

Electronic Medical Records System (EMRS) for Muslim's Information and Knowledge Sharing

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Abstract: Medical records in electronic forms are seen as an effective way of managing medical records, amidst the increasing number of patient's population. The role of networking system in increasing the utility of technology leads to the adoption of the electronic medical records (EMR) system. Although the EMR system experiences a slow adoption rate, it promises improved efficiency in the medical and healthcare system by facilitating information exchange among physicians, caring for the same patients. More specifically, the study aims at examining physicians' perceptions towards the importance of various functions of EMR system and the extent to which their characteristics are related to the perceived importance of the functions of the system. Although previous studies suggest that age, computer sophistication and medical speciality of physicians impact the extent to which they use EMR technology, the present study revealed little evidence that these characteristics are related to the perceived importance of EMR functions. This paper describes elements of the electronic medical records (EMR) system that can contribute to the development knowledge and research as an impetus to the research activities in this area in the Muslim world. It also attempts to consider the various roles that need to be assumed and also reports various strategies that could be undertaken in different capacities such as, government and the business sectors with the goal of adopting an electronic medical records system (EMRS) for the purpose of information sharing.

Key words: Muslim • Health services • Information Sharing • Electronic Medical Record (EMR) • Record management • Patient • Communication Technologies

INTRODUCTION

A great challenge facing the Muslim world is to develop a knowledgeable and critical thinking society while pursuing economic development. According to a Quranic verse (Zumar: 9), Islam urges man to learn because man cannot develop or progress except through knowledge. Hence, Islam differentiates between the learned and the ignorant. The Quranic verse says, "...Say, 'Are those who know and those who do not know alike?' Only the men of understanding are mindful." It is clear that the Almighty Allah considers those who perceive knowledge as mindful since it is the mind (the brain) which understands things. The more knowledge man gains, the more God-fearing and nearer to Allah he becomes. In the current k-economy where knowledge is

regarded as a crucial commodity, it has to be well organized so that it can be effectively retrieved for utilization and application. Similarly in most cases, the expansion of the demography leads to increasing need for health and medical attention and treatment and medical information, including those of the patients which need to be systematically secured and managed. Adopting an electronic medical records system (EMRS) for the purpose of information and knowledge sharing is crucial. Islam motivates man to think and this can be seen from the verses in the Qur'an, one of which says that "And one of His signs is the creation of the heavens and the earth and the diversity of your tongues and colours; most surely there are signs in this for the learned" (Rum: 22) Critical thinking means skilful, responsible thinking that facilitates good judgement because it relies on criteria; is self-

correcting; and, is sensitive to context." It helps growth of individuals through a number of methods, programmes and techniques while furthering knowledge through thinking, research and development. Knowledge and research, including on the electronic medical records (EMR) system could be attained by common approaches, such as discovery approach, lateral thinking, problem-solving, cooperative learning and practical experience. It is also believed that libraries complement these methodologies, if equipped with adequate services and activities. Information system is becoming a critical factor today because it can contribute significantly towards making man more knowledgeable and analytical of their environment and their well being. Inadequate or absence in health and medical information may lead to ignorance, obsolescence, bias and prejudice which are the traits of an uncritical person. Such traits may pose a danger to the well-being of a society at large. Muslim professionals are part and parcel of the educational and innovative process and should play a role that could help mould individuals into critical and knowledgeable ummah.

Information is needed to perpetuate new knowledge and ideas while nurturing the mind. Islam urges man to reason out when making decisions. According to H. Hajj Hassan, "reason in this sense means a degree of comprehension that qualifies man to perceive things. The Holy Qur'an relates judgment to reason and blames the one who does not use his mind. The mind and its function are mentioned fifty times throughout the Qur'an. Men of understanding or the learned are mentioned twelve times and the men of wisdom are mentioned once. Reason or mind is a great bounty from Allah. One should always resort to reason to handle one's affairs" A verse from the Qur'an indicates the high status of reason (mind) when it says that, "These are signs for men of understanding", "signs for the learned," and "thus We do make clear the communications for a people who reflect." (Yunus: 24).

Islam and the Mind: Knowledge acquisition is an important pursuit among Muslims. Seeking knowledge to enhance intellectual superiority is given top priority. Islam has alerted the believer to the value and the function of his mind, to the necessity to think curiously, carefully, logically and critically. It did not advocate that a person should accept its tenets blindly. Islam filled the heart of the believers with deep love for knowledge and inspired them to seek knowledge at all costs. Knowledge

is expected to open mind to new ideas and prepare them to consider novelties in the light of its guidance, free from prejudice and rigidity. Active research and development among Muslim must be actively revived, especially amidst the development of ICT. Revival of this stagnation was made possible through Muslim leaders, such as Imam Al'As'ari, Al-Shiraz, Al-Ghazali and Al-Razi, (physician). Later philosophers, like Al-Kindi, Ibn Sina, (physician), Al Biruni, (physician, astronomer, mathematician, physicist, chemist, geographer and historian), Ibn Khaldun, (historian), Farabi, Ibn Rushd helped to reinstate intellectual vigor and productivity. These scholars have helped carved a strong intellectual tradition by Islam, making a permanent mark in the history of human thought. Such mark provides a deep conscience on the Muslims to be more critical and that we can emulate the acquisition, preservation and transmission of scholarship in the modern world just like before. The present Muslim mind, therefore need to be nurtured and restored to its past dignity with its true Islamic properties: priority; freedom from superstitious beliefs; enlightened reasonable thinking; tolerant; and sympathetic understanding towards co-believers.

With the change towards the increasing use of modern technology, a more dynamic and thinking society who could suit themselves with the changing environment is expected. Allah in His Book also addresses the mind and the heart (reason and emotion) and motivates man to ponder on His creation of countless creatures of perfect structure. The Quranic verse says that, "Certainly the creation of the heavens and the earth is greater than the creation of men but most people do not know." (Mu'minun: 57). This is a reminders that the Muslims must not be left behind but compete in the current sophistication of ICT development and research in more areas, including in the electronic records management. Muslim scholars of the classical age were the inventors and developers of sciences, mathematics, astronomy, astrology, medicine, logic, philosophy, medicine and chemistry (Al-Razi 320 A.H.). Muslim scientists (eg. Nasir al-Din Tusi) contributed greatly to the fields of mathematics, chemistry, medicine, geometry, algebra, geography and history. The major strength of the early Muslim Scholars was that the knowledge and piety went hand in hand. They combined "ilm" (knowledge) and "amal" (good work) to unveil the amazing secrets of nature which in turn deepened and strengthened their faith in Allah.

Allah (Swt) Says:

نُونُ مَوْتٍ وَرُكْنُ مَلَايَعٍ نَوَّهْنَتْ وَفُورِعَ مَلَابِ نَوْرُمَاتٍ
سَانَلَلَتْ جَرِيخَ آةٍ مَآرِي خَمْتَن كَهَلَلَاب

“You are the best of the nation raised up for mankind because you enjoin what is right and forbid the wrong and believe in Allah” [Ali-Imran 3:110]

Electronic Medical Records (ERM): Electronic Medical Records, also called machine readable records is medical records in digital format captured through electronic means which may or may not have a paper records as a back up. Until recently most electronic medical record systems were developed, using older programming languages such as Visual Basic. With many systems now developed using Microsoft, NET Framework and Java technology, electronic medical records can be securely implemented across multiple locations with greater performance and interoperability. Under data protection legislation, responsibility for patients’ records (irrespective of the form they are kept in) is always on the creator and custodian of the records, usually a health care practice or facility. Additionally, those involved with the management of the Electronic Medical Records are responsible for the hardware, software and media used to ensure the information in the records remain usable and not degraded. This requires backup of the data and protection being provided to copies. It will also require the planned periodic migration of information to address concerns of media degradation from use.

The development of health information system (HIS) and electronic medical records (EMR) helps health professionals to enhance patient care and clinical services¹. Moreover, implementing EMR can potentially lead to better quality and more efficient healthcare². However, investing EMR is a costly process in hospitals, making a decision in investing EMR is an important topic for healthcare managers. Accordingly, it is important to

realize whether or not EMR could be accepted by its end-user and whether EMR could provide actual data and information for patient care³.

The Electronic Medical Records System (EMRS)

The Framework: Electronic medical records system and health information system do an evaluation methods and issues and derived from independent study (IS) evaluation. In IS research, Ground Theory (GT) has been used widely⁴ and can be regarded as a method to develop theory⁵. Accordingly, in order to identify and explain the relationships between the aspects of Environment, Technology, Human and Net Benefits, this research adopted GT to generate a proposed conceptual evaluation framework for evaluating Taiwanese EMR (Fig. 1).

This framework considers that the aspects of Environment cover the dimensions of Healthcare Environment (HE) and Organization Behaviours (OB); the aspects of Technology cover the dimensions of System Quality (Sys_Q), Medical Data Quality (MDQ), Service Quality (Ser_Q) and Safety Quality (Safe_Q); the aspects of Human cover the dimensions of User Usage (UU) and User Satisfaction (US); the aspects of Environment cover the dimension of Net Benefits covers the dimensions of Organization Net Benefits (ONB). Therefore, we supposed that HE will have positive affects and enforce hospitals to implement EMR. Then, based on the operational strategies and OB of hospitals, they will have a positive effect on Sys_Q, MDQ, Ser_Q and Safe_Q of EMR. Moreover, UU and US of implementing EMR

¹ Wan, T.T.H., Healthcare informatics research: from data to evidence-based management. Journal of Medical Systems, 2006. 30(1): 3-7

² Schiffman R. N., Brandt C. A., Liaw Y. and C.G. J., A design model for computer based guideline implementation based on information management services. Journal of the American Medical Informatics Association, 1999. 6(2): p. 99-103. [4]

³ Mohd, H. and S.M.D. Mohamad, Acceptance Model of Electronic Medical Record. Journal of Advancing Information and Management Studies, 2005. 2(1): p. 75-92. [5] Ammenwerth, E., J. Brender, P.

⁴ A. A. Akbar, 'Pay-per-use' concept in healthcare: a grounded theory perspective, in Proceedings of the 36th Annual Hawaii International Conference on System Sciences, 2003.

⁵ Taylor, G.R., ed. Integrating quantitative and qualitative methods in research. 2nd ed. 2005, University Press of America: Lanham, Md, Friedman, C.P., Evaluation methods in biomedical informatics / Charles P. Friedman, Jeremy C. Wyatt; foreword by Edward H. Shortliffe. 2nd ed ed. 2006, New York: Springer..

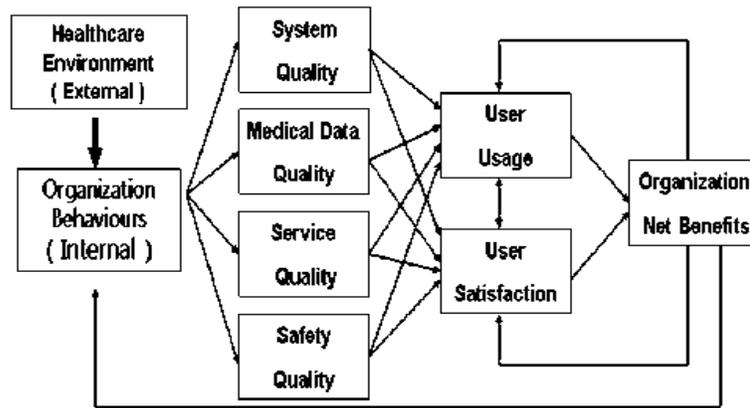


Fig. 1: Taiwanese Electronic Medical Record System Evaluation Framework⁶

will be positive affected by Syst_Q, MDQ, Ser_Q and Safe_Q. Accordingly, there is also an interaction between UU and US. Furthermore, UU and US will have a positive influence on ONB by implementing EMR in clinical service. Finally, ONB will provide a feedback to influence on UU and US of its end-user and OB of hospitals.⁷

What Is Taught: *The discovery of the scientific use of drugs in the treatment of specific diseases was made by Paracelsus, the Swiss-born physician, during the 16th century. He is also credited with being the first to use practical experience as a determining factor in the treatment of patients rather than relying exclusively on the works of the ancients.*

What Should Be Taught: *Ar-Razi, Ibn Sina, al-Kindi, Ibn Rushd, az-Zahrawi, Ibn Zuhr, Ibn Baytar, Ibn al-Jazzar, Ibn Juljul, Ibn al-Quff, Ibn an-Nafs, al-Biruni, Ibn Sahl and hundreds of other Muslim physicians mastered the science of drug therapy for the treatment of specific symptoms and diseases. In fact, this concept was entirely their invention. The word “drug” is derived from Arabic. Their use of practical experience and careful observation was extensive. Muslim physicians were the first to criticize ancient medical theories and practices. Ar-Razi devoted an entire book as a critique of Galen’s anatomy. The works of Paracelsus are insignificant compared to the vast volumes of medical writings and original findings accomplished by the medical giants of Islam.*

The Characteristics: Once records have been created, they must be managed and maintained for as long as required to ensure they have the following characteristics;⁸

- Authenticity - the record can be proven to be what it purports to be, to have been created or sent by the person that created or sent it and to have been created or sent at the time it is purported to have occurred.
- Reliability - the record can be trusted as a full and accurate representation of the transaction(s) to which they attest and can be depended on in the course of subsequent transactions.
- Integrity - the record is complete and unaltered and protected against unauthorized alteration. This characteristic is also referred to as ‘inviolability’.
- Usability - the record can be located, retrieved, preserved and interpreted.

The Issues: Positive economic climate has raised the confidence level of some Muslim nations to have a visionary outlook in achieving the status of a developed nation. In order to develop all sectors of socioeconomic and industrial domains, a critical and knowledgeable society is highly aspired in order to achieve scientific development, (R&D) as well as the growth of knowledge. Without adequate knowledge, it may not be possible for the Muslim society to reach this goal in order to successfully achieve the status of an industrialised nation. The Muslim Ummah must also strive to achieve

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⁷Y. Y. Su, K. T. Win and H. C. Chiu. The Development of Taiwanese Electronic Medical Record Systems Evaluation Instrument. World Academy of Science, Engineering and Technology A: Biological and Biomedical Sciences 4:3 2008

⁸These are taken from ISO 15489.1 Records Management, Section 7.2 Characteristics of records.

research ability imbued with the highest ethical standards so that they could move into a technology-based nation while being a just, fair and caring society. Improved enables individuals to use their intellect to the full extent. Calls for the need to revolutionize thinking and transformation of culture are indeed relevant as far as long as their perspectives are linked with the concept of sustainable economic development.

Nowadays, physicians are encouraged and opted to switch to computerized medical records to improve the increasing sophistication in patients' care. The Director of Federal Affairs think that the money used for electronic medical record can give benefit to their patients. Some their staffs think that electronic medical records can create a huge profit. Electronic medical records have slowly gained acceptance in the health care industry, especially after American President Bush in 2004 wanted the entire Americans to have an electronic patient records by 2014. Proponents, who envision a nationwide online database of medical information, say that the electronic records system can speed up medical decisions, avoid errors and save lives. The electronic medical records can be protected by federal privacy law and supporter of network. However, in large hospitals, the decision to purchase and implement an EMR system may be made by administrators. A physicians may feel pressured to use systems that they perceive hinders their ability to effectively perform their duties. In other cases, especially in small and private practices, physicians may have positive attitudes regarding adopting EMR technology, but do not use or have access to an EMR system because of financial constraints or other reasons.

It is estimated that the potential savings and costs of widespread adoption of electronic medical records systems, models important health and safety benefits and concludes that effective EMR implementation and networking could eventually save more than \$81 billion annually by improving health care efficiency and safety. Electronic medical record systems will lead to major health care savings, reduce medical errors and improve health. Modern EMR systems may be more effective than the legacy systems reporting evidence because electronic medical records can make long-term care.

Electronic Medical Records use in hospital and ambulatory care largely focus on alerts, reminders and other components and also makes information available to physicians at the time they enter an order. There are

potential health benefits of Electronic Medical Record such as exploit important features and capabilities such as communication, coordination, measurement and decision support and secondly, they are potentially high leverage areas for improving health care. Electronic medical records (EMR) systems promise to address many of the inefficiencies of the US healthcare system.

EMRs are defined as a paperless form of the medical records that requires the provider to enter patients' information (i.e. clinical notes). EMR systems are designed to replace the paper medical chart. By computerizing the medical records, EMR systems do away with illegible handwriting and eliminate the onerous chore of alphabetical filing. Key benefits of using this technology stem from the use of imbedded decision support systems that can assist clinicians, via reminders and/or alerts, to provide higher quality, evidence-based care (Agrawal, 2002; Menachemi and Brooks, 2006b).

Moreover, by automating data entry using customizable templates, EMR systems are associated with improved charge capture and reimbursements. Lastly, an important advantage of EMR systems is their ability to interface with other health data sources that contain pertinent patient information needed at the point of care. For example, EMR systems can potentially connect with pharmacy and laboratory data and provide access to refill histories and test results to physicians. Additionally, EMR systems that are connected to other providers' system enable physicians to access the treatment plans and diagnoses produced by other caregivers that may be participating in the care of the same patient (Bates *et al.*, 2003).

Electronic access to comprehensive patients' information previously inaccessible by clinical decision-makers at the point of care is predicted to revolutionize the way medicine is practiced (Frist, 2005). Recent work has expanded the view of network effects beyond a simple function of the number of homogeneous users. Strader *et al.* (2007), adapted the technology acceptance model to include perceptions of the presence of network effects as an antecedent to perceptions of technology usefulness. They found that perceptions of network effects do impact perceptions of technology usefulness and those latter perceptions predict intent to adopt for one technology (e-mail) but not for another (instant messaging). Further evidence of how observations of network effects impact adoption decisions comes from Corrocher and Fontana (2007).

An EMR as a computerized system contains a patient's long-term legal health records. EMR systems offer a number of benefits, including improved quality of patient care, more efficient healthcare workflows and reduced costs (Thompson *et al.*, 2007). Because of the many potential benefits associated with EMR technology, a number of experts believe the market for EMR systems will grow rapidly over the next decade. The slow adoption pace for EMR systems in the USA has been attributed to a number of barriers. Some of the most commonly reported obstacles are price, interoperability and privacy/confidentiality issues (Anderson and Balas, 2006).

However, in hospital settings, the most significant barrier does not appear to be related to the technology of the system, but rather behavioral issues related to the implementation of the technology (Darr *et al.*, 2003; Vanmeerbeek, 2004). Another potential problem with previous studies using global measures to assess the physicians' attitudes toward EMR technology is the wide variety of EMR systems currently available. Physicians are likely to form their general opinions about EMR technology based on the specific system or systems they have used in the past. These systems may or may not have been well suited for the physician's particular needs. To investigate attitudes toward EMR technology independent of past experience with specific EMR systems, it may be best to avoid global measures and focus on attitudes about specific attributes of EMR technology.

Perceived importance has frequently been found to be a strong predictor of subsequent use (Osbourne and Clarke, 2006; Davis, 1989). In addition, assessing perceived importance of various EMR functions provides EMR vendors with valuable information regarding which EMR functions are most needed for inclusion in an EMR system. Physicians generally appear to be aware of the benefits and importance of EMR technology. Some functions were clearly viewed as more important than others, which should assist vendors in the development of EMR systems, particularly with respect to navigating through menus to obtain the desired information.

The Solutions: Several solutions were given with regards to EMR application and implementations. First of all physicians must be implementing to the attribute the significant and adoption of the EMR technology in hospital. The physicians must be compiling with

predetermined workflow or be accountable to computerized system. The second solution, the hospital must be set the staff expected training time, the perceived usefulness of EMR systems and the belief that EMR technology represents an intrusion in the patient-physician interaction.

Physicians' acceptance to EMR is crucial to widespread adoption of this technology. Since physicians must use EMR systems in their day-to-day work, the success of an EMR system depends to a great extent on their attitude and satisfaction with the EMR system. Many unsuccessful attempts to implement EMR technology have been attributed to the physicians' dissatisfaction with the EMR system.

Physicians may likely develop their own general opinions about EMR technology based on the specific system or systems they have used in the past. These systems may or may not have been well suited for the physician's particular needs

Electronic Medical Records has several advantages and disadvantages. In term of solution, Electronic Medical Records must be widely used in medical organizations. It can help staff managing electronic medical record effectively and efficiently. In term of networking, medical agency needs to improve the speed when access patient record so that staff and patient can get their record easily and faster.

CONCLUSION AND RECOMMENDATIONS

The article has outlined the major issues involved in managing and using the electronic medical record. The need to manage records effectively and efficiently cannot be overstated. Poor record keeping has been cited as one of the major areas through which corruption has been thriving. Many of the attendant problems associated with electronic records such as the legal admissibility of electronic records, the speed at which they can be altered without trace, their dependence on hardware and software which are constantly changing, etc. are all issues yet to be resolved. Moreover, there appears to be some misconception amongst policy and decision makers that the introduction of modern information technologies would solve many of their information needs. As noted by Oli Mohamad, "There is an underlying assumption in the Quran that a rational and enlightened mind is a strong foundation for a faithful Muslim, because the more one comprehends the intricacies of natural phenomena,

the greater will be one's reverence for the attributes of the Almighty, Who created all and the stronger will be one's faith in Him." Quran abhors the ignorant thus "Lord" the worst of beast in Allah's sight are the deaf, the dumb, who have no sense." (Surah VIII, 22). It is found that library science promotes knowledge and scholarship while Islam advocates knowledge and learning. It is of utmost importance for libraries and information professionals to proactively stimulate and encourage the Muslims to increase learning and research with the objective of achieving a more critical thinking ummah and revive the past glory during the Golden Age of Islam. After all Islam has already established the great tradition of acquiring and utilizing knowledge and learning and such revival would help meet the challenges of information era and information society.

Those involved in health and medical profession, especially our Muslims scholars and scientists should be aware and concerned with the development and improvement in medical records management. Medical organizations or health agencies need greater co-operation between ministries and departments to ensure the patient's records are well managed. Medical and health organizations must have a good relationship between ministries and department so that every patient's information can be retrieved and utilized. Holy Qur'an orders us to get certain knowledge and admonishes whoever follows illusions. The Qur'an says that, "..... and most surely many lead (people) astray by their low desires of ignorance; surely your Lord, He best knows those who exceed the limits." (Anaam: 120).

Secondly, medical and agencies should conduct continuous study and make analysis about the effectiveness of the electronic records system. The feedback can be used for the improved management of records in compliance with existing nation policy. Using electronic records have created a number of problems, in terms of staffing and maintenance. Not all staff is ICT savvy and they need continuous training. As suggested by several researchers there are a lack of computer sophistication among physicians in implementing of EMR technology. Organization should train their staff to improve their skill in manage the EMR technology.

It is further recommended that organizations should identify those physicians who are most likely to be resistant to EMR technology. This may provide administrators with information regarding areas in which technology training may be most beneficial. Proper

training generally improves attitudes toward EMR technology, even among physicians who were initially resisted the adoption of EMR systems. The level of computer skills or computer knowledge represents another key factor in most theories of technology acceptance

There is a need for further research and development in this area. With the emerging of the 21st century and the new economic order it is imperative that the Muslim nations would require this kind of individual in the society so that the success of economic and industrial programmed could be enhanced and guaranteed. Islam made the acquisition of knowledge an obligatory duty to every Muslim and encourages the spirit of inquiry that is enquiring of the rational mind about man, his origin, his destiny and his role in material universe and the life after. It exerted them to search for and find new knowledge and new information in order to verify the Truth of the Signs of the Creator in the Universe. It also appeals to reason and search for the truth and invites criticism on the basis of knowledge and not based on fancy ideas. The significance of this phenomenon is that it heralds information and knowledge. The Muslims must respond positively to become critical and harness the knowledge to increase productivity in all spheres of activity.

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