


Review: Challenges and Obstacles of Trusted Elements for Mobile Health Records Management [†]

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Abstract: This study aims to identify the significant difficulties concerned with trusted elements of mobile health records management (MHRM) systems. For instance, data migration and lack of staff training have created huge challenges for organizations using such technologies. As such, this study presents potential improvement methods for electronic medical records (EMRs) by promoting the application of the latest technologies and relevant data security techniques. Secondary sources published between 2017 and 2020 were qualitatively reviewed to collect relevant information about EMR advancement. These data allowed reviewers to identify EMRs' reliability and challenges efficiently. In short, this paper identified four major challenges in records management systems: data migration, culture shock among staff, insufficient training, and data privacy. To counter these challenges, this review demonstrated that these difficulties can be effectively resolved through strategic inclusion and proper initiative of the latest innovative technologies.

Keywords: electronic health record challenges; personal health record; health information technology; medical record trustworthiness



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1. Introduction

Advancement in the healthcare technology domain is generally known to improve patient outcomes and enhance healthcare services. The healthcare industry also helps reputable healthcare providers to offer high-quality services with great reliability to the public. Data play a significant role in ensuring that the available healthcare facilities can be improved to meet public needs and expectations. For instance, at the Ulsan University Hospital (UUH) in South Korea, a patient's medical records are transferred either via paper or phone when a patient is referred to another hospital [1]. Unfortunately, traditional paper and phone methods may lack reliability. Likewise, for patients who are sent to the emergency department, it can be difficult to know the patient's medical history, particularly in cases when the elderly cannot recall prior illnesses or the types of medication previously consumed. Therefore, the electronic medical records (EMR) management system plays a vital role in ensuring patients can be diagnosed accurately and treated without further delay. Hence, this paper aims to assess significant challenges and barriers related to EMRs using a mobile application platform.

Although hospitals were first hesitant to adopt the EMR approach in the early 21st century, the use of this approach has grown significantly since the year 2009. Published articles contributed to this trend by reporting the advantages of the EMR approach, such as big data analytics and the ability to incorporate the Internet of Things into a real-time mobile health records management (MHRM) system. As a result, adopting the EMR approach has granted healthcare practitioners easy access to their patients' data, which further enables them to quickly make decisions regarding their patients' wellbeing. For instance, a 3D print on a liver may be required for treatment planning if a cancer lesion

is found at a complex location. With the help of EMR, clinical practitioners can swiftly review previous notes and any complex clinical issues previously addressed regardless of how dated or where those issues were first addressed. Additionally, instead of relying on a third-party vendor to develop the 3D print, hospitals may choose to establish an in-house 3D printing facility, which will enhance the turnaround time (TAT) and eventually improve patient management. Furthermore, implementation of a mobile approach is timely for those in a medical environment, as healthcare personnel require a system that allows them to be mobile and provide appropriate patient care. With MHRM, healthcare practitioners can access their patients' data quickly and with ease. Nevertheless, despite the benefits accrued from this platform, the adoption process does not take place without its own set of challenges and obstacles. Therefore, this review paper aims to identify the challenges and obstacles present in the use of the MHRM approach to help the healthcare industry implement the system effectively. Through an examination of the body of literature related to MHRM use, this review investigates the issues affecting the platform's implementation to answer the following questions: (i) What are the challenges of trusted elements affecting MHRM implementation? (ii) What are the obstacles of trusted elements affecting MHRM implementation?

2. Methods

In this review, the discussion will commence by first presenting the challenges of trusted elements in the MHRM system followed by the obstacles of trusted elements in the MHRM system. Then, the final bulk of this review article will focus on how the issues presented can be addressed to ease the implementation of the platform and data migration. During the research process, several keywords including medical records and challenges of MHRM were used for database search purposes; online databases (PubMed and Scopus) were used to obtain literature related to the topic. The studies reviewed were selected based on four pre-determined criteria: (i) empirical studies on medical records management; (ii) review studies analyzing medical data migration and adoption; (iii) studies on mobile health and health information technology; and (iv) studies investigating medical records' trustworthiness. A systematic search of research articles was conducted from the period of 2016 to 2020, and 35 articles were deemed relevant to the investigated topics. The review was conducted qualitatively based on issues highlighted in the selected articles. Later, the findings were categorized under two general themes: Challenges of Trusted Elements for MHRM, and Obstacles of Trusted Elements for MHRM. Tables 1 and 2 are discussed in depth in the following sections.

Table 1. Challenges of Trust Elements in the MHRM management system.

Theme	Types of Challenges	Explanation	Author(s)
Challenges	Data Migration	Migrating data to the mobile platform is costly and requires effort to ensure the migration process is successful	[2–4]
	Staff Resistance	Staff reluctance to accept or adopt the technology as part of their work routine	[5–9]
	Lack of Staff Training Sessions	Staff are not exposed to how the mobile platform works and how to troubleshoot technical disruptions	[10,11]
	Data Privacy	Concerns regarding the safety of patients' data after data are migrated to the mobile application	[12–15]

Table 2. Obstacles of Trust Elements in the MHRM management system.

Theme	Types of Obstacles	Explanation	Author(s)
Obstacles	Cost Structure	Organizations are deterred from adopting MHRM due to the high costs involved when selecting, implementing, and optimizing the system	[16]
	Technical Limitations	Absence of a reliable technology that supports the adoption process	[17–20]
	Standardization Limitations	Patients’ data are not standardized and validated, which may lead to unethical use of patients’ records and misdiagnoses	[21–23]
	Lack of Organizational Infrastructure	Mobile E-health record (EHR) implementation is impeded by the lack of healthcare infrastructure	[5,11,24–26]
	Poor Communication Tools	Doctors using mobile EHR think that the application is not user-friendly and limits their access to patients	[3,23]
	Changes in Workflow	Healthcare providers’ workflows and efficacy may be affected, as tracking the patients’ medical issues during digital consultations can be difficult, as data are captured digitally	[27–29]

3. Results and Discussion

The greatest challenge in implementing the MHRM system is trust. For the EMR management system to successfully convert into the mobile platform, a practical assessment must be conducted to identify any underlying drawbacks. This assessment is important to identify limitations of the healthcare system and function as a resource to inform the process of formulating mitigation strategies prior to large-scale integration of the system within the existing infrastructure [30]. According to [31], early identification of the issues can help reduce the outcomes of misdiagnosis that affect patients’ treatment plans while safeguarding healthcare providers’ reputations. The authors in [32] reported that a long-term study conducted in multiple countries including Malaysia revealed that 50% of physicians aged 30 to 45 years old display intentions to adopt the EMR system. In this context, well-known vendors offering quality EMR systems include Epic, Cerner, and Allscripts, and the availability of these databases, have been noted to encourage healthcare workers to provide their medical services to patients within a shorter period [33]. Based on the analysis, common challenges encountered by mobile EMR users are related to data migration, staff resistance, lack of staff training sessions, and data privacy. The findings were in line with [34], who posited that the underlying issues of EMRs are linked to its application using the mobile platform, which reduces the opportunities to apply appropriate security policies.

3.1. Challenges of Trusted Elements for Mobile Health Records Management

3.1.1. Data Migration

A mobile EMR interface has been proven to provide healthcare workers with numerous benefits that may also result in improved patient experiences when the system is properly optimized. Despite this, one of the biggest challenges for the implementation of this platform is clinical data migration [2]. Data migration refers to the process of selecting and transferring data from one storage device to another. Unfortunately, incorrect migration of clinical data can result in a huge impact on a patient’s outcomes. Furthermore, errors that occur during data migration may lead to loss of access to the entire database and

consequently will require additional time and cost to correct the migration error. When additional costs are incurred, management may find the process to be less affordable than expected. In addition, during data migration, the presence of large amounts of data within the mobile application might burden the backend servers, which eventually causes data logistics issues. Therefore, to prevent data logistics issues when migrating data from one platform to another (see Figure 1), the authors in [3] explained that the migrated data must be digitized to mirror a paper-based document. Unfortunately, digitizing data and creating online forms are time-consuming, and the authors in [4] reiterated that unintentional errors should be avoided when filling out online forms. Understandably, such carelessness can result in healthcare providers administering the wrong treatment.

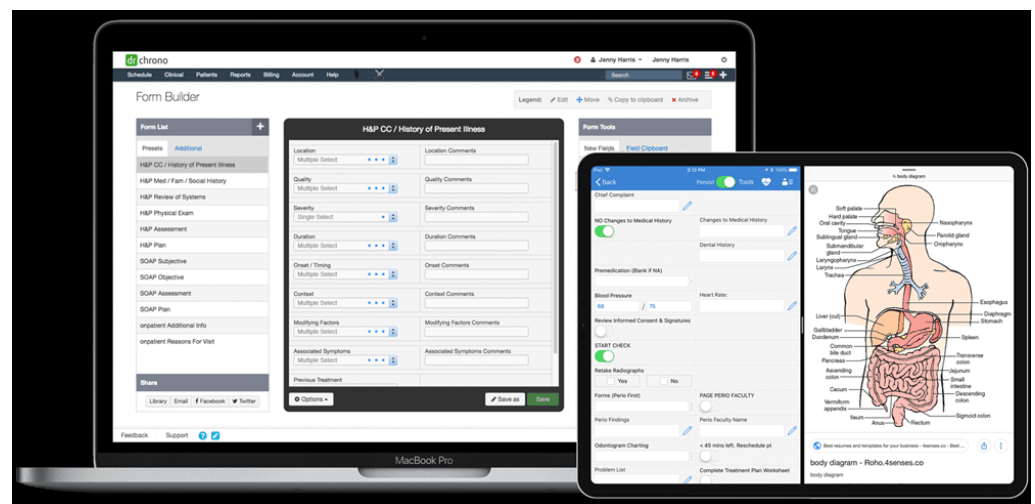


Figure 1. Electronic health record in mobile device [35].

3.1.2. Staff Resistance

Enjoying the benefits of the mobile EMR platform requires dedicated contributions from all levels of staff including clinical and non-clinical personnel. According to [5], healthcare staff are responsible for ensuring that patients' data are readily available, particularly for those who are awaiting treatment or medical assistance. However, the implementation of this platform does not always occur without resistance from healthcare staff because of the lack of knowledge or technical skills in personnel that allows them to use the mobile EMR system effectively. Notably, although the move to digitize medical records improves the healthcare industry, many healthcare workers are not ready to shift to a paperless format, as they doubt their ability to manage the technicalities of deploying the system on a mobile platform [6–8]. Furthermore, it has been noted that healthcare staff's refusal to use the EMR platform has led to incidences of miscommunication [9]. Thus, to minimize staff resistance towards the mobile EMR system, there must be effective change enacted from the management level. Additionally, practices supporting the conversion must be applied to begin platform implementation.

3.1.3. Lack of Staff Training Session

From an advancement perspective, healthcare providers are encouraged to adopt the EMR approach instead of the traditional system. However, a lack of relevant technical knowledge supporting the use of EMR is prevalent among healthcare workers and thus restricts them from being able to use the technology. Therefore, offering healthcare staff adequate and effective training sessions can improve their overall technical knowledge base. On the other hand, it must also be noted that Malaysia's healthcare industry lacks the required capacity to produce suitable training sessions for individuals, including the time, financial costs, and other resources required. As a result, the authors in [10] believe that the scarcity of available training programs in the country has discouraged the improvement of

technical skills among healthcare staff that may further boost the healthcare technology domain. Considering techniques and strategies acquired from healthcare professionals' experiences may also be helpful to provide practical methods to reduce the system's underlying issues [11].

3.1.4. Data Privacy

With the implementation of the EMR mobile platform, it is possible to assume that all clinical and non-clinical personnel will be able to access patient information from anywhere via a mobile device. As such, this situation poses a challenge for data privacy. According to [12], the documentation process of patient healthcare data exposes sensitive information, and thus any mandatory divulging of patient data for treatment purposes require data confidentiality. In 2016, Tucker and colleagues reported that the application of reduction techniques has helped to reduce risks targeted at patient privacy [13]. Data privacy is particularly important, as [14] posited that the unintentional loss of confidentiality associated with patient data can negatively affect the healthcare organization's reputation in the market. Therefore, to prevent a breach in patient privacy, the authors in [15] suggested that protecting data with a suitable security protocol is essential.

3.2. *Obstacles of Trusted Elements for Mobile Health Records Management*

While there are no complete records management systems, there are a few features that can develop the reliability of the management system. Unfortunately, implementing such a system at a national level is not an easy task due to the following identified obstacles.

3.2.1. Cost Structure

The overall cost of implementing an EMR mobile platform is high because the implementation process usually involves several steps including hardware setting, training of staff, software cost and maintenance, and network fees. Furthermore, implementation costs may even be higher in the event of unfavorable situations occurring during the process of optimizing the system, which may subsequently affect the system's efficacy. In an average system, healthcare providers typically lean towards public company funding to implement the system. Unfortunately, a major challenge faced by the government is that it is typically unable to place a large sum of money into the electronic healthcare record system. For instance, the implementation of the EHR system offers transparency in healthcare charges. This has resultantly led to an increase in the prices of medical treatments. Thus, it can be said that the system is not helpful to average-income earners within the population to access the medical treatments that they need. These terms and conditions will undoubtedly create obstacles within the healthcare system and limit the support of the medical system due to the higher level of medical costs [16].

3.2.2. Technical Limitations

An optimized mobile EHR platform requires several specialized pieces of equipment to allow the system to function effectively within the healthcare industry. However, the authors in [17] have demonstrated that a lack of technical integration is present among the major barriers hindering the implementation of the mobile EHR system in healthcare facilities. In addition, mobile EHR requires artificial intelligence (AI) to ensure its cybersecurity, which can be extremely costly. Automation is also not included in mobile EHR, thus leading to data error and a lack of information in healthcare services. Therefore, managing the system by addressing its technical needs is imperative [18]. For example, mobile EHR depends on technological innovation for its fiber healthcare information recording system. However, the authors in [19] and [20] have proven that the lack of technical innovation makes such devices powerless in healthcare facilities, as many healthcare personnel are initially reluctant to use the mobile EHR system.

3.2.3. Poor Data Standardization

Another obstacle identified in this study is poor data standardization in the healthcare industry. Although mobile EHR follows cybersecurity and data protection protocols, the system is not inspected or authenticated by the central authority, thus potentially leading to misdiagnoses. In such circumstances, the authors in [21] stated that misdiagnosis could be life-threatening to patients. Furthermore, the data standardization process in the mobile EHR platform is complex and critical and requires good technical development knowledge [36]. However, there is a lack of competent and skillful staff and technological opportunities to carry out such a process. Due to these limitations, healthcare providers have failed to use the adopted technology correctly [22]. Medical records registered unethically have also been unable to serve as proper medical records for patients due to the risk of causing complications during medical treatments [23].

3.2.4. Lack of Organizational Infrastructure

The organizational culture in a hospital can also pose an obstacle to EHR implementation. The authors in [11] highlight that manually recording and maintaining patients' medical records can lead to poor documentation. Hence, technology is believed to be more effective to standardize information. Unfortunately, the current organizational infrastructure in hospitals is not suitable to implement the mobile recording system, as many individuals in the low-income community are not comfortable recording their health issues on the mobile EHR platform [5,24,25]. As such, healthcare providers, too, are not eager to record patients' data using mobile devices. To address this issue, the government must take proper initiatives to manage mobile EHR systems in all proposed healthcare services [26].

3.2.5. Poor Communication Tools

Many clinicians have highlighted that mobile EHR is not an effective communication tool to communicate with patients. Clinicians have found the platform to be challenging when attempting to assist patients as patients' medical histories are digitally recorded. Apart from the inconvenience caused by mobile EHR, authors in [23] reported that the mobile EHR platform has limited clinicians' ability to have physical access to patients. Records displayed on the system have also been found to be incorrect and inadequate at times. As a result, healthcare providers find it difficult to access patients' actual problems and health issues. Accessing patients' records is a process that requires highly designed communicative tools for both patients and healthcare providers [3], which may, unfortunately, pose a challenge for users.

3.2.6. Changes in Workflow

It is commonly highlighted that the mobile EHR platform can make significant workflow changes by reducing medical services' work requirements as consultation sessions are captured digitally. However, according to [27], this may also result in the possibility of losing data due to a lack of significant investment in training and operation. For instance, several doctors have reported that using a digital platform may reduce the number of patient visitations [28]. For this reason, the authors in [29] offer that this change may be challenging for healthcare providers who must identify patients' medical issues accurately. Moreover, it has also been argued that medical services become complicated when devices are used to control medical records.

4. Conclusions, Limitations, and Future Implications

The challenges faced in the implementation of the mobile EHR system are: (i) data migration; (ii) staff resistance; (iii) a lack of staff training, and (iv) data privacy. In terms of obstacles, the system is impeded by: (i) cost; (ii) technical limitations; (iii) poor data standardization; (iv) a lack of organizational infrastructure; (v) a lack of communication tools, and (vi) changes in workflow. Unfortunately, the reviewed literature does not provide enough information on the contents that should be present in an ideal mobile medical

record system. There is also little mention of how these contents can influence healthcare behavior and perception. Based on this review, it is recommended that greater emphasis be placed on the importance of mobility in medical records management, so that it may be possible to understand how mobile health records can be successfully integrated into healthcare providers' medical record systems.

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