

# The Adoption of Electronic Health Record Model for Healthcare Organizations in Iraq: An Overview

Mohd. Khanapi Abd Ghani, Ali Fahem Neamah

**Abstract:** *Electronic health record (EHR) is an essential healthcare innovation related to many controversies regarding the challenges and benefits to different stakeholders. The adoption of EHR innovation is a complicated task as discussed by the literature; thus, careful consideration and planning to all crucial factors that affect the adoption process through healthcare staff members is required. The aim of this study is to evaluate the factors that influence the adoption of EHR frameworks in healthcare institutions. These include challenges, barriers, methods and best practices EHR implementation in developed and middle-east countries. The study was performed utilizing a non-experimental study exploratory research design. This exploratory study included an essential investigation about secondary data. Through reviewing the literature of the existing frameworks, it is hope that the findings could be used as inputs for proposition of e-health records framework in Iraq. It was noted that the health section in Iraq needs continued attention to get government support.*

**Keywords:** *EHR, IT adoption, Healthcare information system, E-Health, EMR, EHR adoption*

## I. INTRODUCTION

The innovation of electronic health records (EHRs) has become outstanding topic of health-related discussion in the latest years. EHR is the repository and database for all patient medical information retains a great potential with regard to developing countries, as well as a number of these countries have recently implemented the EHRs as a way to enhance the quality for their healthcare services, decrease medical errors, and increase patient care along with safety by being able to access accurate information in any time.

This study consists of the relevant literature, publishing and hypotheses which specifically focus on the subject of the adoption of e-health record system, taking into account the objective to give ensuing discussion and analysis. It will be identifying the gap of literature knowledge and attempt to bridge it. The secondary search of related materials used would identify previous work done in this discipline and to identify and assess the infrastructure of healthcare organizations in Iraq with a view to determine potential opportunities existing for the adoption of e-health record system, define target solutions and infrastructure architecture, and compare and review road maps for the different initiatives researched to support the implementation of e-health systems.

**Revised Version Manuscript Received on March 16, 2017.**

**Mohd. Khanapi Abd Ghani**, Biomedical Computing and Engineering Technologies (BIOCORE) Applied Research Group, Faculty of Information and Communications Technology, Universiti Teknikal Malaysia Melaka, Malaysia.

**Ali Fahem Neamah**, Department of Computer Science, Computer Science and Mathematics College, Wasit University, Wasit, Iraq.

EHR is an important application of information and communication technologies to the healthcare sector. EHR implementation is expected to produce benefits for patients, professionals, organizations, and the population as a whole. These benefits cannot be achieved without the adoption of EHR by healthcare professionals. Nevertheless, the influence of individual and organizational factors in determining EHR adoption is still unclear. Previous researchers have established the advantages of EHRs (Neil, 2012; Sundwall & Lenert, 2012). Benefits included improved clinical practice strategies, decreased medication errors (providing the wrong drug, unfavorable drug interactions, or handwriting error), and improved distribution of preventative health services (V. Patel, King, Furukawa, & Jamoom, 2014). Patient safety, enhanced quality of care, reduced duplicate medical tests, and health promotion, were additional benefits medical professionals had received by implementing EHRs into their primary care physicians business workflow (Lapsley, Cucciniello, Pagliari, & Nasi, 2015). Implementation of EHRs resulted in significant savings of cost and time for healthcare providers (Patel et al., 2015). However, implementation of EHRs posed potential barriers to primary care physicians (Pliskin, Ben-Zion, & Fink, 2014). In order to achieve nationwide interoperability and realize the benefits that can be provided by EHR, physician adoption rates must be increased substantially.

Numerous developing countries face challenges tracking chronic diseases, locating resources, and reducing medical errors due to the lack of technology (Biondich et al., 2005). In addition, the deployment of patient computerized systems depends on local or organizational needs (OpenClinical., 2006). This scenario holds true in developing countries such as Iraq. In 2007, Ms. Gobin Jemma, Medical Records Office Manager, gave the researcher a tour in Port of Spain General Hospital to understand the current workflow about health records system. Indeed, in Iraq, the diffusion and adoption rate of computerized information systems in the healthcare sector is very slow compared to other sectors such as finance, transportation, manufacturing, and retail industries (deGannes Scott, 2006).

This study would be delimited within the confines of exploratory design, with secondary data. The source of secondary data gathered for this research is the literature search; hence the goal of this literature search would be to review past works in line with the subject matter. This will fulfill the study objective which is to evaluate the factors leading to develop an e-health record adoption model for both private and public healthcare institutions. This review would

# The Adoption of Electronic Health Record Model for Healthcare Organizations in Iraq: An Overview

Incorporate evolved search of internet sites, conference papers, gathering, and published information. A variety of searches were performed on article and journals reviews, daily newspapers. Focused online search was done by using such relevant keywords such as “EHR”, “electronic health record”, “IT adoption”, “Healthcare information system”, “E-Health in Iraq”, and “adoption of EHR”.

## II. RESEARCH BACKGROUND

The adoption of EHRs has been in place for over 30 years and has been supported by many national leaders, medical organizations, privacy advocates, and legislation. The prior studies presented an historical timeline of the challenges posed with the adoption of e-health records and the consumer-health care provider communication dynamic. Historical data is beneficial in understanding how the adoption process has evolved and how the many challenges in adoption of these systems have been addressed.

The benefit of this study is that recording the consumer information for easy access could provide information for health care leaders to develop communication plans, community services, or consumer training to ensure consumer awareness of the implications in using EHRs. Improvement in recording the data would be beneficial in the adoption of EHR systems and promote change in how to record information of the patients. Other benefits include understanding the consumer perspective on communication through the measurement of satisfaction with health care or information provided.

The background information provided the challenges with implementation and adoption of EHR systems as the basis for research on the consumer view of record system, the EHR adoption, and how this may affect stakeholder's satisfaction. The purpose statement defined the challenges with the government agencies for EHR systems and delineated how the rush to implement these systems may affect the consumer (Vest, Campion, Kern, Kaushal, & investigators, 2014).

Many studies (Berner, Detmer, & Simborg, 2005; Lee & Meuter, 2010; Stockdale et al., 2009) conducted on the adoption of EHRs focus on the challenges in adoption and the effects on communication between project stakeholders such as IT professionals and the health care providers, and the communication challenges between physicians and patients. Other studies (Fisher, Bhavnani, & Winfield, 2009; Li, Bensing, Verheul, & van Dulmen, 2008; Li et al., 2008) explore the consumer views and communication channels to promote or discourage the use of EHR systems by consumers and health care providers. A gap in literature exists as it relates to the consumers' view on the recording system adoption strategy, communication channels, consumer satisfaction, and the health care provider-consumer dynamic.

These background of studies provided empirical evidence from studies conducted in EHR adoption and communication. The studies previously conducted will provide information on current trends in communication and systems implementation on a national and global level. The literature review section will be presented an historical perspective of the evolution of technology and health records, consumer satisfaction, and the

effects on communication between the health care provider and the consumer.

## III. ELECTRONIC HEALTH RECORD (EHR)

The centers of Medicare and Medicaid Services has defined e-health record: "An electronic version of a patient's medical history that is maintained by the provider over time, and may include all of the key administrative clinical data relevant to that persons care under a particular provider, including demographics, progress notes, problems, medications, vital signs, past medical history, immunizations, laboratory data and radiology reports" ((Medicaid & Medicare Services, 2012). The EHR automates obtain to information in addition to have the possible of improve the clinician's workflow. Typically the EHR has the potential to support additional care-related functions directly or indirectly by different interfaces, such as evidence-based decision assistance, outcomes reporting, and quality management (Medicaid & Medicare Services, 2012).

EHR has been slow to develop due to high development costs (Anderson, Frogner, Johns, & Reinhardt, 2006), lack of standardization in the medical community and inhibited interoperability within a hospital are not to mention outside the hospital (Boonstra & Broekhuis, 2010). Nevertheless, health care providers are moving towards an EHR for various clinical, patient safety and financial reasons. As these goals relate to documentation in a medical record, capture of important information such as patient's medical problem list, allergies, drug interactions and contraindications, aberrant lab values and finally consideration of guideline-based intervention or screen tests can be inconsistent or altogether absent. There is a consensus among health care providers that high quality, safe and efficient health care by way of a universal electronic health data system is a common good with widespread benefits (Follen et al., 2007) but how to make this happen has been a significant challenge.

## IV. HISTORY OF EHR

The primary patient medical record has been developed 100 years earlier through Dr. Henry Plummer in Mayo Clinic (Jane, 2001; Kateri, 2007). Dr. Plummer acknowledged the need for having all information associated with a patient within one folder known as a unit code. The theory of Dr. Plummer's targeted to create a main repository which is enabled records for being moved around in order to wherever the individual might be in the hospitals. Dr. Plummer's device code system showed a patient's test results, visit dates, and doctor's notes. This theory started to be the basis for making almost all the patient health-related records in the medical care sector all-around the world (Jane, 2001; Kateri, 2007). In 1910, Plummer obtained his theory further more when he asked his assistant, Mable Root, to be able to construct what is called the Plummer Root document which contained a listing of all the patients that had interesting diseases after that she gave them numbers for easy search in the future (Jane, 2001).

Lawrence Weed followed a way to organise patient data by offering computerized medical records in 1968. According to Weed, (1968) doctors face enormous difficulties.

comprehending their colleagues' and writing that is often unreadable and needs filtering out data to be able to make it meaningful. Simply in 1960s, both IBM and Lockheed corporations developed Electronic Health Record systems which are enabled hospitals to avoid loss associated with patient records. Typically the first hospitals to use the new technique were Mayo Clinic and El Camino Hospital. Despite the fact that the system was deemed a success during that time, these hospitals stopped its use (H. U. David & Steffie, 2005). The Institute of Medication (IOM) published a report urging their members in 1990 to use computerized patient records in addition to move toward paperless healthcare records (H. U. David & Steffie, 2005). This declaration also brought to the place of the core benefits of EHR.

The e-health Records has a good advantage in dealing with the most essential issues in healthcare, for instance improving the quality associated with patient care, administration workflow, and safety. Nevertheless, the startup costs of EHR could be a substantial burden to main care facilities. EHR implementation costs could be separated into two groups: induced cost and system cost. The induced cost referred to the expense of the productivity throughout the modification from paper-based records for patient to computer-based medical records. The system costs are software, hardware, maintenance, support, training, and implementation.

The immediate advantages of the EHR adoption occur for the insurance organizations instead of the physicians (B. David, 2005). Numerous physicians recommended that the payer need to support the adopting cost (Ludwick & Doucette, 2009). In fact, cost-effectiveness and efficiency are the primary explanations why the healthcare organization is moving for the EHR adoption to be able to reduce preventable errors and deliver quality care (Jane, 2001). Governments together with non-governmental stakeholders tend to be evaluating incentive systems to reward hospitals and providers who adopt EHR.

Despite the fact that the financial cost for starting up e-health records is given by the practices or hospitals, the immediate financial rewards when it comes to increased revenue and cost saving is enjoyed through the payer (B. David, 2005). Health stakeholders are referring to a insufficiency of government motivation systems for starting up the e-health records as a primary reason that practices and hospitals have not adopted EHR yet. The government and healthcare institutions are now indicating setting up external resources to motivate practices and hospitals to adopt e-health record system. Moreover, lack of frequent interfaces is also avoiding hospitals from getting a paperless system.

## V. THE ADOPTION OF EHR

With the lack of evidence and high cost of the financial advantage of EHRs, adopters cite enhancements in healthcare as well as the ability for tracking both patient safety indicators and quality as the crucial drivers of EHRs investment (Song, Scheck McAlearney, Robbins, & McCullough, 2011). This entails that a company has financial resources which can be spent in a technology by using an uncertain returning without taking a chance on the organization solvency. According to (Zhou et al., 2009), the most significant correlation to EHRs

adoption is the quantity of physicians within the group. They identified that the probability of EHR adoption improves as the quantity of physicians within the group enhances.

Similarly, (Galt et al., 2010) determined that physicians related to a large system is more likely for adopting EHR than those are not. Hing, Burt & Woodwell (2006) identified that EHR adoption which is associated with some of physicians in a group in addition to the ownership structure. Higgins, Felt-Lisk, & Au, (2009) observed that large institutions owning several physician groups generally have system extensive plans for supporting and implementing EHRs. Culler, Fleming, Ballard, McCorkle, & Becker, (2011) examined a physician network which is shared an EHR implementations team. They determined that fixed costs and variable related to EHR could be decreased in larger practices when compared with smaller practices employing with fewer physicians. Such these findings recommend a positive correlation in between economy of scale, meaning situation where resources are provided among stakeholders for mitigating a financial risks and the EHR adoption. Small group or solo practices lack like economies of scales and are likely to obtain an EHR (Hing, et al., 2006). Since a solo practitioner, maintaining and owning an IT infrastructure can be really costly. All these practices face financial issues and are thus, highly risk adverse if it occurs to capital expenditures a solo practitioner, maintaining and owning an IT infrastructure can be really costly. All these practices face financial issues and are thus, highly risk adverse if it occurs to capital expenditures (B. David, 2005). DesRoches et al., (2011) identified that just 5% of physicians with one or two physician practices noted having a basic EHRs. The primary barrier reported was financial, with consternation about future physician reluctance. Most of these findings recommend that eliminating this financial obstacle should be addressed for smaller sized ambulatory care practices for adopting universal EHRs.

Certain adopters of EHR are planning on shifting forward with EHRs adoption. Impending adopters view financial obstacles, for example an insufficient return on investments or start-up as well as maintenance costs (Jenter et al., 2009; Menachemi, 2006). Furthermore, Jenter et al. (2009) identified that imminent adopters tend to be more likely to get financial incentives for implementing an EHR, recommending which financial incentives might be a method to tip the scales in favor of EHRs adoption with regard to those which perceive financial difficulties as a obstacle to EHRs adoption.

The slowly adoption of e-health records could be attributed to several issues for example (a) lack of uniform standard, (b) lack of financial incentives and financial barriers, and (c) inadequate technological infrastructure around developing countries (Hing, et al., 2006).

## VI. THE ADOPTION OF E-HEALTH IN IRAQ

Health development has become a pre-requisite with regards to the Iraqi sustainable development and an important element of the process of reconstruction. This study decline in the healthcare of the population along with the values of health services in the last two decades.



## The Adoption of Electronic Health Record Model for Healthcare Organizations in Iraq: An Overview

This explains the issues now faces the country in enhancing health and rebuilding it has the health services as well as, it determines priorities for development and investment over the following few years. The Iraq population has greater than bending in the latest 25 years. It reached to 27.1 million and it is increasing about 3% every year. The health concerning the population was continuously increasing between the year's 1960 & 1990. Throughout this time, infant mortality fell (from 117 to be 40 deaths for every 1000 births) in addition to child mortality dropped by 70 percent (from 171 to be 50 deaths for every 1000 births).

However since about 1990, it is actually a disastrous decrease in peoples' health. During a period when children's health had been improving in the most of countries, maternal mortality, child, and infant rates in Iraq greater than doubled. Adult death rate improved and life expectancy dropped - to under age 60 for women and men by 2000. Currently, according to WHO the rate in Iraq as a country with higher child and adult mortality alongside considerably poorer countries such as Djibouti, Afghanistan, Yemen and Sudan. Before 2003, Iraq seemed to be totally isolated out of the world. All private and public sectors were suffering because of deficiency in the development and communication programs and systems. The information systems of health were entirely paper-based along with manually processed due to the lack of personnel capacity, computers, and network systems. Considering that 2004, Ministry of Health in Iraq (MOH) recognized the value of information technology in processing and collecting health information. Thus, the MOH started the employ of modern technology within its health services at the provincial and central levels.

In the first phase of strengthening main health care project, numerous statistical and Information Technology staff performing in MOH has prepared on how to apply design with computers together with special programs which would lead to strengthening the information system of health. Also, several servers and computers were supplied to health directorate in governorates in the capital city Baghdad and some other governorates. The center of information technology designed a lot of computer programs for getting into data from unique health programs (Family Medicine, Health Visitor), connecting electronically main health centers with health directorate in Governorates. This program is currently utilized in around 300 electronically main health centers in Iraq as well as notably returned in Maysan health directorate in Governorates.

A number of public hospitals created Patient Management Programs which follows patients through their access to the hospitals record system until obtaining medicine right from the pharmacy. The Mental Hospital of Ibn AL-Rushed in Baghdad, and AL-Rusafa health directorate in governorates, are obtaining the system of health facilities. There are fragmented application programs that manage some health relevant data management such as maintenance and management of medical devices inside three hospitals within different governorates. However these programs need to be improved as a part of the Ministry of Health.

The MOH intended to carry out evaluation of the present situation of health information systems in Iraq, determine

priority areas regarding intervention in the six health information systems components in addition to fill the gaps. The process is also expected to lead to improvement of health information systems strategic plan intended for Iraq to strengthen health information systems that will ultimately result into evidence and improved based decision making method. One of the aims of this strategic plan is to be linked the majority of health facilities inside the country by a network to be able to capture time and accurate health information.

### VII. EHR AND RELATED WORKS

The aim of the review was to consider the history of the improvement and use of e-health systems, underlying theoretical frameworks, existing literature regarding the level of e-health readiness, potential obstacles and solutions to the issues for the implementation of e-health, and current initiatives to encourage better use of e-health services. The aim of reviewing this literature is to provide background regarding the possible difficulties to the assessment of e-health readiness. The literature review provided empirical evidence from studies conducted in this area. The studies previously conducted will provide information on current trends in these new systems on a national and global level.

Many studies such as (Berner, et al., 2005; Lee & Meuter, 2010; Stockdale, et al., 2009) conducted on the adoption of EHRs focus on the challenges in adoption and the effects on communication between project stakeholders such as IT professionals and the health care providers, and the communication challenges between physicians and patients. Other studies (Fisher, et al., 2009; Li, Bensing, et al., 2008; Li, Del Piccolo, et al., 2008) explore the consumer views and communication channels to promote or discourage the use of EHR systems by consumers and health care providers.

There are many revealed barriers for EHR implementations. Simon et al., (2007) identified that factors, for instance a perceived lack regarding physician support intended for change, lack regarding technological support or knowledge, efficiency interference, and an inability for finding an EHR that fits with the needs associated with the practice, are frequently reported obstacles to EHR adoption. Nevertheless, inadequate funding is observed as the greatest barrier as a way to EHR implementation (Galt, et al., 2010).

One significant barrier to implementation of an EHR has been the lack of interoperability among the various providers of health care services, either within the community or wherever the patient has lived. Providers such as hospitals, physicians, long term care services, durable healthcare equipment organizations, home health agencies, as well as insurance companies and other payers have not been able to electronically share patient care data between each other in a consistent and efficient manner (Boonstra & Broekhuis, 2010). This leads to a disconnect in the continuum of patient care as well as the need to replicate data collection efforts to ensure all clinical information is accurate and complete. Within these repetitive steps it is possible to inadvertently fail to include a critical piece of clinical information. Moreover, as the size of the clinical record increases in relation to the length as well as frequency of visits, the

medical record becomes less manageable from an overall coordination of care perspective. Finally, overall patient satisfaction is negatively impacted when the same or very similar demographic and data requests are made and as a person ages the information may become less historically accurate.

MacKinnon & Wasserman, (2009) examine six factors which are contributed to the successful EHRs implementation. These factors consist of a business case, an internal project, a planning phase, physician support, business process reengineering, and strong project management abilities. The business case contains sufficient economic together with strategic justifications to get adopting EHR systems, in addition to be able to determine potential obstacles to implementation for example financial cost. Physician support entails not only obtaining the physicians support but also the assistance of upper management. The internal project champ includes an individual which will cause the charge in EHR implementation. While planning phase entails ensuring requirements to get implementation are fulfilled. The skills of strong project management which contain change management are essential for overseeing all phases of implementation. At last, business process reengineering requires having the ability to configure an EHR system for use. Cohn et al. (2009) expand on the aforementioned factors that contribute to successful EHR implementation. During the planning phase, it is important to choose a vendor that is trustworthy and can guarantee that the EHR system will deliver as promised, and it is also important to establish a good working relationship with the vendor that extends beyond system installation as a means of ensuring ongoing technical support and promptly dealing with unexpected problems. Also, with respect to the business case of EHR adoption, it is important to negotiate prices with the vendor in order to ensure affordability regarding continual system maintenance, support and future upgrades.

It was previously mentioned that change management as a part of project management is an important factor in ensuring EHRs are implemented. According to Luo (2006), change management "refers to the process by which an organization gets to its future state" (p. 20). Change management comprises strategies necessary to facilitate the process of change involved in EHR adoption within an organization. Change management is especially important in order to smoothly transition to a new way of doing things, which in this case would involve transitioning from a paper-based to electronic-based system of billing via EHRs. According to Eden, (2002) implementation of an EHR system is also influenced by the perception of the office staff in a medical practice. A telephone survey was conducted where a sizeable majority of respondents reported that their EHR system improved billing processes. It was shown that the perception of the office staff was the primary indicator that led a practice to conclude that their EHR system improved billing processes as was intended.

Miller & Sim, (2004) focus on three main barriers to EHR adoption, and these contain technology, up-front costs, and physicians' attitudes together with perception. The higher initial costs tend to be a leading barrier for implementation,

with estimations of more than \$15,000 to almost \$40,000 for each physician. Technological problems involve usability connected with the system, such as considerably more learning curve to efficiently utilizing the system. Physicians' perception and attitudes relating to EHRs could also impede implementation, since physicians who see EHR more efficiently and are significantly less discouraged through technological and usability issues are more likely for adoption.

In spite of the financial benefits, primary costs of implementing an EHR system are already founded as a leading obstacle (Vicknair, Spruell, & Dochterman, 2010). Besides the substantial start-up costs, some negative cash flow can be typically experienced in a 1-2 year time period after EHR system implementation, and this could be mainly hard for small group practices and solo. In 2009, the Health Information Technologies regarding Economic & Clinical Health (HITECH) recognized monetary payments can be physician practices which adopt EHR systems to assist the financial cost.

A study used variables from the TAM to assess factors related to physicians' attitude for utilizing EHR (Wiedenbeck & Morton, 2009). In general, perceived usefulness (PU) explained 73 Percent of the difference in physicians' attitude towards EHR use, whereas perceived ease of use (PEoU) did not significantly influence attitude. None of the physicians' characteristics (years in practice, age, health system relationship, clinical specialty, and earlier computer experience) have been correlated with any of the TAM variables (Morton & Wiedenbeck, 2010). This study did not assess physicians' intention to use EHR. Because physicians may differ from other types of users in terms of IT acceptance, some authors have suggested adding other constructs to the TAM (Ayers, Menachemi, Ramamonjiravelo, Matthews, & Brooks, 2009; Yarbrough & Smith, 2007). Ilie et al. (2009) found the most significant factors effecting physicians' intent to use an Electronic Health Record (EHR) were attitude, PU, logical access and physical access. Walter and Lopez (2008) have highlighted the role of perception of threat to professional autonomy as an important antecedent to PU, intention, and EHR usage. For their part, Price (2010) observed that PEoU, PU, and perceived patient record privacy have moderate positive effects on physicians' intention to use an EHR. Holden (Holden, 2012) conducted a qualitative study of the effect of social influence on physicians' EHR use and their results suggested that role beliefs and moral norms could both encourage or discourage use. Besides, a study by Seeman and Gibson (2009) investigated the factors associated with their acceptance of EHR using two models: the Theory of Planned Behavior (TPB) and the TAM. Results from their multiple regression analyses showed that the TPB was more powerful than the TAM in explaining physicians' acceptance, but that a framework combining both models was even more powerful. Attitude towards EHR use and perceived behavioral control were the most important predictors of physicians' intention for using an EHR. Archer and Cocosila (2011) compared EHR perceptions of Canadian physicians already using EHR

# The Adoption of Electronic Health Record Model for Healthcare Organizations in Iraq: An Overview

systems with those not yet using them through an integrated theoretical approach inspired by the Unified Theory of Acceptance and Use of Technology (UTAUT), a model offering an extension to the TAM by including key concepts from other technology acceptance models (Venkatesh, Morris, Davis, & Davis, 2003). Their theoretical model explained 55.8% of the variance in behavioral intention to use EHR among physicians who were EHR users, and 66.8% among non-EHR users. Effort expectancy (a concept similar to PEOU) was found to be the strongest determinant of intention among EHR users, while performance expectancy (equivalent to PU) was the strongest determinant for nonusers. However, this study did not assess the role of context, particularly normative influences, which characterize the medical profession and could have an impact on the intention to use EHR. Contextual factors could also play an important role as barriers or enablers to EHR use (Holden, 2010).

The role of context and social influence was taken into account in a recent study by Chang and Hsu (2012) suggesting that a modified UTAUT model is useful in predicting medical staff intention to use an information system (IS). These authors employed a framework that integrated the constructs of assisting perceived consequence and conditions from the Interpersonal Behavior Theory (TIB) (Triandis, 1979). Their results showed that effort expectancy, performance expectancy, social influence, facilitating conditions and perceived consequences explained 31% of the variance in physicians' intention. In addition, including gender, age, experience, and occupation as moderators increased the explanatory power from 31% to 39% (Chang & Hsu, 2012).

In a recent study on EHR acceptance by physicians, Venkatesh et al. (2011), tested a modified UTAUT that also considered the specificities of the medical profession. Accordingly, they hypothesized that only age would have a moderating effect on the predictors of behavioral intention of physicians. Their modified model was effective in predicting physicians' acceptance and use of the EHR, with 45% and 47% of variance explained, respectively. Overall, previous studies have shown some support to using the TAM and the UTAUT as theoretical models of EHR and EHR acceptance by physicians. However, these models are still limited in their predictive power and, according to Venkatesh, future technology acceptance research must attempt to integrate other theories and studies (Venkatesh, et al., 2011).

## VIII. CONTRIBUTION AND SIGNIFICANCE OF THE STUDY

Health care professionals have the responsibility to ensure consumers are knowledgeable of the changes implemented for the use of e-health, access to personal health information, and consumer rights for privacy and security (Tang & Lansky, 2005). The findings of this study could be beneficial for government agencies and e-health stakeholders. The government has taken advantage of technology by providing information on policy and services offered by governmental agencies. Government agencies, such as public health agencies, ministries of health, health care providers, international organizations, donor countries, aid agencies

have taken on new roles of providing leadership in terms of providing strategic direction as it affects the entire nation and health care (Abd Ghani, Bali, Naguib, Marshall, & Wickramasinghe, 2008). Moreover, the results are much related to managers and decision makers who are experiencing the challenge of adoption EHR in the healthcare system. In addition, it could be beneficial for health care professionals and insurance companies in promoting communication, community services, and training toward encouraging consumer awareness and health care providers.

## IX. CONCLUSIONS

In this study, the existing of e-health recording frameworks for both private and public healthcare organizations in developing countries along with Iraq has been discussed briefly. A review of these studies showed that the health section in Iraq needs continued attention to get government support, Iraqi health services have never developed over the latest years in the different levels of health and medical services: tertiary, secondary and even the primary level, as well as in measuring the practicality of the existing approach. The findings indicate that interventions and programs designed to increase the EHRs adoption need to include a focus on the practice level because that is decision making regarding adoption occurs, in addition to help physicians change their workflow to obtain the most record, along with addressing privacy concerns and explicitly acknowledging. Additionally, the study will suggest a variety of healthcare settings in order to ensure higher generalizability associated with the outcomes. All these results can be mainly relevant and timely with regard to decision maker who presently face the obstacle of EHRs adoption in the Iraqi healthcare environment. The limitations of this study includes that there was single-source bias, as the collection of information was from secondary sources only. Also the study has more of a judgmental conclusion as there is no post data assessment. Healthcare organizations should figure out how to rationalize their organization needs and priorities, applications, and their own premise information, and after that merge their framework accordingly. Therefore, it is recommended for future researchers to conduct a field survey by collecting primary data and conducting statistical tests on the study variables test the variables implicated in the findings of this study.

## REFERENCES

1. Abd Ghani, M. K., Bali, R. K., Naguib, R. N., Marshall, I. M., & Wickramasinghe, N. S. (2008). Electronic health records approaches and challenges: a comparison between Malaysia and four East Asian countries. *International Journal of Electronic Healthcare*, 4(1), 78-104.
2. Anderson, G. F., Frogner, B. K., Johns, R. A., & Reinhardt, U. E. (2006). Health care spending and use of information technology in OECD countries. *Health affairs*, 25(3), 819-831.
3. Archer, N., & Cocosila, M. (2011). A comparison of physician pre-adoption and adoption views on electronic health records in Canadian medical practices. *Journal of medical Internet research*, 13(3), e57.
4. Ayers, D. J., Menachemi, N., Ramamonjiravelo, Z., Matthews, M., & Brooks, R. G. (2009). Adoption of electronic medical records: the role of network effects. *Journal of Product & Brand Management*, 18(2), 127-135.



5. Ben-Zion, R., Pliskin, N., & Fink, L. (2014). Critical success factors for adoption of electronic health record systems: literature review and prescriptive analysis. *Information Systems Management*, 31(4), 296-312.
6. Berner, E. S., Detmer, D. E., & Simborg, D. (2005). Will the wave finally break? A brief view of the adoption of electronic medical records in the United States. *Journal of the American Medical Informatics Association*, 12(1), 3-7.
7. Boonstra, A., & Broekhuis, M. (2010). Barriers to the acceptance of electronic medical records by physicians from systematic review to taxonomy and interventions. *BMC health services research*, 10(1), 1.
8. Chang, I.-C., & Hsu, H.-M. (2012). Predicting medical staff intention to use an online reporting system with modified unified theory of acceptance and use of technology. *Telemedicine and e-Health*, 18(1), 67-73.
9. Cohn, K. H., Berman, J., Chaiken, B., Green, D., & Scherger, J. E. (2009). Engaging physicians to adopt healthcare information technology. *Journal of Healthcare Management*, 54(5), 291.
10. Cucciniello, M., Lapsley, I., Nasi, G., & Pagliari, C. (2015). Understanding key factors affecting electronic medical record implementation: a sociotechnical approach. *BMC health services research*, 15(1), 1.
11. Culler, S. D., Fleming, N. S., Ballard, D. J., McCorkle, R., & Becker, E. R. (2011). The financial and nonfinancial costs of implementing electronic health records in primary care practices. *Health affairs*, 30(3), 481-489.
12. David, B. (2005). Physicians and ambulatory electronic health records. *Health affairs*, 24(5), 1180-1189.
13. David, H. U., & Steffie, W. (2005). Hope and hype: predicting the impact of electronic medical records. *Health affairs*, 24(5), 1121-1123.
14. deGannes Scott, B. J. (2006). Can Developing Countries Overcome the Digital Divide? *Information Technology in Trinidad and Tobago. Western Journal of Black Studies*, 30(2), 75.
15. DesRoches, C. M., Rao, S. R., Donelan, K., Campbell, E. G., Miralles, P. D., & Jha, A. K. (2011). Electronic health records in small physician practices: availability, use, and perceived benefits. *JAMIA*, 18(3), 271-275.
16. Eden, K. B. (2002). Selecting information technology for physicians' practices: a cross-sectional study. *BMC medical informatics and decision making*, 2(1), 1.
17. Fisher, B., Bhavnani, V., & Winfield, M. (2009). How patients use access to their full health records: a qualitative study of patients in general practice. *Journal of the Royal Society of Medicine*, 102(12), 539-544.
18. Follen, M., Castaneda, R., Mikelson, M., Johnson, D., Wilson, A., & Higuchi, K. (2007). Implementing health information technology to improve the process of health care delivery: a case study. *Disease Management*, 10(4), 208-215.
19. Fraser, H., Biondich, P., Moodley, D., Choi, S., Mamlin, B., & Szolovits, P. (2005). Implementing electronic medical record systems in developing countries. *Journal of Innovation in Health Informatics*, 13(2), 83-95.
20. Galt, K. A., Bramble, J. D., Siracuse, M. V., Abbott, A. A., Drincic, A., Paschal, K. A., & Fuji, K. T. (2010). The relationship between physician practice characteristics and physician adoption of electronic health records. *Health care management review*, 35(1), 55-64.
21. Grimson, J. (2001). Delivering the electronic healthcare record for the 21st century. *International journal of medical informatics*, 64(2), 111-127.
22. Higgins, P., Felt-Lisk, S., & Au, M. (2009). Health information exchange: The role of safety-net providers: *Mathematica Policy Research, Incorporated*.
23. Hing, E., Burt, C. W., & Woodwell, D. (2006). Electronic medical record use by office-based physicians: United States, 2005. *Health E-Stats*.
24. Holden, R. J. (2010). Physicians' beliefs about using EMR and CPOE: in pursuit of a contextualized understanding of health IT use behavior. *International journal of medical informatics*, 79(2), 71-80.
25. Holden, R. J. (2012). Social and personal normative influences on healthcare professionals to use information technology: towards a more robust social ergonomics. *Theoretical Issues in Ergonomics Science*, 13(5), 546-569.
26. Ilie, V., Van Slyke, C., Parikh, M. A., & Courtney, J. F. (2009). Paper versus electronic medical records: the effects of access on physicians' decisions to use complex information technologies. *Decision Sciences*, 40(2), 213-241.
27. Jenter, C., Kaushal, R., Bates, D., Mills, S., Volk, L., Burdick, E., . . . Simon, S. (2009). Imminent adopters of electronic health records in ambulatory care. *Journal of Innovation in Health Informatics*, 17(1), 7-15.
28. Kateri, C. (2007). Capturing medical data in the EMR. *Medical Laboratory Observer*, 39(5), 28.
29. King, J., Patel, V., Jamoom, E. W., & Furukawa, M. F. (2014). Clinical benefits of electronic health record use: national findings. *Health services research*, 49(1pt2), 392-404.
30. Lee, O. F., & Meuter, M. L. (2010). The adoption of technology orientation in healthcare delivery: Case study of a large-scale hospital and healthcare system's electronic health record. *International Journal of Pharmaceutical and Healthcare Marketing*, 4(4), 355-374.
31. Lenert, L., & Sundwall, D. N. (2012). Public health surveillance and meaningful use regulations: a crisis of opportunity. *American journal of public health*, 102(3), e1-e7.
32. Li, H. Z., Bensing, J., Verheul, W., & van Dulmen, A. (2008). Patient anxiety in the medical encounter: a study of verbal and nonverbal communication in general practice. *Health Education*, 108(5), 373-383.
33. Li, H. Z., Del Piccolo, L., Angela Mazzi, M., Scardoni, S., Gobbi, M., & Zimmermann, C. (2008). A theory-based proposal to evaluate patient-centred communication in medical consultations: the Verona Patient-centred Communication Evaluation scale (VR-COPE). *Health Education*, 108(5), 355-372.
34. Lim, M. C., Patel, R. P., Lee, V. S., Weeks, P. D., Barber, M. K., & Watnik, M. R. (2015). The long-term financial and clinical impact of an electronic health record on an academic ophthalmology practice. *Journal of ophthalmology*, 2015.
35. Ludwick, D., & Doucette, J. (2009). Primary care physicians' experience with electronic medical records: barriers to implementation in a fee-for-service environment. *International Journal of Telemedicine and Applications*, 2009, 2.
36. Luo, J. S. (2006). Tech advisor technology adoption: managing change *Primary Psychiatry*, 13(8), 20-23.
37. MacKinnon, W., & Wasserman, M. (2009). Integrated electronic medical record systems: critical success factors for implementation. Paper presented at the System Sciences, 2009. HICSS'09. 42nd Hawaii International Conference on.
38. Medicaid, & Medicare Services, H. (2012). Medicare and Medicaid programs; electronic health record incentive program--stage 2. Final rule. *Federal register*, 77(171), 53967.
39. Menachemi, N. (2006). Barriers to ambulatory EHR: who are 'imminent adopters' and how do they differ from other physicians? *Journal of Innovation in Health Informatics*, 14(2), 101-108.
40. Miller, R. H., & Sim, I. (2004). Physicians' use of electronic medical records: barriers and solutions. *Health affairs*, 23(2), 116-126.
41. Morton, M. E., & Wiedenbeck, S. (2010). EHR acceptance factors in ambulatory care: a survey of physician perceptions. *EHR Acceptance Factors in Ambulatory Care: A Survey of Physician Perceptions/AHIMA, American Health Information Management Association*.
42. OpenClinical. (2005). Electronic medical records, electronic health records. Retrieved from <http://www.openclinical.org/emr.html#refs>.
43. Price, A. (2010). A study of factors influencing physician adoption of electronic medical records technology. *Grenoble Ecole de Management*.
44. Savage, N. (2012). Better medicine through machine learning. *Communications of the ACM*, 55(1), 17-19.
45. Seeman, E., & Gibson, S. (2009). Predicting acceptance of electronic medical records: is the technology acceptance model enough? *SAM Advanced Management Journal*, 74(4), 21.
46. Sim, I., & Miller, R. H. (2004). Physicians' use of electronic medical records: barriers and solutions. *Health affairs*, 23(2), 116-126.
47. Simon, S. R., Kaushal, R., Cleary, P. D., Jenter, C. A., Volk, L. A., Poon, E. G., . . . Bates, D. W. (2007). Correlates of electronic health record adoption in office practices: a statewide survey. *Journal of the American Medical Informatics Association*, 14(1), 110-117.
48. Song, P. H., Scheck McAlearney, A., Robbins, J., & McCullough, J. S. (2011). Exploring the business case for ambulatory electronic health record system adoption. *Journal of Healthcare Management*, 56(3), 169.
49. Stockdale, R., Day, K., Heart, T., O'Reilly, P., Sammon, D., & O'Donoghue, J. (2009). Bottom-up or top-down? A comparative analysis of electronic health record diffusion in Ireland and Israel. *Journal of Systems and Information Technology*, 11(3), 244-268.

## The Adoption of Electronic Health Record Model for Healthcare Organizations in Iraq: An Overview

50. Tang, P. C., & Lansky, D. (2005). The missing link: bridging the patient-provider health information gap. *Health affairs*, 24(5), 1290-1295.
51. Triandis, H. C. (1979). Values, attitudes, and interpersonal behavior. Paper presented at the Nebraska symposium on motivation.
52. Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. *MIS quarterly*, 425-478.
53. Venkatesh, V., Sykes, T. A., & Zhang, X. (2011). 'Just what the doctor ordered': a revised UTAUT for EMR system adoption and use by doctors. Paper presented at the System Sciences (HICSS), 2011 44th Hawaii International Conference on.
54. Vicknair, D., Spruell, J., & Dochterman, S. (2010). Capturing the financial benefits of electronic medical record investments in the small medical practice. *Journal of Business & Economics Research (JBER)*, 8(6).
55. Walter, Z., & Lopez, M. S. (2008). Physician acceptance of information technologies: Role of perceived threat to professional autonomy. *Decision Support Systems*, 46(1), 206-215.
56. Weed, L. L. (1968). Special article: Medical records that guide and teach. *New England Journal of Medicine*, 278(12), 593-600.
57. Wiedenbeck, S., & Morton, M. E. (2009). A framework for predicting EHR adoption attitudes: a physician survey. *Perspect Health Inf Manag*, 6, 1a.
58. Yarbrough, A. K., & Smith, T. B. (2007). Technology acceptance among physicians: a new take on TAM. *Medical Care Research and Review*.
59. Zhou, L., Soran, C. S., Jenter, C. A., Volk, L. A., Orav, E. J., Bates, D. W., & Simon, S. R. (2009). The relationship between electronic health record use and quality of care over time. *Journal of the American Medical Informatics Association*, 16(4), 457-464.