Health Information Technology (HIT) in Arab Countries: A Systematic Review Study on HIT Progress

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Abstract. Information Technology is changing the shape of globalized operations in all fields. Over the years, most developed countries have succeeded in implementing information technology in major parts of their economy and society including the healthcare sector. While on the other hand, developing countries, especially the Arab world, are mostly far behind in properly implementing HIT systems within their healthcare sectors. This paper aims at identifying the current status of HIT within Arab countries, discussing the methods of utilizing and securing HIT systems, finding the barriers and proposing possible solutions to HIT implementation. Studies were searched in IEEE, PUBMED, Springer link and JHIDC using predefined criteria and retrieved in the period of publication from 2001 to July 2014. The systematic review included primary studies of health information systems within Arab Countries. Study types included conceptual, exploratory, and cross-sectional and action-research studies both in English and Arabic languages. A total of 29 studies were retrieved out of 655 studies. The findings show that besides having access to financial resources, most of Arab countries lagged behind in HIT due to lack of dedicated financial resources and professional incompetency. Public hospitals funded by the governments have a lack of professional utilization of IT , while private hospitals do not have sufficient funds to implement HIT. HIT systems are a cornerstone of the healthcare sector development in many forms such as telemedicine, EMR, and E-Health. Arab countries need to make a strategic plans to overcome the financial and cultural barriers in order to be competitive in the HIT field. Research centers should be also encouraged and supported to promote scientific researches in this field.

Keywords. Arab World, Barriers, Healthcare Systems, Information Technology, Medical Informatics, Electronic Health Records.

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1. Introduction

Over the past few years, basically a decade ago, Arab countries have shown quite much growth and massive changes in the health sector especially in the Middle Eastern region including the Kingdom of Saudi Arabia (KSA) and United Arab Emirates (UAE) in particular. The population of the Arab world is demanding accountability and inclusion from their government at all levels [1]. The important indication of the progress in the public health service and the health care information systems is the transition in the mortality. This is true for the developed countries but not really for the developing countries. Developing countries used to lag behind in the transition in term of demographic situation. But Arab countries have tried to make this notion untrue through effectively managing the healthcare services and most of the countries of the Arab region have reduced the mortality rate [2]. In the current era of globalization, the use of IT has been pervasive. Each country is trying to grab this asset for development because without up-to-date technologies and computerized devices it is almost impossible to grow and compete with the contemporary world. Hence, it is called information and communication technology (ICT) world, where it is necessary to share knowledge among different sectors of the economy [3]. Most of the countries like India, China, Germany, USA, Russia, etc. are utilizing their best efforts to maintain the information system and to develop their own knowledge exchange systems to achieve a competitive edge in the world. In developed countries especially European countries like Germany, France, UK, Norway, Sweden and others in the EU, these information systems are so strong in the field of medicine that most of the hospitals are linked with each other electronically [4]. While in the case of developing countries the advancement is not to that marked, the government is trying to give incentives to organizations and encourage them to use information systems [5]. Governments in these developing countries want their nation to achieve the competitive advantage by investing in the programs of information systems to help the citizens by offering them special and convenient services. This is also the case of Arab world where the government has a great interest in the ICT that it wants this development in all the aspects of life [6].

For an example, the government of the Saudi Arabia has tried to implement the information and technological setup and systems in the health care sectors. Therefore, to achieve these technological goals, most of the hospitals are using healthcare information systems to provide the patients with higher standards of healthcare [7]. By using these integrated information systems, hospitals in Saudi Arabia are determined to provide the best possible service and solutions for the medical and clinical problems. However, there are some hospitals in Saudi Arabia which are using these healthcare information systems for maintaining and developing the records of patient's history and the administration's dealing. Along with this computerized service of hospitals, some hospitals have integrated networks of information through which these hospitals can share information and medical history of the patients. Through these integrated networks it is now possible to diagnose and treat patients online and one can choose the doctors and instruments for the cure through information networks [8]. The study here aims at finding out the progress of implementing Health Information Technology and E-health services within Arab World.

2. Methods

An extensive and advanced search of medical and technical databases was conducted, mainly from Conference proceedings of the Institute of Electrical and Electronics Engineer (IEEE), digital library IEEE Xplore, Springer link, PubMed and Journal of Health Informatics in Developing Countries (JHIDC). The primary sources were IEEE and JHIDC with a few articles obtained from PubMed and Springer link. Google scholar search was also used to collect more criteria fulfilling articles. Search terms were used and combined to come up with the articles including: health information technology AND Arab Countries; Databases management systems AND Arab Countries; Electronic health AND Arab Countries; Health policies AND Arab Countries, Health system implementation AND Arab Countries; Barriers OR challenges AND health AND Arab Countries.

The included studies were full text articles and related to different aspects of health IT within the scope of the Arab Countries from 2001 to July 2014, both in English and Arabic languages. The eligible criteria included studies focused on HIT within Arab countries that addressed the status of HIT from different points of view. The studies were screened and duplicated references were excluded. Other exclusion criteria were studies without abstracts, those not related to health IT and studies before 2001, abstracts with no detailed studies, general reviews and studies that focused on multiple information systems (health and non-health). Since the main aim of the study is to provide information about HIT, any system which does not belong specifically to the healthcare field was excluded as well as all non-health information systems (figure 1).
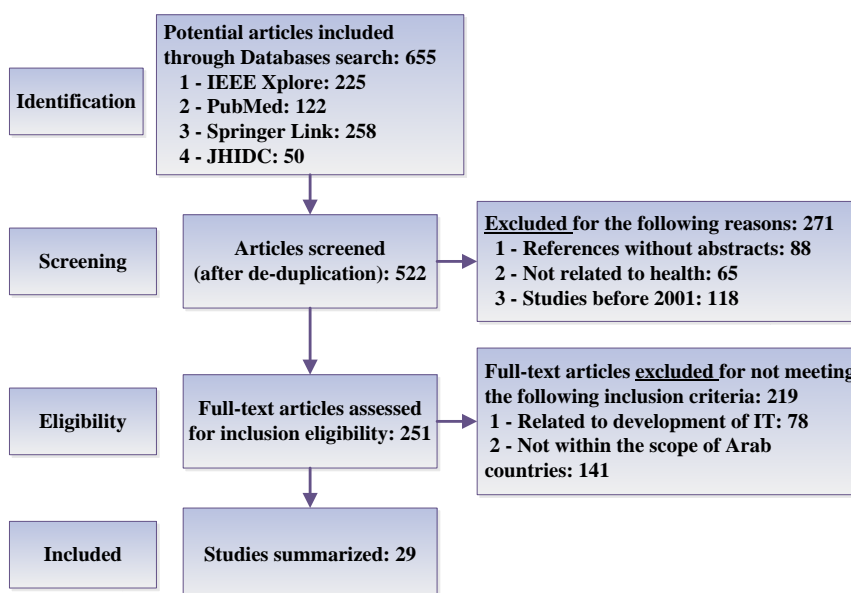

Figure 1. Flow chart showing inclusion and exclusion criteria for research methodology

The search showed a total of 655 studies. From these, 522 studies were screened after de-duplication. 271 studies were excluded (references without abstract; 88 studies,

not related to health; 65 studies, studies before 2001; 118 studies). A detailed analysis of the remaining 251 studies was performed and excluded 219 studies (not related to information technology; 78 studies, out of Arab World scope; 141 studies). The remaining studies included in the research were 29 studies. We classified these studies into four major domains; Health Information Technology and Electronic Health, Health Policies, Applications and Implementations, and Barriers and Challenges.

3. Results

The 29 included articles were related to different countries and geographic regions, ten studies (34.5%) were from the Kingdom of Saudi Arabia (KSA), seven studies (24.1%) were from Egypt, and three studies (10.3%) were from United Arab Emirates (UAE), two studies were from Sudan (6.7%) and lastly, one (3.4%) study was from Algeria, one from Tunisia and one from Kuwait. However, four studies (13.8%) addressed Arab countries in general (Arab). See table 1.

Table 1. The concept matrix of the included studies.

Articles	Country	HIT & E-Health	Health Policies	Application & Implementation	Barrier & Challenges
Abdel-Wahab, S. et al., 2010	Egypt	✓			
Aghadjanian, K. et al., 2007	Egypt	✓			
Alahmad, G., et al., 2012	Arab		✓		
Alkelya, M. A., 2006	KSA	✓			
Almulhim, D. A. et al., 2012	Arab		✓		
Altuwaijri, M., 2011	KSA			✓	
Altuwaijri, M., 2008	KSA	✓			
Anane, N., et al., 2001	Algeria			✓	
Buabbas, A. et al., 2011	Kuwait	✓			
El Lawindi, et al., 2013	Egypt	✓			
Eldin, A. S., et al.,., 2013	Egypt	✓			
Farah, S. K. S., 2010	Sudan				✓
Hauseh, et al., 2010	KSA			✓	
Hayajneh, Y. A. et al., 2012	Arab				✓
Kabir, S. et al., 2011	UAE				✓
Kamel, K. et al., 2014	KSA			✓	
Khalid, A. et al., 2011	UAE			✓	
Khalifa, M., 2013	KSA				✓
Khalifa, M., 2014	KSA				✓
Magdy, S., 2013	KSA			✓	
Rada, H. et al., 2012	Egypt			✓	
Radwan, A. S., et al., 2012	Egypt	✓			
Richard Lakua, 2012	Sudan			✓	

Saddik, B., et al., 2012	KSA			✓	
Safwat, A. et al., 2009	Egypt	✓			
Saleh, S. S., et al., 2009	Arab	✓			
Siddiqi, A., et al., 2009	KSA		✓		
Trichili, H., et al., 2008	Tunisia				✓
Zineddine, M., 2011	UAE		✓		

3.1. Health Information Technology and Electronic Health

Ten articles addressed the current HIT situation and evaluation of the effectiveness of HIT in the healthcare sector. They also addressed building public datasets and cloud based services. El Lawindi el at (2012) designed and implemented a system of electronic medical record in one of Cairo University's Hospitals in Egypt. There were three development stages involved in this operational research study. First was to develop the policies and procedures of medical records and statistical department MR&SD. Second was to redesign the statistical departments and medical records based on peripheral and central approaches. Third was to put emphasis on the unique patient identifier by redesigning the data screen entries of the MR&SD. The results of this study were beneficial in creating a regulatory plan for approved policies and procedures for the regulation of MR&SD working systems. An infrastructure was built up for both peripheral and central units of the MR&SD while integrating them with software and hardware and thus transforming the traditional unit of manual archiving to a complete electronic archiving unit [9].

A study conducted in Kuwait, focused on the benefits of computer based healthcare systems which include: quality of information, functionality and improvement. Of 50 pharmacists from Kuwait, 38 percent are those who declared that current system does provide full information about the drugs and the other 37 percent had the view that current system does not provide full information about drugs. Of total 20% are completely proponents of the claim that current system is effective to provide drug information and 38% are not on either side (neutral). However despite this controversy of the current system, eighty three percent of the total (50) pharmacists advocate the fact that electronic prescription system is surely to reduce the medication errors and enhance patient care [10].

Eldin et al (2013) examined the state of Egypt's electronic health records. The survey study involved using a survey questionnaire by distributing the questionnaire forms in selected hospitals. 60% of the responses were received out of which only 6.67% of hospitals had adopted EHR. 38.1% of the hospitals claimed that due to high costs they did not adopt or implement EHR but were planning to adopt it in the future. The survey included responses from doctors, administrators and nurses. But the hospitals that had adopted EHR claimed that the system was effective in increasing the service quality, accelerating and improving performance and time efficiency [11].

Abdel-Wahab and Rayed (2010) highlighted the importance of a cancer registry system in Egypt for cancer care evaluation. They argued that such IT integrated systems help in efficient care of cancer patients by providing data entry and recording of patient's

medical history and then retrieving to analyze the overall health conditions for making critical healthcare decisions. The authors proposed a Spatial Information System (SIS) for the registry of cancer care in Egypt. The system would be important for the administration and consultants for referencing and legality of the issues [12].

Altuwaijri (2008) investigated the applications and advancement of e-health services in the world while evaluating the current position of Saudi Arabia in e-health. The government of the country had been spending millions over the healthcare sector in Saudi Arabia over the past three decades. As a result many hospitals from the country emerged out with an international recognition of performance. In Saudi Arabia, around 60% of the healthcare sector is funded by the ministry of health itself but still the ministry has not made enough initiatives in implementing and adopting e-health applications and systems within their hospitals [7].

Aghadjanian et al (2007) discussed the convergence of ICT and media for healthy living in Egypt and Jordan. The convergence involved two John Hopkins University USAID funded projects; one based in Cairo under the name The Communication for Healthy Living and the second is The Jordan Health Communication Partnership which was based in Amman. They were initiated to promote health in both public and private sectors by providing mobile and web based technologies. In both Jordan and Egypt, the mobile technology has been in use where viewers are linked via contests on television programs and also via calling campaigns during Ramadan season. A website named Sehetna.com provided the consumers with healthy tips and advices for different life stages and seasons. In Egypt, the Media Material Database of the State Information Services would allow the health service providers to access online material on the web in order to help them to develop such materials which could be used in their own programs for health. These systems wither funded privately or publicly were developed with community collaboration and close relations in order to ensure that the technology and its users fit together [13].

Alkelya (2006) wrote about the features of Pharmacy Information System (PIS) and Pharmacy & Therapeutics (P&T) in Saudi Arabia. In the survey, the questionnaire used to collect information on pharmacy characteristics, hospital characteristics, P&T committee characteristics and PIS characteristics was sent to 127 pharmacy managers at non-specialized hospitals of the MOH. A record of 150 patients was sampled from each hospital. Data response was 67% out of which 63.7% was valid. Further analysis indicated that the results were not conclusive enough most probably due to lack of data and unstudied variables, which shows the need for more focus [14].

Radwan et al (2012) propose to use cloud-based service in Egypt's healthcare sector for secure exchange of electronic medical records between e-health applications and health information systems (HIS). The cloud-based service which the authors proposed would consist of a single entry point from where the electronic medical records (EMR) could be retrieved by any e-health application which seeks such information of patients' records as stored in the HIS. To assess the efficiency of the proposed platform, the authors made a study on a sample of hospital managers, patients and physicians. The results were satisfying and lead to conclude that a standardization of data exchange mechanism will ensure security and interoperability between different entities but unfortunately they were usually neglected [15].

Saleh et al (2009) highlighted the importance of evidence-based advanced health systems by exploring the availability of datasets that were publicly accessible in the Middle East and North Africa (MENA) region. It was found that the MENA region with some rare exceptions lacked publicly-accessible databases for health sector. The authors highlight the benefits of such databases as policy makers of the region could make decisions on solid evidences rather than small scale assumptions, researchers could practice their expertise for public and government policy makers while the population of these countries would benefit from their own local studies rather than depending upon international sources. The availability of these datasets on regional basis will also allow exploring comparable regional variations for benchmarking [16].

Safwat and Pourabdullah (2009) compared the Web Based Training (WBT) and Computer Based Training (CBT) methods to be potential applications for e-learning of professionals in the healthcare sector in Egypt. Compared to traditional knowledge gaining processes, WBT and CBT are considered more reliable and recognized at global levels. In developing nations, where knowledge is hard to find and its availability is not ensured, such applications of integrated learning and healthcare systems may have greater impacts. With the qualitative research methodology applied, the researchers gathered empirical data and results from online experiments from a group of professionals in Egyptian healthcare sector. The course was delivered through e-source learning and it was found that WBT was more appreciated as it proved to be more motivating, learner-centered and collaborative. While on the other hand CBT was not that much interactive with un-clear objectives. This comparison was useful and carried forward for future references and work in the area [17].

3.2. Health Policies

We also reviewed health policies issues across the Arab countries in regards to HIT progress. Among 4 articles, one was done in Saudi Arabia, one from UAE and two papers covered the Arab world in general. Alahmad et al (2012) described national research on ethical regulations and guidelines. They took Middle Eastern Arab countries, and divided them into two groups. The first group has good research ethical regulations and guidelines while the second group has no research ethical regulations and guidelines or has a deficiency in this domain. Authors also explained that the American Medical Association issued the code of research ethics in 1847. Many other ethical guidelines were prepared by different organizations for biomedical research on humans i.e. council for international organization of medical sciences and World Health Organization (WHO) etc. but still it is a question that why Middle East and other Arab countries do not understand the importance of these research ethical guidelines. Authors took data from different government websites sources for research ethics review on regulations and guidelines. The data are about code of ethics in 13 Arab countries in the Middle East, extracted from health ministry, ministry of education, medical councils. In conclusion authors described that more efforts should be put for making better ethical regulations and guideline in Arab countries [18].

Almulhim and Househ (2012) argued on the influence which health policies in the Arab World have on the development of Health Information Technology (HIT). The authors discussed the debate in the Arab World of whether the health policies are derived

by health information technology or the HIT is developed by the health policies. Comparing the two thoughts, the authors define Health Information Technology (HIT) as a field of IT which is involved in designing, developing, using and maintaining of tools and systems for improving patient care in health industry. Contrary to this, health policies are defined as the initiatives, guidelines and procedures which governments develop to improve health sectors for public. Through their analysis and counter arguments, the authors claim that within the Arab World, HIT should be influenced strongly by health policies. They put forward six points to strengthen their claim that health policies should be developed at first and then HIT should be implemented. The points they raise include that; (1) Arab World should manage continuous changes in health through implementation of strong policies; (2) The Arabs should make HIT related policies which are sensitive to them and to Muslim culture; (3) Such comprehensive HIT should be implemented that reflect health equity policies and eliminate any inequity in health policies that exist in the Arab World; (4) Medical issues cannot be resolved alone with HIT unless it is backed up by strong health policies; (5) In order to ensure that HIT is private and secured, clearly defined policies are required; (6) Many hospitals manage their HI systems with the help of their specific IT teams who follow proper health policies. So it was concluded that both health policies and HIT are significant for Arab World where health policies have more influence over the HIT [19].

Zineddine (2011) discussed privacy concerns and security issues in healthcare industry. The ICT should contain secured information systems and should maintain confidentiality and integrity of healthcare data. The author also explained that healthcare information technology is an important determinant of the healthcare system. For example, in UAE almost all healthcare facilities and centers address privacy issues. The author collected data through surveys and interviews. The author concluded that health insurance portability and accountability act of 1996 (HIPAA) played a fundamental role in protecting electronic healthcare information (ePHI), while healthcare centers generally applying ISO 27001 information system for managing and improving information security in an organization. Finally the author predicts that ICT is necessary for health care facilities in UAE for private and security issues [20].

In a rapidly changing and dynamic environment, changes in every health industry are occurring at an ever fast pace and the educated population requires the attention of healthcare professionals to swift the healthcare system with an uttering efficiency. Therefore, an integrated health care system has become the challenge of this era. When we say integrated, it implies that the system should provide comprehensive, relevant, reliable, accessible and timely patient information which has not been evidenced so far with exceptions of some minor proportion around the world. The reason is that they are not ready yet to fully integrate health system which has to undergo in a long way. Although we observe computerized systems in hospitals and clinics for documentation, billing, patient bed management and lab reports, the system however is away behind to integrate medical health records. To validate the criticism of using old age methods in patient treatment plans, manual nursing notes and manual clinical information, studies counter this argument by providing the fact that in KSA more than 95% of physicians use PDAs, however as a whole region hardly 1% of total health service providers are using this technology; thus holding the criticism valid that at majority the core need of the system is still not satisfied. Holding this criticism potentially valid does not undermine the importance and benefit of system itself, but it implies that non-usage of

the system is what needs attention. Therefore, this study with reference to KSA provides detailed information about the possible driven benefits out of using PDAs and other computer based devices. Study in its core lists eleven tested and proven benefits of using PDAs for patient satisfaction and integration the health system. This and the previously known and evident benefits of the computerization has made Saudi Arabia believe about its functionality and efficiency of smart systems in health care and has therefore lead Kingdom to shift from traditional old age systems to fully integrated modernized health care systems [21].

3.3. Applications and Implementations

Anane (2001) presented an overview of the telemedicine projects and the development situation ongoing in Algeria at that time. Medical resources were being concentrated more towards urban areas and larger cities while southern and rural areas of the country were being ignored in providing ample healthcare resources. It was then when the Center of Development of Advanced Technologies in Algeria proposed to integrate medical practices with telecommunication in Algerian hospitals for distribution of healthcare services to overall country. In June 1996, an experiment was conducted where a hospital from north was connected to a hospital from south. In the experimentation process, medical images and information was transmitted to each other through the telephone lines by which the hospitals were in connection. Later on with further development, innovations were made to compress these medical images as they took storage spaces and also to solve the saturation problem in communication channel thus integrating the medical services with 21st century technologies [22].

Arab world has always been a keen interest of researchers because of its unacceptability to modernization, which at current has been evolved however and they are tending towards modernization. This does not imply Arabs are lagging behind the world when only 8% hospitals in US have comprehensive and 12% with basic electronic record systems. These numbers fall even more below when it comes to UK and other European countries. According to a survey 7.7 percent hospitals are using clinical results (computerized) and only 2.6% are those using electronic prescription. In Saudi Arabia, when countries are criticized about lacking in implementation of fully integrated system, National Guard Health Affairs (NGHA) has managed to achieve Excellence award in implementing computerized health care system in the region. This is not to flag or advertise NGHA for any material reasons, but to identify the practical lessons learned and the proven benefits delivered by implementing comprehensive e-health system. Since implementation of a full integration system is believed to be cost consuming and has become challenging even for developed countries, NGHA instead of implementing it to every hospital has rather come-up with interaction of other health providing institutions with the major two hospitals to benefit with their implemented system. This, author believes, will increase the functionality of health care organizations, better patient care, and increased return on investment. Despite all these suppressers of implementing automation in health care industry, professional and paramedics believe that once fully achieved, electronic health record solutions are potentially benefit for enriching clinical data availability and synchronization for patients welfare and increased satisfaction. So, they clearly foresee the emerging demand for this automation for its evident benefits [23].

The division of Ministry of health, monitoring and evaluation (M & E) developed framework and system for heath condition in 2008 by surveys and interviews. In this way a plan is made for named 3 in one strategy in which database, monitoring and leadership is kept in front of ministry of health. Then ministry of health starts assessment of it for Health management information system (HMIS) by developing tools and analyzed it for integration of health programs into system. Two assessments have been done in 2007 and 2009. As a result HMIS task was accomplished in 2011 by the corroboration of the best assessment which was discussed and established two principles which were simplicity and relevance. The simplicity defined as it was tool which is understood by all staff of health at all levels, while second relevance explained as understandings of all staff of health care, state officers, programs and ministry of health about information of health related issues. Thus finally author's corroborated in their article that ministry of health in South Sudan is progressing and they established an integrated healthcare management information system (HMIS) by 3-one strategy and government of south Sudan health policy, to provide information and management to each level and hence, state about health facilities condition in South Sudan [24].

The government of Saudi Arabia tried to establish electronic health systems through building training and research program. The NGHA and King Saud Bin Abdul Aziz University for Health Sciences were involved to propose a research center establishment for improvement and excellence in the services of electronic health in the country. The establishment with the name Electronic Health Care Center for Research Excellence (E-CoRE) was proposed to be the leader in world of e-health training and research by excellence in research and innovation, improvement in health services quality and reducing the costs for health care. Some objectives of the proposed E-CoRE included conducting research activities of national importance in the field of e-healthcare; to create a strong relation between re-searcher, public and private sectors for improved e-health; creating an innovative research environment for students, researchers and government to develop and enhance in e-health technologies and make the KSA world leader in its practice; to strengthen the relation between research centers of e-health, government, private and international universities for a global scientific experience in e-health; and to attract as much capital to invest in the e-health projects for attaining efficiency and effectiveness in e-health practices and thus improve healthcare services and their quality. Researchers proposed a plan and identified the above objectives plan for establishing such a research center and the main core for this project was concluded to be human interaction at the maximum as possible [25].

According to Khalid and Ahmad (2011), the government of Gulf countries tried their best to achieve the most innovative and technological solutions for the medical and clinical problems of the patients and to revolutionize the whole health care sector so that most of the tasks were to be achieved according to international standards. The government of UAE is trying to deliver the latest and proper technology for their population and rise up the health care sector to high levels. The health care sector of UAE has faced these problems due to the high costs of the health care services, the poor access of the health care services for individuals and the centrally integration of the ICT. As in the current millennium, health care information system is very emerging and prominent field of study thus, most of the government hospitals in the UAE are going for the privatization phase and these hospitals are privatized to the specialized foreign institutions. Through this privatization to the foreign specialized management, UAE

would make possible the high level delivery of health care services to the patients. The aim of the study is analyzing the shift from traditional hospitals to smart hospitals. It also focuses on the necessary steps and initiatives for the actual transformation toward e-health practice [26].

According to Hussein and Khalifa (2012), ICT is gaining more importance in making life reliable and luxurious, by using new and innovative technologies in different sectors of life especially in healthcare sector to provide the patients with best quality treatments and services. Like many other countries, Egypt has been relatively successful in achieving significant progress in this field. But Egypt had not attained the best scope in telemedicine projects and is still facing problems and challenges. Although, healthcare information systems are operating in Egypt but there are some flaws in the effective operationalization of the systems. This study covered the scope of the telemedicine services and application of the services in Egypt by doing a comprehensive SWOT analysis. Based on this analysis, there are four future trends that are being identified in the telemedicine industry in Egypt by 2020; these are the financial, technological, governmental and the medical perspectives. And these future trends are in accordance with the global standards of telemedicine trends. Thus, Egypt is trying to achieve the perfect level in telemedicine [27].

According to Magdy (2013), Saudi hospitals are planning for strategic ways through which they could be converted into smart hospitals. The conversion of a traditional hospital system into the smart model requires the adoption of some intelligence of hospital information systems (HIS). However, one of the main aims of HIS is to secure patient information. Smart hospital information system should allow doctors to access patient information remotely from any place. There is a need to develop omnipresent computer environment using the technologies of semantic web in the traditional hospital systems. Through his research, the author discusses that semantic web technology is preferred as a computing tool which can be used to effectively develop the traditional hospital systems into the smart hospital. This new semantic technology is advantageous over the traditional healthcare systems because through this way online identification of the patients is possible and the doctors, nurses, paramedical staff and the equipment could be identified and booked online so to accelerate the delivery of healthcare services to the patients. Thus, this new health information system will bring the revolutionary reforms in the healthcare sector [28].

According to Kamel and Saud (2014), King Abdulaziz University Hospital (KAUH), Saudi Arabia, is now an advanced facility with eight hundred and fifty beds and it is equipped with all the resources needed to deal with all medical specialties. Initially KAUH was not equipped with a modern health information system and all medical and administrative information were recorded manually; in a hard copy form. At the time of need or in emergencies the information could not be easily available and finding it was a very hard job. Critical and important data of clinical importance were not correctly recorded, rather there were some omissions in these entries. To avoid this problem and to maintain the safety of patients, KAUH adopted and implemented computerized systems for both administrative management and patient care. The hospital administration wanted to achieve the maximum accuracy and reliability in the records of patient's general and clinical private information and to keep it private for all patients. With this new healthcare information system the hospital has maintained the records of

patients, services delivered by the laboratories, pathology labs, operations room, radiology and pharmacy departments. KAUH is determined to provide best quality services to the patients by using this health care information system [29].

A study was conducted in 2008 about the status and progress of telemedicine in Tunisia. Authors explained that by telemedicine facility like Rabta hospital was connected with Hôpital Paul-Brousse in Paris, the child health hospital was linked with LA Timone in Marseille. Many projects of Tunis hospitals which are about Neurology, tele-radiology, tele-pathology were linked with hospitals in other countries like Romania, Italy, Bulgaria, Australia and Greece. Telemedicine in Tunisia was developed for enhancing social security and improving quality of medical care and clinical services. Authors attributed that, in Tunisia, a professional committee was made to discuss the effect of telemedicine on national health policies, including disease prevention and health promotion in remote and developing regions. So finally they concluded that there is a need to bridge the gap between IT and health care systems in developing countries and that telemedicine is successful in developing countries [30].

One study focused on the role of computers in bringing efficiency to the field of healthcare through measuring PDA and smartphone adoption rates at King Saud Medical City Hospitals, Saudi Arabia. Compared to some international researches, which claim that 64 percent of US physicians during 2009 have been using PDAs and Smart Phones and that 84 percent was the expected percentage by 2012, the authors measured the prevalence rate in King Saud Medical City hospital. Results found that in the sample population the usage rate of PDAs was 69.1 percent, which is consistent with that of USA. Among the gender groups, female users were slightly higher (90 percent) than their male counterparts (88.9 percent); however almost all the participants (97.4 percent) believe PDAs and smartphones could improve efficiency in health care because of their benefits of providing drug information [31].

3.4. Barriers and Challenges

Hayajneh and Zaghloul (2012) identified barriers which had been holding the Arab countries back from adopting HIT in hospitals. Where all governments around the world had been planning to implement HIT policies, the Arab countries were lagging behind. Their study aimed at identifying and describing the barriers which restricted Arab countries from thorough adoption of HIT in their healthcare planning and policies. The researchers found that there are several reasons for this lag of HIT. These include lack of financial resources, bureaucracy and poor management in the hospitals, low IT competency of the staff, lack of IT qualified staff and lack of the HIT knowledge and value among hospital administrators. The authors discussed that these barriers should be dealt with short and long term policies and by providing more financial resources to hospitals. Staff and professionals should be taught about the importance of HIT and thus training should be implemented [32].

Farah (2010) in his study articulated that the existing HIS is not fruitful for primary health care programs (PHCP) in northern Sudan. Particular attention was paid to the issue of fragmentation of the HIS and opportunities and challenges to integrating it. The findings of the study revealed that PHCP HIS was ineffective at providing effective quality information for managers to use to support decision making. The main problems

of the system included lack of good infrastructure, inadequate skilled personnel, parallel reporting and lack of coordination. Absence of supportive supervision and feedbacks to lower levels were also problems contributing to HIS dysfunction. Absence of uniformity of data handling procedures, and lack of decentralized information management were reported [33].

Kabir and Nasir (2011) examined the online presence of the health authorities and hospitals in the seven Emirates of the United Arab Emirates (UAE) and the available online health services. The study calculated the number and percentages of hospitals that have online presence and visited the website of each hospital to check if they offer online health services. The study found that out of the 7 Emirates, only 2 have health authorities with online services and only 4 Emirates have hospitals that offer online health services. Total number of hospital's in UAE is 95 out of which 39 hospitals have websites, out of these 39 only 15 hospitals provide online health services, 14 hospital are private and one is semi-government. The online health services available are: Make an Inquiry, Book an Appointment, Find a Doctor and Ask a Doctor [34].

Previously stated, Arab countries are criticized for lacking in technological advancement, Saudi Arabia is one region known mostly for its conservatism and a major resistant to change. In current times, technological advancements can be highly identified across industries in the region; however previous resistance to acceptance of technology, change, and outsider's consultation has rooted problems in Saudi Culture. This has trailed the problems throughout every industry and has caused numerous challenges to Saudi Arabia, of which human and technological challenges are regarded most. Perhaps there be any study which does not regard benefits of Health Care Information System (HIS), however numerous studies alongside enlisting its benefits also portray its difficulty and challenges of implementation of HIS. Despite regarded as one of the countries using advanced medication systems and HIS, Saudi Arabian information systems are said to be poor and far less than expected. This has not been the reason of system's deficiencies but the problem is more regarded with its user's inability. The major challenge to Saudi Arabia health information system is regarded as the late adoption of the technology and lacking HIS, implying that systems are adopted but are not fully utilized and understood; therefore, the author argues that despite its implementation the failure rate of health IT system in Saudi Arabia is still high. High resistance in Saudi Arabia by physicians is caused due to the inadequate level of knowledge by physicians about the usage of information system. The author argues that physicians because of non-equipped with IT skills find it difficult to operate and require extra working time to learn systems, therefore the inherited complexity, inadequate knowledge, and time pressure on physicians increase the resistance level, hence potential of information system are not realized. The study recommended increasing the awareness and training among the involved individuals [35].

Continuing to the problems in Saudi Arabian hospitals for implementing HIS, Khalifa (2013) conducted research to find out the barriers which are restricting the use of Health Information Systems and Electronic Medical Records in hospitals across Saudi Arabia at greater levels. But still there was lesser use of such systems possibly due to resistance from professionals in healthcare. Study conducted covered two hospitals from Saudi Arabia, one government and one private. With the results, Khalifa found out six main categories of these barriers to HIS and EMR. One was the barrier related to attitude,

behaviors and beliefs of the professionals. Second was technical barriers related to the lack of IT as basic system. Third one was the professional barrier depicting what kind of job did the professional had and its linkage with the IT. Fourth factor was that of organization's including the hospital management. Fifth barrier was related to financial resources as lack of money and funds. And the sixth barrier identified were the participants who took part in the pilot sample of the system. So the author concluded that the major barrier among all these lies in the financial resources as lack in these funds is causing a halt to buy and install HIS in hospitals [36].

4. Discussion

The acquisition of HIT can be either a success or a failure. The reasons could be technical, managerial or even national. El Lawindi el at (2012) designed a system for electronic medical record with various goals. One of the goals was developing a reliable database for patient information. The goals, including the previous goal, were achieved. However, Buabbas et al (2011) did not agree with that goal since the information retrieved from the system was not sufficient due to lack of reliable database that include massive information about drugs prescribed to the patient in a pharmacy information system. Moreover, Alkelya (2006) has searched on the characteristics of the Pharmacy Information system but the results were not conclusive due to lack of data. Radwan et al (2012) propose to use the cloud-based system for medical information exchange in a secure and private platform. The results were satisfying but concluded that a standardization of data exchange mechanism will ensure security and interoperability between different entities.

The health policies are always different in each country, or sometimes in each hospital. The difference is related to the content, information, references and structure. Alahmad (2012) addressed that many efforts were conducted but did not reach to the expectations. However, Almulhim and Househ (2012) got in detail in this matter. However, the authors claim that HIT should be affected by health policies. Zennidine (2011) agrees with Almulhim and Househ (2012) at the importance of acquiring the health policies at first. He addressed the security and privacy issues that might result from burdens of weak policies. The use of technology in the medical field could face many challenges. Hayajneh and Zaghloul (2012) identified the barriers holding the Arab countries from adopting health information technology (HIT) in hospitals. They included lack of financial funds and resources, bureaucracy and poor management in the hospitals, IT competency of the staff, lack of IT qualified staff and lack of the HIT knowledge and value among hospital administrators. Khalifa (2014) addressed other side points which are resistance. He claimed that physician resistance is a major issue that might fail any HIS project. However, he recommended increasing awareness and training of the importance of HIT and adding them the undergraduate education. However, Hayajneh and Zaghloul (2012) recommended that the barriers should be dealt with short and long term policies and by providing more financial resources to hospitals. However, they agree with the previous study in term of the importance of training and education among public.

Now from this literature review, we shall be able to discuss the important findings. First of all HIS is important for all countries now to implement within their healthcare

systems. As it can be seen, the developing and underdeveloped countries especially Arab world in our case are still lagging behind in HIT applications. Some countries however have taken enough initiatives to progress as much as they can in implementing such systems as electronic medical records (EMR), etc. EMR is among the most common tools to be implemented and used in organizations through which a patient's history can be recorded and saved over databases and then extracted when needed for inspection and diagnosis purposes. HIT is a cost effective method of delivering quality health services to patients. For the Arab governments, it is important to define their strategies and eliminate the challenges and barriers restricting the full fledge implementation of HIT in their healthcare sector. From the analysis part, it was seen that major cause of restriction by government and private hospitals is due to lack of financial funding, especially private hospitals in Arab world which do not have much funds to spend on HIT implementation and training of professionals to use those systems. HIT provide a number of benefits to their users as from a single database, the historical information regarding the healthcare of a patient can be seen in no time. Apart from that, it is seen that even the public doesn't trust these systems, it is important that public confidence is gained. Governments and health institutions should consider activating their websites and reach out to public. Websites and integration of data over a cloud database system would make the information secured and available.

The sector of healthcare is quite much sensitive and labor intensive. The differentiation between the service being provided by the hospital and the quality being received by the patients depends heavily on the quality and service of staff. The change process in the systems of healthcare gives rise to the basics of relationship like client-provider which defines the overall outcomes. The impact of this one-on-one relationship is intense where the independence of technology and facility is ensured for being the environmental and structural factors in health care. In the UAE, based on Civil Service Commission and the systems used, it was impossible to attract and hire professionals trained in Europe and America to sustain the improvement of maintain critical mass. If incentives are not offered to health professionals, then they might become disillusioned due to this fact. With their restrictions of license, they might not have been able to practice in the facilities of Europe and America in order to develop their professional growth. Until 1993, all patients were provided with free of costs healthcare services before the introduction of health insurance systems.

Besides planning for so many years, still much of the Arab world lags behind where much activities had been done in Egypt, Sudan and Libya yet they are not as advanced in the technology as in UAE and Saudi Arabia. Saudi Arabia has provided a perfect example of rapid growth in HIT implementation in its healthcare sector. The NGHA of Saudi Arabia had won the award of implementing and creating excellence in the field of e-health in a conference in Dubai in 2010. The ICT just like the entire world has been taking immense progress in the healthcare industry of Middle East Arabian countries and the region have been keen to achieve quality in healthcare and reducing the costs of delivering healthcare services. Thus, Saudi Arabia implemented HIT and the award was given to encourage more countries to take part. The NGHA took on some major and important projects in IT which led it to achieving that reward. Within a 13 year period, a study was conducted on how NGHA planned and implemented the strategy over the years from 1999. The project highlighted the importance of ten key areas in project management including IT project risks, IT vision, healthcare analytics, IT infrastructure,

role of IT department, political impacts, integration of systems, adequate training, project management and a fit between the local requirements and international solutions to be implemented. But the results indicated that despite the benefits of HIT in the sector, failure in such projects were quite high and following these steps carefully would have made the projects to be success-fully executed [23]. Considering these results as found, it would be safe to say that the model followed by the NGHA of Saudi Arabia should be implemented for the time being.

Some of the limitations which could be faced in this research are information provided by authors and researchers previously are usually biased by their own perspectives. Due to lack of studies from some countries, the status of HIS in these countries was not identified. So, part of the causes and barriers was missed.

5. Conclusions and Recommendations

Health information technology, in the form of telemedicine, EMR, e-health technology, etc. is the future of healthcare sectors to implement in order to improve their health delivery service quality. Through this study, some major limitations and barriers were found to restrict the growth of HIT and its adoption in the Arab countries healthcare sector. Healthcare institutions in Arab countries should seriously consider increasing the HIT in their hospitals as the future of medical and scientific researches and people healthcare depends largely on it. The policy makers of the Arab region should be ready and focused on representing their information and data on evidence based models rather than estimations from small studies. Arab countries need to make a strategic plan to overcome the financial barriers which deprive them from being up-to-date in Health IT field. However, Arab health associations must activate the partnership and collaborate together to exchange experiences. Research centers should also be encouraged and supported to promote scientific researches in the healthcare field.

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