

## Assessment of factors influencing nurses acceptance of electronic medical record in a Saudi Arabia hospital



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### ABSTRACT

**Background:** We aimed to explore the acceptance level of electronic medical records (EMR) by the nursing staff and understand their perspective on it.

**Methods:** The target population included all nurses working in Imam Abdulrahman Al Faisal Hospital at the National Guards Health Affairs (NGHA), Dammam, Saudi Arabia using EMR in their clinical practice. A questionnaire was developed to determine the respondent's opinion for achieving the study objectives. A total of 230 questionnaires were distributed and 153 questionnaires were completed and returned with 66.5% response rate.

**Results:** The findings state that there is a strong positive correlation between perceived usefulness and perceived ease of use resulting in a positive effect on nurses' acceptance. The nurses in National Guards Health Affairs (NGHA) are willing to use EMR to improve the quality of patient care. Therefore, their willingness to learn the system and be less resistant to change will be possible by introducing a more user-friendly system, which will ultimately increase their level of acceptance.

**Conclusions:** User demographic characteristics, top management and IT support and system quality are important in predicting nursing personnel's acceptance toward EMR. These findings can be used as guidance for hospital management to address the nurses' concerns.

## 1. Introduction

### 1.1. Background

Electronic Medical Record (EMR) has a powerful and significant impact in improving the safety, efficiency, and quality of care while protecting patient's privacy and personal rights [1–3]. The quality and efficacy of healthcare delivery are reliant on the daily operation and communication between various care providers, physicians, nurses, medical residents, and others interested parties in medical field [2]. It can be aided by the use of EMR in clinical practice. EMR has become an essential part of our modern healthcare field as it is concerned with the complete management of information of different patients, which includes retrieving test results, medication prescription, patient history, etc. Many have considered EMR as an excellent tool for imparting better quality of health care, enhanced clinical decision-making skills, and reduction in long-term medical expenses [2–5].

On the other hand, the inability to manage health information exchange can adversely affects patients' care eventually letting patients to lose trust in the clinical service provided [5,6]. Further, it will have

negative influence on the performance of work processes and services in a medical organization. Introducing a new EMR requires the consent of medical staff, especially nurses, as they play a significant role in healthcare environment both for patients as well as for the hospital facility itself [2,3,7]. EMR has a significant impact on the work performance and clinical service of nursing staff and therefore they form the most influential group in the implementation of EMR systems. Even though the EMR is increasing and is becoming evident day by day, medical staff continues to resist its adoption [3]. Enough scientific evidence exists that support the fact that it is not an easy task to change the daily work routines and activities for medical personnel, especially when introducing new EMR system [2,5,7].

### 1.2. Nursing staff and electronic medical record

Nursing staff in any hospital is proportionally the largest labor force. Their dealing with the clinical work and interaction with EMR on a daily basis is maximal. They offer an important link in making diagnoses, noting vital signs, as well as checking and transcribing physician's orders [8]. In general, nursing department is the center of care delivery and

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plays the leading role in the adoption of EMR [9]. It has been shown that using EMR in a hospital has its impact on nursing work [10,11]. Nurses, like other hospital personnel have always shown concern about the effect of such systems. With enough training and awareness the healthcare professionals will be able to use EMR efficiently [10,12]. Moreover, a substantial evidence supports that success of EMR implementation is related to the attitude of nurse towards the system [1,4,11]. Additionally, medical organizations can gain the benefits of computerizing services only if nurses adapt to the change with a positive attitude [10]. Recent studies demonstrate that the attitudes of nurses toward the acceptance of EMR usage has become more positive than before [3,13,14]. Alquraini H et al., [4] reported that nationality, the level of education, previous experience in computer use and computer skills tend to remarkably affect the nurse's view on EMR usage. Alquraini et al., [4] & Brumini et al., [13] demonstrated that gender, age, education, and computer usage were the statistically significant predictors of nurses' attitudes toward using EMR. Young, highly educated nurses with computer knowledge have more positive views towards the usage of EMR than other nurses [13,14]. Furthermore, nurses with higher job positions had more favorable perspective toward computerization and usage of EMR [14].

### 1.3. Nursing staff acceptance of health information systems

Hsiao et al. [9], Lu et al. [15], and Chow et al. [11] investigated the critical factors affecting the use of EMR from the level of nurse's satisfaction in clinical practice. The nursing personnel have been examined using Technology Acceptance Model (TAM) regarding the usefulness, ease of use, and acceptance of EMR. The researchers have also identified that the top management and technology support are the best predictors for perceived ease of use. Further, perceived ease of use and perceived usefulness can be achieved through providing information quality and compatibility [9,15]. Both the features of EMR have been shown to be the significant factors in determining the level of EMR acceptance and positive intention to use such systems [9,16]. The higher the perceived ease of use and usefulness, higher is the acceptance and satisfaction level. This implies that better satisfaction levels have been associated with positive attitude towards usage and acceptance of system [9,11,15]. Considering the role of nurses in providing high-quality healthcare services to patients, adequate health information accessibility along with user-friendly systems and proper training is required to improve their viewpoint towards computerization, which in turn will influence the current and future planning and implementation of EMR [4,9,11,15].

The evidence of successful implementation of EMR is the complete utilization of such systems; however, factors affecting the medical personnel's acceptance are still not fully identified [5,6]. Although a lot of research has been done on the factors that affect the end-user's intention to adopt a new system and technology, the past studies have only been theoretical and do not evaluate the factors that directly affect the adoption of a new system. As a developing country, Saudi Arabia is trying to cope up with the developments and technologies in order to improve the health and quality of care of its citizens.

This study has been developed to analyze the compliance level of the nursing staff for EMR in the Saudi healthcare sector. Technology Acceptance Model (TAM) will be used to examine nurse's consent for EMR. The five dimensions that are considered for determining the acceptance level of the EMR are user demographics, top management and IT support, system quality, perceived ease of use and perceived usefulness [15].

As such, this study is a first of its kind to utilize a questionnaire survey to evaluate the factors that influence a user's intention to adopt EMR system in the healthcare sector. It is also a first of its kind study to be conducted taking into account the nursing staff employed in the hospitals of Saudi Arabia. Of all hospitals in Saudi Arabia, approximately 60% are public hospitals under the jurisdiction of the Ministry of Health. The remaining percentage denotes the private hospitals or the University hospitals. The NGHHA started to consider EMR implementation in the

1990s and has been one of the first organizations to take such an initiative. However, there are several healthcare providers in Saudi hospitals, who are unaware of the functions that are available through the implementation of EMR system. Therefore, this study focuses on assessing the acceptance level of electronic medical records (EMR) by the nursing staff and understands their perspective on it in order to encourage well-coordinated initiatives and programs to assist integrated EMR implementation in other hospitals of Saudi Arabia.

### 1.4. Technology acceptance model (TAM)

Davis [17], proposed an analytical model to predict user acceptance to use computer technology. It is considered as one of the most widely used and fit models to examine the behavioral and social intentions that influence the acceptance of technology [16]. This study also examines the factors affecting the attitudes of the nursing staff towards the implementation and usage of EMR system and takes into consideration, the variables laid upon by Davis's Technology Acceptance Model (TAM). According to TAM, the behavior of adopting information system technology is linked to the intent of using a specified system, which is determined by the perceived usefulness from the user's point of view and by perceived ease-of-use. Therefore, Davis developed and validated two distinct variables; perceived usefulness and perceived ease of use. Perceived usefulness referred to the level of belief in people about the fact that using the system will help them in achieving better work performance and whether they will use such technology or not. Perceived ease of use refers to the level or degree to which the user considers or believes that the information system is easy to use and effortless. In terms of predicting the factors influencing the acceptance of technology across many contexts such as health care, TAM has proven to be the most favorable model in that regards [11,19]. Fig. 1 clearly depicts the model designed in alignment with the study objectives. This study intends to determine the attitude, intention and factors influencing the acceptance and adoption of EMR from nurses' point of view. Fig. 1 shows a model consisting of two TAM variables, perceived usefulness and perceived ease of use, as prediction variables for user acceptance to computerization in addition to the other factors such as user demographic characteristics, top management and IT support and system quality, which have shown their importance in influencing the acceptance of Information Technology (IT) [18,20].

## 2. Methodology

### 2.1. Study setting

The study was conducted in Imam Abdulrahman Al Faisal National Guard Hospital in Dammam, Saudi Arabia. It is one of the most prominent hospitals in the Eastern Province of Saudi Arabia due as it has received international accreditation from JCIA for its recognized efforts. It accommodates 112 beds for inpatient, and has up to 7000 outpatients monthly who are being served through twelve specialized clinics. The hospital implemented EMR for managing the patient record since 2009.

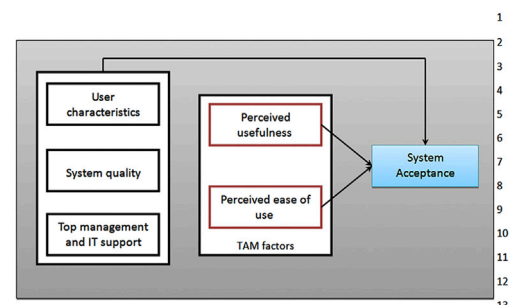


Fig. 1. Factors affecting user acceptance of EMR.

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