



E-health and its Transformation of Healthcare Delivery System in Makkah, Saudi Arabia

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ABSTRACT

Introduction: E-health is relatively a recent term and can be shuffled with health informatics. It engulfs all forms of digital and electronic processes found in healthcare provided via information and communication technology (ICT) channels. This study is an attempt to find out the level of utilization and effectiveness of e-health in Saudi Arabia due to the vast number of citizens, residents and pilgrims dependent on the present healthcare system. **Aim:** 1. To assess the utilization status of electronic health (e-health) in Makkah city hospitals. 2. To measure the usefulness of e-health in delivering good healthcare in Saudi Arabia. 3. To find out the challenges cum barriers in implementing e-health services in Saudi Arabia. **Methods:** A randomized study was carried out in three important hospitals in the Makkah Region. The entire number of samples collected for this study was 51. They belong to the administrative and medical staff in the hospitals and comprise of those staff who handle the daily operations of delivering healthcare services to the patients. **Results:** The hospitals - King Abdullah Medical City (KAMC), King Faisal Hospital (KFH) and Al Noor Specialist Hospital are using e-health but in different capacities. The main challenges are the costs and expertise of such innovative systems in information technology apart from the lack of computer and technical expertise of the hospital staff. **Conclusion:** E-health is widely used nowadays and is playing a dynamic and modern role in the delivery of healthcare in Saudi Arabia. This study brings out the e-health utilization and application in the health sector. It has exhibited that most of the clinical departments are utilizing e-health at an optimum level.

Keywords: E-health, Healthcare delivery, Information and Communication Technology, Challenges, Barriers

INTRODUCTION

E-health is relatively a recent term and can be shuffled with health informatics. It engulfs all forms of digital and electronic processes found in healthcare provided via information and communication technology (ICT) channels [1]. It ranges from informational, educational and commercial services to shortest facilities presented by healthcare organizations, professionals, and consumers themselves. Simply stated, e-health is creating healthcare extra sufficient and efficient, while allowing professionals and patients to enter and manage data in ways that were earlier quite impossible. The execution of information and communications technology (ICT) in healthcare has taken a frontline in the last 15 years. Its ability and flexibility to improve usefulness and effectiveness have been recognized by governments worldwide [2]. National strategies have been noticed in Europe, Australia, North America, Middle East and elsewhere and the aim of these strategies is to develop health information infrastructures and “info structures”. In addition, these strategies provide the standards and policies for ensuring interoperability and data security [2].

Saudi Arabia has a population of approximately 31.7 million with 3.2% growth rate and spread over 2,150,000 million km². KSA has a total number of 548 hospitals with overall 82,594 beds distributed across different cities and provinces. The kingdom has high importance for followers of Islam all around the globe. It is also the most important Islamic destination for pilgrimage. Saudi Arabia represented by the Ministry of Health (MOH) has dedicated vast funds to enhance national healthcare services with the goal of offering quality healthcare services to the citizens and residents and expanding the coverage at the same time [3]. This study is an attempt to find out the level of utilization of e-health in Saudi Arabia given the vast number of citizens, residents and pilgrims dependent on the present healthcare system. The e-health works to expand the medication safety by minimizing medication errors arising out of handwritten prescription orders. It augments robust communication towards patient health [1]. This study will help us to understand whether e-health was indeed useful in delivering good healthcare in Saudi Arabia. E-health helps in the prompt delivery of information around the organization, dropping turnaround time in delivery of medication, tracking down patients and processing lab work, carrying out radiology exams and standardizing other tasks [4,5]. The knowledge, health data, and information can also be pooled to support research in public health at a wide national level [1]. The electronic health records have been increasingly adopted by Saudi hospitals across the country. Although all e-health applications have a promising future for Saudi Arabia, quite a lot of challenges also exist in the organizational and technical level to implement the e-health initiatives. This study also attempts to assess the e-health status in the kingdom by determining the challenges and barriers. It will also try to analyze the influence of e-health on the new Saudi Arabian 2030 vision [6].

Aims of the study

1. To assess the utilization status of electronic health (e-health) in Makkah city hospitals.
2. To measure the usefulness of e-health in delivering good healthcare in Saudi Arabia.
3. To find out the challenges cum barriers in implementing e-health services in Saudi Arabia.

METHODS

Study design

The current study was a prospective randomized study done in three hospitals in the Makkah Region. Saudi Arabia is made up 13 administrative regions. Each region has a number of Ministry of Health hospitals depending upon the healthcare requirements in that particular region. But the point to be noted here is that the holy Makkah city has a very high patient turnout consisting of pilgrims, citizens, and residents. There is also a constant flow of pilgrims from different countries all throughout the year. First of all we made two broad stratifications of government and private hospitals for the present study [7].

Inclusion and Exclusion Criteria: We selected those hospitals in the Makkah region who were utilizing e-health for providing healthcare to the population. E-health was not utilized in the private hospitals as the implementation required a high cost and they were not funded directly by the Ministry of Health. So, the private hospitals were excluded from the present study. So, we were left with only seven government hospitals in holy Makkah city who utilized e-health to deliver healthcare to their population.

Sampling

We selected a random sample of three hospitals namely King Abdullah Medical City (KAMC), Al-Noor Specialist Hospital and King Faisal Hospital (KFH). These three hospitals are important Ministry of Health hospitals in Makkah region with a high patient turnout.

Sample Size

The number of samples selected for this study was 51. It comprised of the medical and administrative staff of the hospitals who were handling the daily operations to deliver healthcare services to the patients.

Research Tools Used

The appropriate tool for this study was a pretested survey questionnaire. The questionnaire aims to check the e-health strategies, the implementation, and the utilization at these hospitals. The different kinds of e-health applications used the effectiveness in the patient care and effect on the quality of services and finally the challenges and barriers in implementation of e-health in these hospitals. Furthermore, it will help us to get the perceptions of the staff towards the acceptability and implantation of new software’s and applications of e-health. The staff who participated in this study was mostly healthcare professionals from the clinical field, administration and health information management departments. The data collected from different departments in these hospitals was evaluated and analyzed for percentage of utilization and the effectiveness in improving the healthcare system. Also, the perception of the staff in implementing the e-health was analyzed. SPSS version 19 was used for analyzing the data and finding the results.

Use of Technology

With regards to the electronic concept, the technology used for this study was a tablet with assisted online survey software. This software would facilitate the answering of the questionnaire by the healthcare professionals. The reason behind using this software was to increase the quality of data entered and to review the answers with high precision thus dropping the chances of errors in filling the questionnaire [8,9].

Bias

The potential bias would have been approaching only the technical staffs of different departments in the hospital who were dealing with the e-health applications. This bias was controlled by selecting healthcare professionals from different fields like clinical, administration and health information management departments who worked in the hospitals.

RESULTS

It was found that all the three-selected used e-health in different capacities. It was found that different applications of e-health were used in these hospitals by the staff and it varied for the three different hospitals depending on the patient turnout and specialty of the hospital.

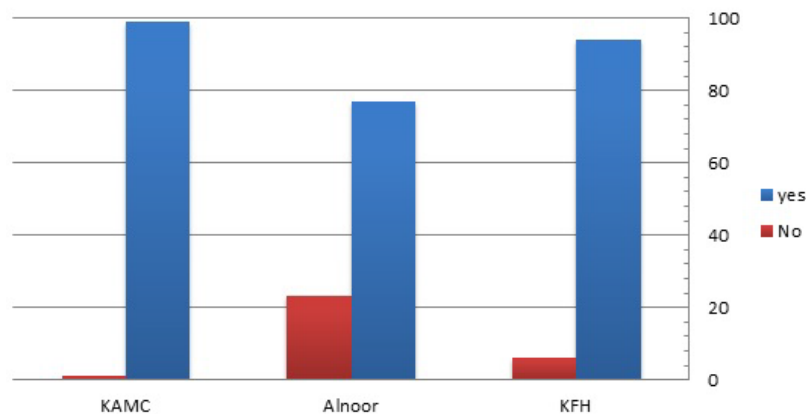


Figure 1 Utilization e-health in the selected hospitals (health information management systems, electronic health records, e-prescribing, etc.)

The perception percentage of e-health systems utilization in Makkah city hospitals showed that most of the hospitals use the e-health system. KAMC uses the electronic health system and electronic concept as an adopted approach and 98% of the departments utilized e-health. King Faisal Hospital (KFH) adopted the e-health system in around 96% of the departments. Al Noor general hospital used e-health system which is 76.9% as it is still implementing new applications of e-health. We found that Al Noor general hospitals’ utilization of e-health needs a boost and it is significantly lower as compared to the other two hospitals. (Figure 1).

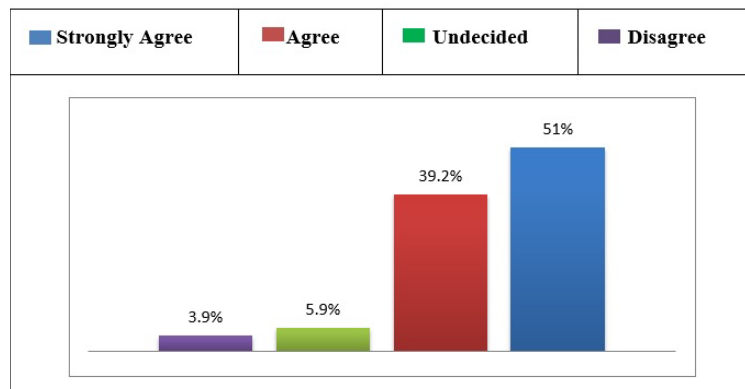


Figure 2 Electronic health records (EHR) utilization based on the kingdom’s e-health strategy

The perception percentage in the bar chart shown in the Figure 2 shows that 3.9% have disagreed with the use of EHR according to the kingdom’s e-health strategy, 5.9% remain undecided, 39.2% have agreed, and 51% have strongly agreed with using EHR as part of an e-health strategy in hospitals respectively. The disagreed percentage is not significant.

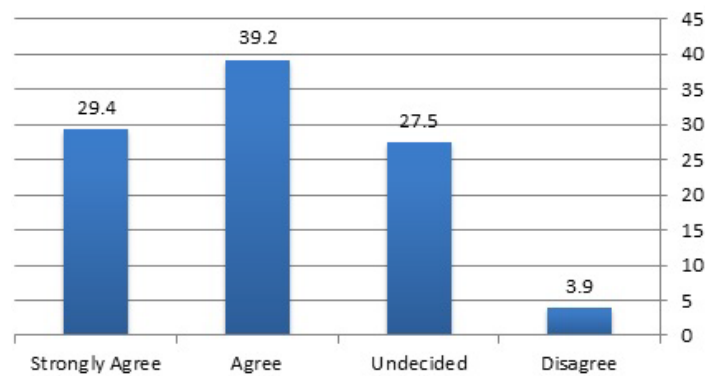


Figure 3 Implementation of e-health and improvement of healthcare delivery system in Saudi Arabia

The above data plotted in Figure 3 as a bar chart indicates the extent of the implementation of e-health on the healthcare delivery system in Saudi Arabia. We found out that 29.4% and 39.2% of healthcare professionals have agreed and strongly agreed with the fact that the implementation of e-health has improved the healthcare delivery system, but 27.5% couldn’t decide whether the implementation has indeed improved the healthcare system. Finally, 3.9% disagreed that e-health implementation has improved the healthcare delivery system and it is not very significant.

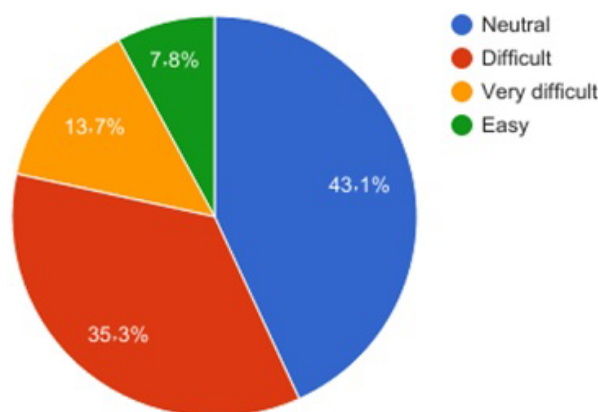


Figure 4 Difficulties in implementation of e-health in the hospitals

The above pie chart expresses the percentage of health professionals who faced difficulty while implementing E-health system in the hospital. The principal percentage was the neutral segment that constituted 43.1%, meaning that they faced a balance of difficult and good times during implementation owing to lack of training and expertise in these applications and also the language as most of the speakers are Arabic, while the least percentage constituted 7.8% who said that the implementation was easy. 35.3% said that it was a difficult option and 13.7% said it was very difficult to implement e-health in the hospitals.

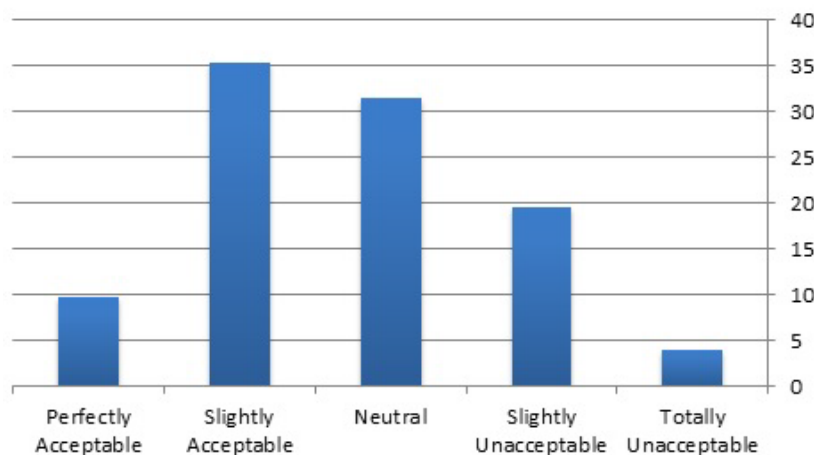


Figure 5 Perception of acceptability of e-health among employees

The perception among the participants about acceptance of employees for e-health in the hospitals is depicted in Figure 5. It is shown above that 35% of the participants agree that there has been adequate acceptance for e-health in the hospitals between employees. A 31% are neutral and they have accepted the e-health system but were not very happy with their performance, 20% of employees found the implementation as unacceptable and 4% do not accept the e-health system at all. Overall, there is acceptance of the e-health system but implementation is not complete as a result the employees have problem in acceptability. Also, training and skills of the employees are also areas of concern for operating the e-health applications.

DISCUSSION

In this study, the researchers found that the current utilization status of e-health system in Makkah city hospitals is satisfactory. The hospitals King Abdullah Medical City (KAMC) and King Faisal Hospital (KFH) are using the e-health applications at their maximum capacities. Al Noor general hospital is little behind in the implementation and utilization of e-health. Most of the departments like department of medical records, information technology department, pharmacy department, laboratory, ICUs, appointment and reception departments as well as other clinical departments have e-health utilization. But not all the hospitals have converted from paper medical records to electronic health records. There is partial implantation of some of the aspects of the EHR. This study also found out the implementation and utilization of e-health following the country's strategy for achieving complete e-health utilization in the Saudi Arabian Vision 2030. According to Altuwajiri's research published in 2008 e-health implementation benefits the patient in providing better patient care in the hospitals [10].

E-health plays a substantial role in saving a patient's life, reducing physician misunderstanding or errors that will also reflect the patient health [11]. On the other hand, with regards to management, e-health is supporting a smooth and gradual movement of information around an organization, helping a hospital to achieve a paperless concept with reduced time for healthcare delivery. This study found that e-health is also playing a vital role in improving healthcare services by providing appropriate tools e.g. telehealth, telemedicine, PACS, e-prescribing, EMR, etc. This is consistent with a study done to find out how telehealth can empower patient care through the adapting the information and communication technology for healthcare purposes [12]. This finding of the study can also be supported by WHO's ranking of the healthcare services in Saudi Arabia as 26th in the world and 2nd in the Gulf Cooperation Council (GCC) and the Middle East [13].

Challenges and barriers were also a part of the study objectives. This study tried to find the reason or the gap which is

an impediment to achieving complete implementation of e-health. In many developing countries, we find that the main challenges were implementing the e-health system, the training and skills available with the staff, perceptions about the e-health system and so on. In our study we found the staff had difficulties in implementation and acceptability of e-health systems. This can be attributed to lack of training and supervision in these departments. Some studies have also highlighted that the technical and computer expertise of the hospital staff affect the level of implementation and utilization of e-health [14-16]. The key issues to be addressed prior to execution of any systems for hospital information are the technical skills and expertise of the healthcare professionals [15]. The main social barriers are lack of computer literacy and resistance to use the new system. The language issue is another identified barrier to EMR implementation in Saudi Arabia. The reason is that Arabic is the first language and the systems implemented here are mostly in English.

Some of the above stated barriers had not been previously identified in the Kingdom of Saudi Arabia. A wide variety of research articles on these barriers have highlighted these points [16-18]. Both Alanazy's, et al., in 2014 shows that the implementation barriers were apparent despite the two studies occurring in different time periods as well as in different geographical arrears (the central region in 2006 and western region in 2010, respectively) [4,5]. Khalifa's research done in 2013 identified the barricades to Health information systems (his) and electronic medical records' implementation as human barriers, financial barriers, regulatory and legal barriers, technical barriers and organizational barriers [19]. However, this study could not measure the satisfaction level of the staff using these applications.

Further, this study highlights some solutions to solve this problem. The health information management and technology professionals can manage the e-health systems in a better way given the fact that they study a wide variety of courses relating to this field. The current employees lack the scientific qualification and required training needed for this field [20]. The technical and computer expertise of the hospital staff affect the level of implementation and utilization of e-health. Therefore, it is essential to incorporate training courses for increasing the technical knowledge as well as language education for the staff for better performance. According to the Vision 2030 of Saudi Arabia, the government is trying to diversify the country's oil- dependent economy. The national transformation program is promoting efficient conversion of all the important government agencies and to induce coordination among them to achieve common national goals [21].

CONCLUSION

E-health is widely used nowadays and plays a dynamic and modern role in the delivery of healthcare in Saudi Arabia. This study brings out the e-health utilization and application in the health sector. It has exhibited that most of the clinical departments are utilizing e-health at an optimum level. This study also brought to light that employees face some challenges and barriers to the implementation of e-health. Finally, this is paving the way for a new technology-driven economy which will benefit all the sectors.

DECLARATIONS

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Conflict of Interest

The authors have disclosed no conflict of interest, financial or otherwise.

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