical support and service and ease of use. The majority of the participants found the performance of some tasks easier when utilizing EMR and expressed EMR systems' positive impact on quality of care.

CONFLICTS OF INTEREST

The authors declared that there is no conflict of interest.

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Budget

This study is self-budget; there is no external financial support.

Informed Consent

Written and oral informed consent was obtained from all individual participants included in the study.

Ethical Approval

The study was approved the Regional Research and Ethics committee in Najran, Saudi Arabia.

REFERENCES

1. Almunawar, M. N., & Anshari, M. (2012). Health Information Systems (HIS): Concept and Technology.
2. Honavar, S. G. (2020). Electronic medical records - The good, the bad and the ugly. *Indian journal of ophthalmology*, 68(3), 417-418. doi:10.4103/ijo.IJO_278_20
3. Ratwani, R. (2017). Electronic Health Records and Improved Patient Care: Opportunities for Applied Psychology. *Current directions in psychological science*, 26(4), 359-365. doi:10.1177/0963721417700691
4. Office of the National Coordinator for Health Information Technology. Non-federal Acute Care Hospital Electronic Health REcord Adoption. 2015 Retrieved August 9 2016, from http://dashboard.healthit.gov/quickstats/pages/FIG-Hospital-EHR-Adoption.php.
5. Ober, K. P., & Applegate, W. B. (2015). The electronic health record? Are we the tools of our tools? *Pharos Alpha Omega Alpha Honor Med Soc.*, 78, 8-14.
6. Lim, S. B., & Shahid, H. (2017). Distribution and extent of electronic medical record utilisation in eye units across the United Kingdom: A cross-sectional study of the current landscape. *BMJ Open*, 7, e012682
7. Byyny, R. L. (2015). The tragedy of the electronic health record. *Pharos Alpha Omega Alpha Honor Med Soc.*, 78, 2–5.
8. Lim, M. C., Boland, M. V., McCannel, C. A., Saini, A., Chiang, M. F., Epley, K. D., & Lum, F. (2018). Adoption of electronic health records and perceptions of financial and clinical outcomes among ophthalmologists in the United States. *JAMA ophthalmology*, *136*(2), 164-170.
9. Gillum, R. F. (2013). From papyrus to the electronic tablet: A brief history of the clinical medical record with lessons for the digital age. *Am J Med.*, 126, 853–7 [Last accessed on 2020 Feb 10]. Available from: https://www.extractsystems.com/healthydata-blog/2016/9/30/a-brief-history-of-the-emr.
10. Zhang, X., & Zhang, X. (2016). Recent perspectives of electronic medical record systems. *Exp Ther Med.*, 11, 2083–5.
11. National Academies of Sciences, Engineering, and Medicine. (2019). Taking Action against Clinician Burnout: A Systems Approach to Professional Well-Being. *Washington, DC: The National Academies Press*.
12. Hill, R. G., Jr, Sears, L. M., & Melanson, S. W. (2013). 4000 clicks: A productivity analysis of electronic medical records in a community hospital ED. *Am J Emerg Med*, 31, 1591–4.
13. Bates, D. W., & Gawande, A. A. (2003). Improving safety with information technology. *New England journal of medicine*, *348*(25), 2526-2534.
14. Simon, S. R., Kaushal, R., Cleary, P. D., Jenter, C. A., Volk, L. A., Orav, E. J., ... & Bates, D. W. (2007). Physicians and electronic health records: a

statewide survey. *Archives of internal medicine*, *167*(5), 507-512.
15. Alyemeni, M. (2021). Five year program to transform healthcare delivery in Saudi Arabia. http://www.salud-e.cl/wp-content/uploads/2013/08/saudi+arabia+e-health+strategy.pdf Saudi Arabia MOH. 01
16. Alzobaidi, H., Zolaly, E., Sadeq, B., Alghamdi, A., & Ahmed, E. T. (2016). Attitudes toward implementing electronic medical record among Saudi physicians. *Int J Med Sci Public Health*, 5, 1244–1255.
17. Al Otaybi, H. F., Al-Raddadi, R. M., & Bakhamees, F. H. (2022). Performance, Barriers, and Satisfaction of Healthcare Workers toward Electronic Medical Records in Saudi Arabia: A National Multicenter Study. *Cureus*, *14*(2), e21899. doi:10.7759/cureus.21899
18. AlOtaybi, H. F., Al-Raddadi, R. M., Munshi, A., Bakhamees, F. H., Khalil, A. K. M., & Mukhtar, Y. H. (2018). Performance, barriers, and satisfaction of health care workers toward electronic medical records in Jeddah, Saudi Arabia. *Int J Med Res Prof, 4*, 118-26. http://ijmrp.com/Admin_Portal/Upload/Vol4Issue2/26%20IJMRP%204(2)%20118-26.pdf Int J Med Res Prof. 2018;4:118–126.
19. Hamilton, C. (2013). *Studies in Health Technology and Informatics.* Vol. 192. Amsterdam, Netherlands: *IOS Press.* The WHO-ITU national eHealth strategy toolkit as an effective approach to national strategy development and implementation; pp. 913–916. [PubMed] [Google Scholar]
20. Azubuike, M. C., & Ehiri, J. E. (1999). Health information systems in developing countries: benefits, problems, and prospects. *The journal of the Royal Society for the Promotion of Health*, *119*(3), 180-184. [PubMed] [Google Scholar]
21. DesRoches, C. M., Campbell, E. G., Rao, S. R., Donelan, K., Ferris, T. G., Jha, A., ... & Blumenthal, D. (2008). Electronic health records in ambulatory care—a national survey of physicians. *New England Journal of Medicine*, *359*(1), 50-60. [PubMed] [Google Scholar]
22. Loomis, G. A., Ries, J. S., Saywell, R. M., & Thakker, N. R. (2002). If electronic medical records are so great, why aren't family physicians using them?. *Journal of Family Practice*, *51*(7), 636-641. https://pubmed.ncbi.nlm.nih.gov/12160503/ [PubMed] [Google Scholar]
23. Urkin, J., Goldfarb, D., & Weintraub, D. (2003). Introduction of computerized medical records. A survey of primary physicians. *International Journal of Adolescent Medicine and Health*, *15*(2), 153-160. [PubMed] [Google Scholar]
24. Van der Meijden, M. J., Tange, H., Troost, J., & Hasman, A. (2001). Development and implementation of an EPR: how to encourage the user. *International journal of medical informatics*, *64*(2-3), 173-185. [PubMed] [Google Scholar]
25. Kalogriopoulos, N. A., Baran, J., Nimunkar, A. J., & Webster, J. G. (2009). *2009 Annual International Conference of the IEEE Engineering in Medicine and Biology Society*. Minneapolis, MN: IEEE, Electronic medical record systems for developing countries: review; pp. 1730–1733. [PubMed] [Google Scholar]
26. Williams, F., & Boren, S. A. (2008). The role of the electronic medical record (EMR) in care delivery development in developing countries: a systematic review. *Informatics in primary care*, *16*(2), 139-145. [PubMed] [Google Scholar]
27. Bates, D. W., & Gawande, A. A. (2003). Improving safety with information technology. *New England journal of medicine*, *348*(25), 2526-2534. [PubMed] [Google Scholar]
28. Al Otaybi, H. F., Al-Raddadi, R. M., & Bakhamees, F. H. (2022). Performance, Barriers, and Satisfaction of Healthcare Workers toward Electronic Medical Records in Saudi Arabia: A National Multicenter Study. *Cureus*, *14*(2), e21899. doi: 10.7759/cureus.21899. PMID: 35155041; PMCID: PMC8820490.
29. Manca, D. P. (2015). Do electronic medical records improve quality of care? Yes. *Can Fam Physician*, 61, 846–847. https://pubmed.ncbi.nlm.nih.gov/26472786/ [PMC free article] [PubMed] [Google Scholar]
30. Evans, R. S. (2016). Electronic health records: then, now, and in the future. *Yearbook of medical informatics*, *25*(S 01), S48-S61. [PMC free article] [PubMed] [Google Scholar]
31. O'Mahony, D., Wright, G., Yogeswaran, P., & Govere, F. (2014). Knowledge and attitudes of nurses in community health centres about electronic medical records. *Curationis*, *37*(1), 1-6. [PubMed] [Google Scholar]
32. Menachemi, N., & Collum, T. H. (2011). Benefits and drawbacks of electronic health record systems. *Risk management and healthcare policy*, *4*, 47-55. [PMC free article] [PubMed] [Google Scholar]
33. AlOtaybi, H. F., Al-Raddadi, R. M., Munshi, A., Bakhamees, F. H., Khalil, A. K. M., & Mukhtar, Y. H. (2018). Performance, barriers, and satisfaction of health care workers toward electronic medical records in Jeddah, Saudi Arabia. *Int J Med Res Prof, 4*, 118-26. http://ijmrp.com/Admin_Portal/Upload/Vol4Issue2/26%20IJMRP%204(2)%20118-26.pdf [Google Scholar]
34. Alzobaidi, H., Zolaly, E., Sadeq, B., Alghamdi, A., & Ahmed, E. T. (2016). Attitudes toward implementing electronic medical record among

Saudi physicians. *Int J Med Sci Public Health*, 5, 1244–1255. [Google Scholar]

35. O'Connell, R. T., Cho, C., Shah, N., Brown, K., & Shiffman, R. N. (2004). Take note (s): differential EHR satisfaction with two implementations under one roof. *Journal of the American Medical Informatics Association*, *11*(1), 43-49. [PMC free article] [PubMed] [Google Scholar]
36. Murff, H. J., & Kannry, J. (2001). Physician satisfaction with two order entry systems. *Journal of the American Medical Informatics Association*, *8*(5), 499-509. [PMC free article] [PubMed] [Google Scholar]
37. Nwulu, U., Nirantharakumar, K., Odesanya, R., McDowell, S. E., & Coleman, J. J. (2013). Improvement in the detection of adverse drug events by the use of electronic health and prescription records: an evaluation of two trigger tools. *European journal of clinical pharmacology*, *69*(2), 255-259. DOI: 10.1007/s00228-012-1327-1.
38. Bani-issa, W., Al Yateem, N., Al Makhzoomy, I. K., & Ibrahim, A. (2016). Satisfaction of health-care providers with electronic health records and perceived barriers to its implementation in the United Arab Emirates. *International journal of nursing practice*, *22*(4), 408-416. doi: 10.1111/ijn.12450. Epub 2016 Aug 1. PMID: 27481126.
39. Ward, M. J., Froehle, C. M., Hart, K. W., Collins, S. P., & Lindsell, C. J. (2014). Transient and sustained changes in operational performance, patient evaluation, and medication administration during electronic health record implementation in the emergency department. *Annals of emergency medicine*, *63*(3), 320-328.
40. Harmon, C. S., Fogle, M., & Roussel, L. (2015). Then and now: nurses' perceptions of the electronic health record. *On-Line Journal of Nursing Informatics*, *19*(1).
41. Hamid, F., & Cline, T. (2013). Providers' acceptance factors and their perceived barriers to electronic health record (EHR) adoption. *Online Journal of Nursing Informatics*, 17. Available from URL: http://ojni.org/issues/?P=2837. Accessed February 15, 2015, 1– 11.
42. Redley, B., & Botti, M. (2013). Reported medication errors after introducing an electronic medication management system. *Journal of Clinical Nursing*, 22, 579– 589. DOI: 10.1111/j.1365-2702.2012.04326.x.
43. Nwulu, U., Nirantharakumar, K., Odesanya, R., McDowell, S., & Coleman, J. J. (2013). Improvement in the detection of adverse drug events by the use of electronic health and prescription records: an evaluation of two trigger tools. *European Journal of Clinical Pharmacology*, 69, 255– 259. DOI: 10.1007/s00228-012-1327-1.
44. Secginli, S., Erdogan, S., & Monsen, K. A. (2014). Attitudes of health professionals towards electronic health records in primary health care settings: a questionnaire survey. *Informatics for Health and Social Care*, 39, 15– 32. DOI: 10.3109/17538157.2013.834342.
45. Jia-lin, L., Siru, L., & Fei, L. (2013). Physician satisfaction with electronic medical record in a huge hospital (China). *Studies in Health Technology and Informatics*, 192, 920.
46. Alharthi, H., Youssef, A., Radwan, S., Al-Muallim, S., & Al-Tuwaileb, Z. (2014). Physician satisfaction with electronic medical records in a major Saudi Government hospital. *Journal of Taibah University Medical Sciences*, 9, 213– 218. DOI: 10.1016/j.jtumed.2014.01.004.
47. Alquraini, H., Alheshem, A., Shah, M., & Chowdhury, R. (2007). Factors influencing nurses' attitudes towards the use of computerized health information systems in Kuwaiti hospitals. *Journal of Advanced Nursing*, 57, 375– 381.
48. Kipturgo, M. K., Kivuti-Bitok, L. W., Karani, A. K., & Muiva, M. M. (2014). Attitudes of nursing staff towards computerisation: a case of two hospitals in Nairobi, Kenya. *BMC Medical Informatics and Decision Making*, 14, 35. DOI: 10.1186/1472-6947-14-35.
49. Tilahun, B., & Fritz, F. (2015). Comprehensive evaluation of electronic medical record system use and user satisfaction at five low-resource setting hospitals in Ethiopia. *JMIR Med Inform*, 3, e22. DOI: 10.2196/medinform.4106.
50. Takian, A., Sheikh, A., & Barber, N. (2012). We are bitter, but we are better off: case study of the implementation of an electronic health record system into a mental health hospital in England. *BMC Health Services Research*, 12, 484. DOI: 10.1186/1472-6963-12-484.