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Research Article

The Role of Electronic Health Records in Monitoring Communicable Diseases: The Case of Saudi Arabia

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Abstract: This study aims to explore the adoption of electronic health records (EHRs) amongst physicians within the context of Saudi Arabia. This study collected primary data through interviews from 10 physicians from King Fahad Armed Forces Hospital, Jeddah, Saudi Arabia. Four main themes were identified in this study (adoption criteria for electronic health records, organisational readiness for the adoption of electronic health record, adoption of electronic health record during COVID-19, and challenges associated with electronic health records). The findings suggest that the adoption of electronic health records during the COVID-19 pandemic depends on a number of factors such as resistance to change and the availability of training courses for physicians. Moreover, majority of participants assured on the importance of using EHRs to facilitate the flux of work during the times of crisis as it is the case of the COVID-19 pandemic.
Keywords: COVID-19, Monitoring, Challenges.

Introduction

Electronic health records (EHR) represent a modern system of recording patients' medical history in a more organised way, so that when a patient needs to be diagnosed or receive treatment for a disease, the history of their health condition can be accessed instantly by the care giver [1]. Previously, the recording of a patient's medical history was done on paper. Moreover, protecting that data became very expensive and hazardous. However, the introduction of EHR made it easier and more cost effective to record and protect patient data and information [2, 3].

The positive side of EHR systems are therefore that they provide detailed information about a patient's medications, treatment plan, allergies (if any), diagnostic reports, and radiology images [4]. The healthcare providers get a clear idea of the patient's medical history and can then process further medications and treatment with maximum transparency and ease with the help of the EHR tool [5, 6]. It makes the decision-making procedures easier and the treatment system more streamlined and automated in a healthcare setting [7]. Most of the leading healthcare organisations in the world are for these reasons implementing EHR within their treatment setting for managing over expenditure and protecting patients' confidential data in a more secure way [8]. Hence, it can be said that EHR has significantly impacted on the provision of treatment and care to patients [9].

In Saudi Arabia, the healthcare system is responsible for providing free healthcare facilities to its population and ensuring their right to access proper treatment facilities [10]. Saudi Arabia also recognises that EHR systems are an important tool to be implemented within their overall healthcare model, to provide better healthcare facilities to the Saudi population and maximise the productivity

of health services [11]. A recent statistic shows that most primary healthcare units in Saudi Arabia have implemented EHR for the documentation of patients' records, decision-making, and communication [12]. The Ministry of Health is the main regulatory board in the country. It decides, plans, and implements healthcare facilities and is also responsible for upgrading the overall healthcare system as well [13]. On the other hand, it can be observed that some Saudi health centres have not fully implemented EHR within their systems and the care professionals associated with those Saudi health centres have not provided feedback regarding how they feel working with EHR [14].

Meanwhile, Birkhead et al. stated that communicable diseases are mainly responsible for deaths worldwide every year and can be managed through proper implementation of EHR within all healthcare facilities [15]. Hence, according to Almayahi et al. Saudi Arabia is planning to come up with a strategy so that EHR can be implemented in all government and private healthcare settings in the country. This will in turn allow it to be utilised to minimise the prevalence of communicable disease in the Saudi population [16].

This study will highlight how EHR has contributed to the improvement of care facilities in Saudi Arabia, from the perspective of care professionals present in the country. To this end, the study records their reaction to working with this modern tool for recording patient data and then using electronic systems to help in their treatment and medication of patients.

Methods

To understand the impact of EHR in communicable disease management, this study conducted 15 interviews with care professionals and recorded their input. Such a sample size is sufficient to achieve data saturation. A practical user of EHR can give their experience and that is the reason for selecting care professionals who are adapted to the technology, because they have been working with the system for more than a couple of years in healthcare units in King Fahad Armed Forces Hospital in Jeddah City, Saudi Arabia, and thus have valuable feedback to provide.

This study ensured that the interviewees and interviewers were selected to showcase diversity and only concerns the set criteria regarding them so that the best results can be achieved. The questions that were asked to the interviewees looked to get insight on communicable disease management and the role EHR can play in it. The study also gathered information about what factors stand in the way of proper implementation of EHR, as well as about what gaps exist in the system for training the professionals using the EHR system.

This research has selected 15 care professionals from different care centres based in King Fahad Armed Forces Hospital in Jeddah City in Saudi Arabia, from a total pool of 50 physicians. These 15 professionals were then interviewed. The study ensured that the professionals selected for the interview provided their consent and assured them that their confidentiality would be protected. Based on Clarke and Broun [17], thematic analysis is selected to analyse transcripts. This approach helps underline the codes and themes of the information provided by the professionals, with such qualitative analysis able to provide structure to the study findings.

Results

The results of the interviews have been classified into four different themes. These are: impact on patient care, programs running over communicable disease, impact on the care professionals working culture, and linking of EHR systems.

Theme 1: Impact on patient care

EHR systems have drastically changed the scenario of patient care, as they enable care professionals to be more informed about a patient's health and reminded about medication timings. In such ways, EHR provides crucial data about what needs to be done next to ensure patient safety and care.

Multiple studies have also disclosed that EHR systems have impacted the working culture of physicians in a positive way, as improved coordination and communication between care givers is fostered, which results in better care for users.

Participant 1 supported this perspective, commenting that since the proper implementation of EHR they have experienced "an optimum level of satisfaction while working on the EHR tool for providing better care to their patients". Participant 4, who is a renowned physician, also opined that "EHR helped him a lot [in] getting a clear forecast of patients' medication need [s] and by this reminder a patient's comorbidity has been avoided". Another interviewee (participant 9) also stated that "documenting patients' health related information becomes much easier and [more] convenient after the implementation of EHR in their care setting". Moreover, EHRs also enable the care professionals to improve the gathering of information related to patient care, which in turn helps improve the overall care giving system [18].

Interviewee 10 stated that "the relationship between physicians is also strengthened and their coordination is improved too". Some of the interviewees, namely 7, 13 and 14, focused on the practical benefits of EHR for managing communicable disease. However, they also warned that improper knowledge of EHR systems and/or a lack of computer knowledge in general can put the patient health and safety at risk. Improper EHR practice can lead the care giving process to face adverse situations, where medication errors happen and serious illnesses are not identified on time, as highlighted [19]. Therefore, the physicians involved in EHR practice must be willing to implement it throughout the medical system of Saudi Arabia, with this combined with the proper arrangement of training courses related to EHR so that the negative sides of EHR adoption can be avoided [20].

Theme 2: Programs running over communicable disease

Mapping techniques are widely used in Saudi Arabia for reducing and managing communicable disease in the country [21]. According to participant 2, "EHR would help to provide a database that helped a lot of the physicians in providing treatment to the infected people and limiting the spread of communicable disease such as transmitted disease, AIDS, HIV, COVID-19 and tuberculosis". Such findings are compatible with the literature, as secondary use of EHR data can be beneficial in tackling the spread of any infectious disease [22-24]. This is because the data provided by the patients is recorded on a database, which enables the care professionals and the Saudi authority to identify the spread of any contagious virus and resist it through different initiatives [20].

The Kingdom experiences a huge footfall in global tourists on different pilgrimages and visits to religious sites, which increases the possibility of spreading infectious viruses among the population [25]. As a result, Saudi Arabia and its population possess a higher risk than many countries if any pandemic happens [26]. The EHR tool has helped a lot in detecting early the possibility of communicable disease spread, however, as the integrated database system introduced by the government collects data and detects patients suffering with any communicable disease, which helps limit and even stop the possibility of further spread [27, 28].

Theme 3: Impact on the care professionals' working culture

The regulations introduced by Saudi Arabian Ministry of Health have impacted a lot on the care professionals working with the EHR system, as they have created an environment where the care facility is more organised and streamlined [29]. The Ministry of Health in Saudi Arabia has introduced a mobile application named 'Seha', where a patient books their appointment for care facilities in primary health centres and other healthcare facilities in Saudi Arabia online [30]. The interviewees welcomed this development, noting that it helps the primary health centres and other healthcare settings to record a patient's treatment and other useful details from scratch, so that whenever they come for further treatment in future, their care givers will have access to the records which are needed to provide better treatment to that patient. Another physician also added that the waiting times is reduced for patients, due to the addition of EHR systems in care settings [31]. Early

detection of infectious diseases and morbidity becomes possible and following up on patients become easier than it was before as well [32]. The Centres for Disease Control and Prevention has worked with authorities in Saudi Arabia to detect, resist, and limit the spread of potential contagious diseases, as well as assisting in the executing and conducting of plans and processes regarding health information studies and patient information [33]. Interviewee 5 said that "the system needs to be more organised and structured so that proper information can be accessed and worked accordingly to fight emerging diseases".

Theme 4: Linking of EHR systems

Interviewees 3, 9 and 15 emphasised the linking of EHR systems within different healthcare settings in the country, such as primary health centres, private clinics, hospitals, and centres for the control of diseases. In this way, the coordination of providing care facilities to control communicable disease to the care users is improved. They asked for such a system where all the care organisations share and discuss information recorded in EHR with each other, so that when a patient changes the care organisation they use for treatment, then their past medical history can be accessed by the new care organisation. Such practices will also help in giving an updated care and treatment to the patients suffering with communicable diseases, as their past health, medications, and treatment history is easily available to the new physician, which will in turn help the physician to properly diagnose the issue the patient has and then provide the best possible medication/treatment to that patient [34]. Interviewees 5, 7, and 13 also emphasised decentralising the EHR systems between all healthcare facilities, to enable the patients to be more informed about their health condition as well. Such decentralisation to improve the privacy of patient information is in conformity with the findings of Margheri [35].

Discussion

Alsulame et al. stated that Ministry of Health in Saudi Arabia is only authorised to access the EHR records it needs, but the interviewees have stressed the need for a system which is integrated and decentralised between all the care facilities available in the country [36]. This is because it will enhance the care giving procedures and helps the care givers working in different care organisations to obtain information while providing treatment to patients [37]. All the interviewees agreed on the benefits of EHR, as they disclosed how their care giving processes are improved due to the availability of patients' records in a dedicated platform. The improvement they want to see in future is integration of the EHR in a more coordinated way, which it is thought will be beneficial for the patients and as well as for the care professionals [38].

Saudi Arabian healthcare authorities have made EHR available to patients so that they can get updates about their health condition and about their prescribed medications [39]. But the access is provided in a limited way, so that no breaching of information takes place. The interviewees hope to see a more secure and modern in design patient portal, where the whole system is focused on creating an interface which is patient-centric and the patients can benefit from getting full access to their medical history. It is the right of the patient to be informed about their treatment procedure. Moreover, providing such a facility will be helpful in tackling challenges associated with the increased amount of communicable diseases cases in the country [40]. It will make the patients feel more empowered and their involvement within the treatment procedure will help physicians as well to provide better care and treatment [41].

The interviewees have also suggested that initiatives be undertaken so that patients can be informed about what constitutes a healthy lifestyle. For achieving this, Saudi Arabian healthcare authorities should organise seminars and conduct awareness programmes for patients, to help them understand the benefits of wearing masks, along with taking antidotes/vaccines for diseases such as tuberculosis, polio, malaria, and coronavirus [42]. Some physicians suggested that partnering with different NGOs can be beneficial, as these NGOs can help in educating people about how communicable diseases can be avoided, along with how to stop the spread among the population.

Moreover, they also added that EHR systems can be designed in such a manner that the patients will be provided with a dedicated diet plan according to their health condition. The system will remind the patients about routine diagnosis, measuring weight regularly, and doing exercise, along with about not making physical contact with unknown people. It can become an insisting force, that helps the population to become more aware about their health condition and avoid such practices that expose a person to greater risk of communicable diseases. In addition, educating people by providing proper training about how these infectious diseases spread can become an effective way to limit the spread of the communicable disease. Young people are more exposed to a contagious virus; hence, starting educational programs related to IDM can also be beneficial [43].

The finding from the interviews suggests that there is a need to improve the EHR system to achieve better use of this health information electronic tool. Gaps remain present in the database system, which needs to become more integrated so that proper detection of communicable disease cases can be recorded and further spread of deadly viruses can be avoided [44]. A chat option can also be added to the EHR platform, so that the patient can directly communicate over internet with their dedicated care givers. Sometimes, it is not possible for the elderly people to be physically present in primary health centres or private clinics; hence, providing them with the option of a video chat and text chat can be beneficial for the limiting of communicable diseases and also in saving the cost and time of care organisations in respect providing proper care and treatment to a patient. It will also help the care system to get a recorded version of patients' issues in their own words virtually and provides transparency about the physician's medication procedures, too, both of which can be used in future for training other physicians who are new to the care system.

Integration of patient records in a single system is the ultimate need in this situation as it consists of several benefits. For instance, medical tests do not need to be performed repeatedly if a patient changes their care organisations [45]. This will save the time of the physician and lighten the storage burden, by decreasing the volume of patient documentation. On the other hand, the physicians will be better informed about a patient, which will help them to detect the spread of contagious viruses in a more structured way [46]. It will also increase the coordination between several care organisations and its physicians, which as a result will enhance the overall care giving process.

The security of the EHR tool can be enhanced by inter-linking the EHR between private clinics and primary health centres, because breaching of information if it happens can be reported from one of the access points, which will make the overall system more secure and genuine [47]. The patients will be more empowered, as their choices and preferences for getting care from an organisation will be acknowledged and prioritised [48]. Usually, patients fear changing their care organisations due to the limitation of the EHR tool, but the inter-linking of EHR will provide them with the right to opt between different care organisations as per their preference [49].

Conclusion

EHR has several benefits that have been acknowledged by the interviewees, such as improved communicable disease management and helping physicians to get a more detailed picture about the patients they are providing treatment to. EHR saves costs for care organisations in respect documenting patients' medical history and diagnostic reports. The conducted interviews also provided a clear insight about the overall system of EHR in Saudi Arabia and how it impacts care givers and care users. The findings from the interviews nevertheless show that there is also a need to redesign the EHR system to make it better able to tackle the increasing communicable disease cases in the country. There is also need to provide training to physicians and patients on how to use EHR systems, so that their resistance to use of this impactful technology can be overcome. Last, making the tool more secure and accurate is necessary to avoid any bad consequences, such as leakage of data and information and wrong output of disease detection.

Conflicts of Interest: The authors declare no conflict of interest.

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