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Healthcare Workers Experiences with Electronic Health Records in the Middle East: A Systematic Review

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ABSTRACT

Background: The constant upgrades and improvements in Electronic Health Record systems may influence the perceptions and views of healthcare workers. The dynamicity may affect the users' view of the culturally dynamic environment of the Middle East.

Purpose: This study was conducted to assess the experiences of healthcare workers about the application of electronic health records in the Middle East.

Methods: A systematic review was conducted by searching articles from three online journal databases – PubMed Central, MEDLINE, and Google Scholar. The articles were scrutinized for quality before recording the data in the abstraction table.

Results: A total of 3456 were retrieved. However, only 13 articles met the inclusion criteria and were considered relevant. These studies were conducted in five countries in the Middle East, including Saudi Arabia, Jordan, Qatar, the United Arab Emirates, and Oman. All the included articles applied quantitative research methodology. Two thematic outcomes were noted: the negative and positive experiences with Electronic Health Records and factors affecting health workers' experience with Electronic Health Records. The positive experience came from usability, ease of use, improvements in quality of care, time-saving, clinical workflow, data protection, and reduction in work. On the other hand, negative experiences were mainly attributed to time constraints and system breakdown. The experiences were affected by sociodemographic factors, knowledge, awareness, and training requirements.

Conclusion: Electronic Health Records elicit diverse perceptions that may affect their overall usefulness in patient care. Training should be done to improve its positive view.

KEYWORDS: Electronic healthcare record; EHR implementation, literature review; healthcare workers.

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INTRODUCTION

Technology has grown more dynamic and versatile with the endless chains of discoveries. The application of technology in healthcare can be considered revolutionary, impacting changes in healthcare service delivery, patients' diagnoses, staff interactions, documentation, storage, and information sharing.(1,2) Within the revolutionary scope, the application of health informatics, notably the Electronic Health Records (EHR), has taken a central stage in reshaping healthcare in developing and developed countries. ((3) Alongside some notable drawbacks, EHR produces an array of benefits to the healthcare system, and a vast amount of evidence from meta-analyses and opinion surveys unanimously ascend to this idea.(4–6). Predictably, more benefits and challenges are expected to arise over time.

The already observed benefits of EHRs are diverse and can be applied in almost every sector of healthcare, as noted above – diagnosis, aiding treatment decisions, and care coordination, among others.(1) According to Campanella and colleagues, EHR can significantly "improve the quality of healthcare, increasing time efficiency and guideline adherence and reducing medication errors and ADEs."(4) Other benefits have been noted in improving administration efficiency, standardizing communication, reducing medication errors, documenting patients' information, and coordinating patient care activities.(7–9) These benefits, however, are subject to the revolving nature of technology and healthcare policy changes, which undergo radical changes, time after time.

Amidst the benefits, many negative impacts of the EHRs have also been noted in the healthcare system. Some of the

challenges include redundant communication messages, lack of interoperability, time constraints, technological breakdown, and adaptability with the existing resources and staff knowledge.(5,10) These drawbacks are almost ubiquitous and persistent with every development to improve the system. However, there has been extensive research going on to improve the potential benefits of EHRs, focusing on areas such as security and privacy, data sharing, analysis, and usability of the system. According to the literature review conducted by Negro-Calduch and colleagues, there have been changes and improvements in EHR, focusing in many concepts, such as natural language processing, blockchain technology, data visualization, users' de-identification, and communication techniques.(11) These changes may elicit different reactions from the users of EHRs, notably healthcare professionals.

Based on the dynamic and evolving nature of the EHRs, this study held the speculations and hypotheses alluding that the changes may alter the views, perceptions, and even satisfaction of the healthcare workers towards the use of EHR. Nevertheless, since there have been intense technological developments and applications of health informatics in the last few years, mainly brought about by COVID-19, there could be changes in how healthcare workers currently view EHR, particularly in the Middle East. The Middle East is of critical interest due to the unique cultural setup, linguistic diversity in the region, rapid development of technology in the region, and many policies stressing the adoption of health informatics, such as the National Transformation Program of Saudi Arabia, and the limited research about the implementation of EHRs in the region.

Interestingly, many research studies have been conducted within the last few years to assess healthcare workers' experience and perceptions about the system. Many of these studies have been conducted in Saudi Arabia, Jordan, and Qatar, with diverse outcomes. The diversity in the outcomes from the previous research studies thus calls for a systematic review to harmonize the outcomes for reliable evidence in healthcare applications. Accordingly, this systematic review examines healthcare workers experiences with EHRs in the Middle East.

METHODS

A systematic review of the literature was done by including thirteen published journal articles that focus on health workers' experiences with electronic health records in the Middle East from different perspectives. These articles were sought from three online journal databases, including PubMed Central, MEDLINE, and Google Scholar. However, an additional search was conducted manually online and through the reference list of other articles. Four keywords were used to guide the search, which were further modified for each individual search, considering the truncation forms and the Boolean operators. The keywords include healthcare workers, perception, and Electronic Health Records. Searching for articles considered four specific inclusion criteria: (1) publications made in the English language, (2) articles published within the last five years (2018-2023), (3) full-access articles with primary data, and (4) studies done in the Middle Eastern countries. On the other hand, the review excluded articles translated from other languages to English, review articles, editorials, and other non-peer review journal articles.

The initial search for the articles yielded a total of 3456 articles from the three databases and the manual search. However, some of these articles were not relevant (1390), and some were duplicates (125) and were therefore removed. The remaining (1941) articles were subjected to scrutiny by scanning through their titles and abstracts, which led to the removal of 1774 articles. Some of these articles were reviews addressing irrelevant concepts, and some were published outside the Middle East. A total of 67 articles were left, then subjected to careful reading and scrutiny. Upon careful reading, a total of 54 articles were further removed as unsuitable matches for the study aim. In the end, 13 articles were considered to meet the topic relevance and the set inclusion criteria. A summary of the article selection process is presented in the PRISMA diagram (Figure 1). A summary of the key outcomes from the articles is presented in the abstraction table (Table 1).

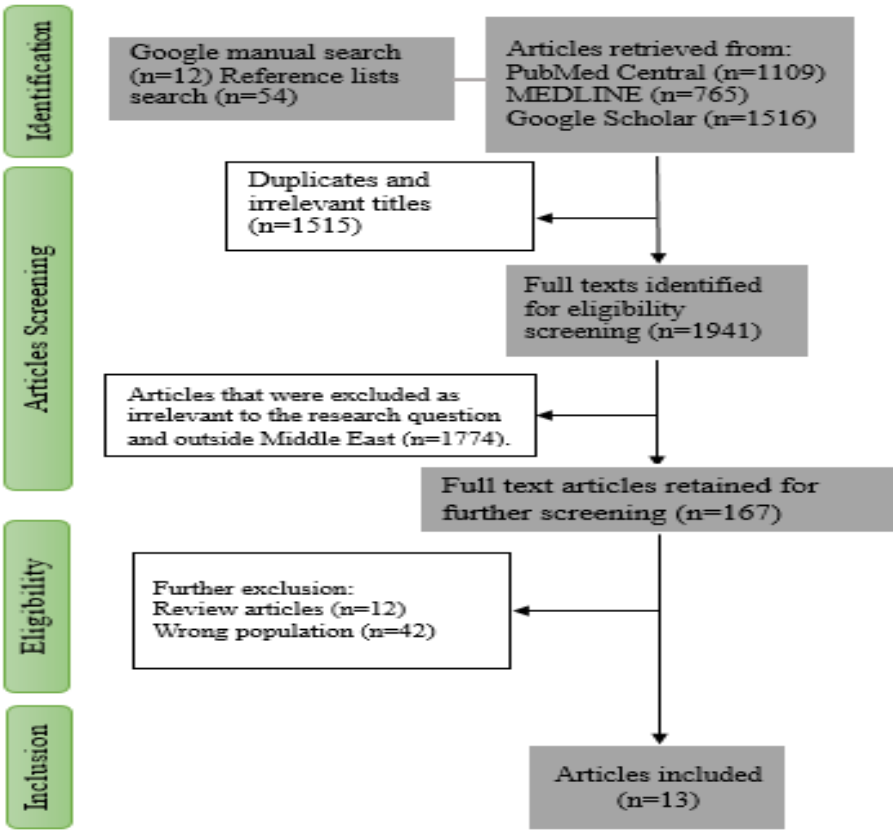

Figure 1: A PRISMA diagram

RESULTS

The review of the past studies ended with 13 relevant research studies. These studies were conducted in different countries within the Middle East, eight in Saudi Arabia, two in Jordan, one in Oman, one in Qatar, and one in United Arab Emirate. All the studies applied quantitative research methodology involving diverse research participants, including nurses, physicians, pharmacists, and other healthcare professionals. Two thematic outcomes were noted from the summary of these studies: negative and positive perceptions about the EHRs and factors affecting the healthcare workers' perceptions about the successful implementation and use of EHRs.

Negative and positive perceptions about the EHRs

There are mixed reactions among the participants regarding the implementation and use of EHRs in the current times. While most studies reported positive perceptions, attitude and experience, there were scanty cases of negative attitude and perceptions about the use of EHR in the healthcare sector. Abu Raddaha for example, reported that the EHR offers an easy-to-use platform and significantly improves patient care practices.(12) One of the commonly reported themes in line with healthcare workers' experience is improvements on performance. For example, Al Otaybi and colleagues reported the healthcare workers perceived the EHRs as having high performance, and hence their satisfaction.(13) A significant improvement in the healthcare workers performance based on the implementation of EHR was also reported by Mansoori and others.(14)

The positive perception is also based on the ability of the electronic systems to improve quality of patient care. This was reported by Al Otaybi and colleagues who surveyed different healthcare workers in Saudi Arabia.(13) On the same note, Jaber and colleagues also reported the positive experience in terms of quality-of-care improvements that come with the implementation of EHRs.(15) The electronic health records also help the healthcare workers to manage their daily patient care practices, which makes them report a positive perception towards it. Alhur established that the EHRs helps nurses to go about their daily nursing activities, and help them gain a composed control over the practice.(16) The improvements in clinical workflow and reduction in the working hours also contributed towards the positive experience reported by the health workers.(17)

Abu Raddaha also reported that the level of confidence that the health workers have in the EHR also improves their positive perceptions on the EHRs.(12) The confidence come from different sources, including quality of information stored. AlMarzooqi and colleagues noted that the privacy of data in the health informatics confides the trust in the system.(18) Moreover, Mansoori and others indicate that the systems have current information relevant to practice.(14)

Despite the positive perceptions, negative experience has also been reported regarding the use of EHRs. The negative experience come from the instances of system breakdown, such as technological crashes.(15) Mansoori and others also noted that time constraint is another significant barrier to using the EHR, and a negative experience in that case.(14)

Lastly, Yousef and others established that lack of awareness, low literacy and resistance to new technologies among patients collectively contributed to the negative perceptions.(19)

Factors affecting perceptions about the successful implementation and use

The reviewed articles also noted various factors that affect the perceptions of health workers toward the successful implementation and use of EHRs. These factors include gender, age, nationality, job ranking, and level of experience.(20–22) The other cluster of predictor factors include computer literacy, staff training, and the extent of patients' engagements.(19,22,23).

DISCUSSION

This review identified two primary thematic outcomes regarding the experience and perceptions of healthcare workers toward the implementation and use of EHRs. First, there are contending opinions about the application of EHRs in healthcare practices. While some studies reported positive views among the participants, others reported mixed reactions, which captures both negative and positive experiences. The second notable outcome identified the various factors and issues that affect the successful implementation of the EHR.

Positive and negative perceptions about EHR

As observed in this review, healthcare workers mostly hold positive experiences and perceptions about the application of EHR. The positive perception comes from considering many elements, such as its use in improving quality of care delivery, improving performance, the perceived ease of using the system, helping in daily healthcare practices and clinical workflow, reducing working hours and difficulty of work, and ensuring data protection.

Beginning with the improvements in the quality-of-care delivery, the review outcomes showed healthcare workers hold positive experiences due to the positive impacts that EHR has on patient care quality. Many studies have acknowledged that electronic medical record technology currently provides healthcare professionals with data formats that were previously unattainable through traditional paper charts.(24,25) Primary care providers now have the capability to observe and generate visual representations, such as graphs depicting values like weight, cholesterol levels, and blood pressure, facilitating faster tracking of trends and changes over time. Moreover, studies also show that careful implementation of the EHRs helps healthcare workers achieve their goals related to chronic disease management, thereby enhancing the quality of care.(26). Moreover, the application of EHRs provides health workers with constant reminders and alerts that help to schedule treatment plans more accurately.(27)

Nevertheless, the quality of patient care is a broad concept that spreads to the overall performance of the health workers, the accuracy of information shared on the electronic system, and timely care. These three concepts are related to the outcomes noted in the literature about reducing working hours and improving performance.(13,14,17,18) There are many pieces of evidence supporting the positive impacts of EHR usability on health workers' performance across the globe. For instance, Melnick and colleagues observed that using the EHR helped to lower rates of burnout among physicians in the US.(28) Other researchers, such as Wani and Malhotra (2018), have also noted that the EHR greatly helps healthcare workers make faster decisions for smoother workflow and coordination of care. In a survey conducted by Collier about the benefit of EHR in the quality of patient care, more than 65% reported a positive outcome, with only 5% indicating otherwise.(29)

Data protection and privacy were also scored as a positive experience of using the EHR. The EHR helps to protect data by different security means and other measures.(30,31) Security measures, such as encryption, firewalls, user authentication, and data masking, help to reduce the potential loss of patients' data to unwanted hands.(32,33) Keeping uncompromised data on the EHR system would thus help to ensure faster clinical decisions for better quality of care.

The other notable concepts that contributed to the positive perceptions about the application of EHR include the ease of using the programs, usefulness, ability to help navigate daily healthcare activities, reducing work difficulty, and ensuring smooth clinical workflow.(16,17,21,22,34) These concepts describe the overall use of EHR in facilitating all clinical activities. The EHR helps streamline daily healthcare activities by providing a single platform where all healthcare staff can access comprehensive patient information. Therefore, work becomes less due to the reduced time of looking for health information.(35). Regarding smooth workflow, studies have noted that the EHR can manage various tasks simultaneously, ensuring order entry, prescriptions, and patient appointments simultaneously.(36) Moreover, the availability of real-time data helps the healthcare staff to quickly access and share information for accurate communication without redundancies.

Just as noted in this review, many studies have also reported the usefulness of the EHR in improving clinical activities.(37) According to Wani and Malhotra, the accurate assimilation of EHR into the healthcare system helps to improve the efficiency of care delivery and can significantly reduce the chances of patients' readmissions.(38) The ease of EHR use has also been noted in the literature. For example, a study by Watterson and colleagues reported a high ease of using the EHRs among healthcare professionals.(39) The comfort provided in the interface also contributes to the positive perceptions among the healthcare staff towards the application of EHRs.

Despite the positive perceptions and experience, three negative experiences were also noted. These include time constraints, system breakdown or interruptions, and patient factors, such as lack of awareness, resistance to technology,

and low literacy levels.(20–23) Time constraint has been mentioned in other studies as one of the barriers or negative influencers to the successful implementation of the EHR. For instance, Upadhyay and Hu noted that many healthcare workers considered the EHR to be time-consuming and limiting their faster clinical practices.(5) The same idea is expressed by Tayefi and colleagues, who examined the challenges of applying the EHR to clinical practices.(40) There have also been recommendation for time considerations before implementing the EHRs.

System breakdown and interruptions, such as power outages, may disrupt the system and are also noted to adversely affect the operations. Accordingly, the users expressed a negative view of the EHR. Graber and colleagues noted that adverse vulnerabilities can be encountered with the EHR system, causing negative repercussions on clinical practices.(41) Systems that are not well updated were also noted as a significant turn-off to some health workers.(14) The breakdown and crashes can cause loss of information, with determinantal effects on healthcare operations.

Lastly, patient factors, such as lack of awareness, resistance, and inadequate knowledge about the EHR, were also noted as a barrier to the satisfactory use of the systems. While these factors directly affect the patients, they affect the coordination of care and communication between the healthcare experts and patients. Yet, the EHR is an effective tool of communication between all the parties in the healthcare system.(39) Therefore, lack of awareness or knowledge and resistance to using the system can adversely affect the smooth sharing of information.

Factors affecting perceptions about the successful implementation and use

Sociodemographic factors, such as age, gender, and nationality, were noted as significant factors affecting experience and perceptions of the EHR application in healthcare. Old age negatively affects interest in technological advancements and usage. For instance, the old may be unfamiliar with the complex and ever-evolving technology, such as EHR, thereby making them turn away from them or use them without the passion in them.(42) Again, there is a fear of making errors while handling the systems, which may make one develop a negative view of them. Apart from age, gender was also noted to affect the experience of using the EHR. Males were more interested in the system than females. This difference can be attributed to comfort with technology, exposure/experience, and societal norms.(43) Also, nationality was noted to affect the experience with the EHR, and this can be attributed to the extent of technological advancements in the home country. The healthcare workers from developed countries with strong technological background of EHR are more likely to exhibit better harmony with the system and hence the positive perceptions.

Besides the sociodemographic factors, knowledge, awareness, and interest also affect the users' experience with the EHRs. Low awareness and knowledge among patients were noted to affect how healthcare workers perceive the application of EHR. The effect comes from the inefficient sharing of information between patients and healthcare workers. Breakdown in the communication system, whether from patients or staff side, would significantly affect patients' engagement and care delivery practices.(44) Consequently, the healthcare personnel would view EHR as ineffective.

Moreover, some healthcare staff perceived EHR usage as time-consuming due to the training that they needed to undergo.(19) Training equips the healthcare staff with the necessary knowledge needed to use the electronic system and has to be done after every update of the system. However, these are sometimes perceived negatively by the staff, thereby causing divergent opinions about EHR.

STRENGTHS AND LIMITATIONS

Two notable strengths support the evidence in this review. First, the review was done according to the standard approach to conducting systematic reviews, which follows specific steps, from article search to critical analysis and documentation of the outcomes. Secondly, the articles included in this review have high quality data, with strong internal and external validity ingrained in their research procedure. Moreover, this review present outcomes from the most recent empirical evidence relevant to the current technological environment in healthcare.

However, there are two limitations that need to be considered. First, this review excluded articles that were published in the Arabic language despite being situated in the Middle East. The non-English papers were excluded to attain uniformity of the articles and comparable outcomes by readers from any other place. The second limitation is the use of studies conducted during Covid-19 and those that were conducted before/after the Covid-19 pandemic. This combination may create bias when comparing the experiences of healthcare workers from these two different moments. Nevertheless, the outcomes compare well with the previous literature evidence.

CONCLUSION

This systematic review was conducted to assess the experience and perceptions of healthcare workers toward the implementation and application of EHR within the Middle East. Data was collected from 13 articles in Saudi Arabia, Jordan, Qatar, Oman, and the United Arab Emirates. These articles met the inclusion criteria and were scrutinized for their data, which led to the development of the study outcomes.

Healthcare workers have divergent experiences and opinions about the application of EHR in the Middle East. Positive and negative experiences have been noted in the literature. Positive experiences were spurred by many concepts, such as the ease of using the EHR, usability, ability to improve quality of care, and ability to improve healthcare performance. On the other hand, negative experiences were noted in line with

time constraints, low knowledge and awareness, and resistance to the evolving nature of EHR. These negative and positive experiences were influenced by many factors, including sociodemographic elements, staff training, patients' awareness, and knowledge.

RECOMMENDATIONS

Hospital administrators should devise a viable method of training healthcare workers by using relevant change management theories and models to ensure a smooth transition in care practices when implementing new changes in healthcare technology. Health promotion experts also need to ensure adequate patient information for their acceptance of the EHRs.

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Appendices

Table 1. Summary table

Author (year of publication)	Country(s)	Purpose	Methodology	Outcome (perceptions and experiences)
Abu Raddaha (2018)	Oman	To explore nurses' confidence and confidence in using the EHR	A cross-sectional survey among 169 nurses.	About half of the participants were confident in using the EHRs. Nurses develop confidence in using the EHR based on the duration of using it and the adequacy of the system updates. Thre is overall positive perception.
Al Otaybi et al. (2022)	Saudi Arabia	To examine perceptions and practices of healthcare workers toward implemented EMR systems.	A questionnaire survey among 2684 healthcare workers.	Respondents perceived that the informatics had a positive impact on quality of care. However, they were barred by temporary loss of access to patients' information, due to technological or power issues. Users perceived high performance and satisfaction with the system.
Aldosari et al. (2018)	Saudi Arabia	To assess nurses' level of accepting the EHRs.	Questionnaire survey among 153 nurses	Nurses accepted the EHR based on their perceptions about its use and ease of use. They are willing to use the system for patient care.
Alhur (2023).	Saudi Arabia	To assess nurses' willingness to use the EHRs in patient care practices, and to examine the possible factors affecting their willingness.	A cross sectional quantitative study among 350 nurses in four hospitals.	Nurses perceived the system useful based on its easy of use. They were satisfied with the system, helping them go through daily activities and reducing the difficulty of work.
AlMarzooqi et al. (2020)	United Arab Emirates	To determine the perceptions of healthcare workers toward EHR and data privacy.	An electronic survey among 201 healthcare workers.	There was overall acceptance of good data protection practices on the EHR. Users' perceptions about privacy were influenced by income, gender and nationality.
Alrasheeday et al. (2023)	Saudi Arabia	To assess nurses' attitudes and the associated factors toward using EHRS.	Electronic survey was conducted among 297 nurses.	81% of the participants expressed positive attitudes towards using the EHRs. Higher positive attitude was noted among those Nurses who are Saudi nationals, male, younger, have previous computer experience, and have less than five years of experience in using the EHRs.

Gosadi et al. (2022)	Saudi Arabia	To assess satisfaction and experience of physicians concerning e-health systems and the associated factors.	Online cross-sectional survey among 445 physicians working in the primary healthcare facility.	There was an overall satisfaction with the e-health systems on two domains: clinical workflow, and ability to reduce work hours. Less satisfaction was noted in the need to have a prior training before using the system.
Abed et al. (2022)	Jordan	To assess nurses' attitudes towards the use of EHR.	Survey among a sample of 130 nurses.	Nurses had an overall positive attitude towards EHRs. The study recommends training to improve nurses' knowledge and practice for better experience with the EHRs.
Jabali et al. (2023)	Saudi Arabia	To assess the perceptions healthcare practitioners toward using EHR.	A questionnaire survey among 108 physicians was done focusing on satisfaction, easiness, and benefits of use.	Most participants perceived the EHRs to be making their work easier, and were mostly satisfied with the systems. On the negative side, they perceived EHR to slow down work. Perceived satisfaction and use were affected by age, experience, job, and job rank.
Jaber et al. (2021)	Saudi Arabia	To assess nurses' views on the use, quality, and satisfaction with EMR.	A cross-sectional survey among 170 nurses in a tertiary hospital in Riyadh,	Positive views regarding the use, quality and satisfaction with the system. There are a few cases of concern, such as technological crashes and writing the nurse care worksheets. Perceptions on use, quality, and satisfaction were all positively related.
Mansoori et al. (2021)	Qatar	To examine nurses' perceptions regarding the use, quality and satisfaction with health informatics.	A cross-sectional survey among nurses working in 6 healthcare centers.	An overall satisfaction with the system for three reasons: clear, up to date and improves performance. Two significant challenges were also reported; system downtime and time constraints.
Tubaishat et al. (2018)	Jordan	To explore nurses' perceptions of usefulness and ease-of-use of EHRs.	National exploratory study involving 1539 nurses in 15 hospitals.	Positive perceptions and high levels of acceptability. Better perceptions on usefulness of the system were reported among males, nurses with higher professional rank, and those with EHR experience, and computer skills.

Yousef et al. (2023)	Saudi Arabia	To explore nurses' perceptions on barriers and enablers of using the EHRs.	Cross-sectional survey among 291 nurses.	Three barriers were noted from experience: lack of awareness, low literacy and resistance to new technologies among patients. Nurses had mixed attitudes towards the system implementation. Successful implementation requires patients' engagement, training among staff, and patients.