VOL. 10, NO. 4, MARCH 2015 ISSN 1819-6608
ARPN Journal of Engineering and Applied Sciences

www.arpnjournals.com

BARRIERS FACES TELEMEDICINE IMPLEMENTATION IN THE DEVELOPING COUNTRIES: TOWARD BUILDING IRAQI TELEMEDICINE FRAMEWORK

Mohd Khanapi Abd Ghani, Mustafa Musa Jaber* and Nanna Suryana Herman
Biomedical Computing and Engineering Technologies (BIOCORE) Applied Research Group, Faculty of Information and Communication Technology, Universiti Teknikal Malaysia Melaka, Malaysia
*E-Mail: mustafamusajaber@yahoo.com

ABSTRACT

The Iraqi healthcare services are tussling get possession of lost momentum. Many professional physicians and nurses left Iraq because the current situation there. In spite of the plans of calling back the skilled health workforce but they still afraid of disadvantage of their return. Hence, technology plays a central role to take advantage of their profession through the use of telemedicine. Thus it is the need to study the factors that effects the implementation of telemedicine that covers network services, policy makers and patient understanding. These papers shows the issue that faces the implementation of telemedicine and analyze the literature of previous telemedicine in Middle East countries to find out the essential factors toward building Iraqi telemedicine framework.

Keywords: telemedicine framework, factors of telemedicine, telemedicine in Middle East.

1. INTRODUCTION

Telemedicine is the use of Medical Information Exchange between a Doctor and a Patient to improve the health of the Patient. The Patient being in a remote area, this information exchange is carried out by two way-Video Conferencing, Audio, Smart Phones or Wireless Tool and uses of Telecommunication Technology in her various forms. The use of Telemedicine has grown rapidly and has become an integral part of hospital, specialty Departments, home Health Agencies, Private Physicians at Consumer Homes and Offices as shown in Figure-1.

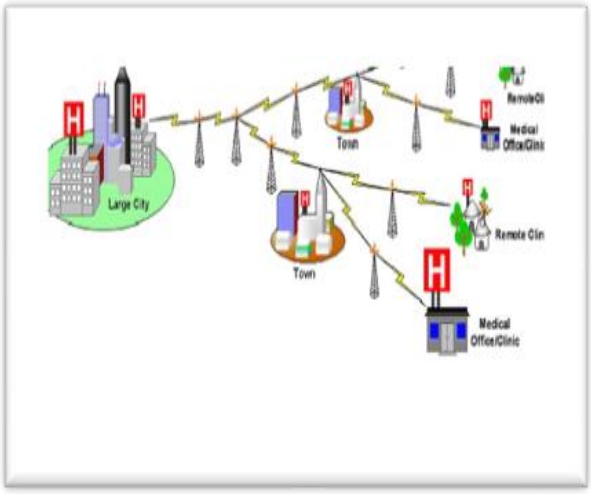

Figure-1. The use of telemedicine.

Telemedicine covers too many areas as shown in Figure-2.

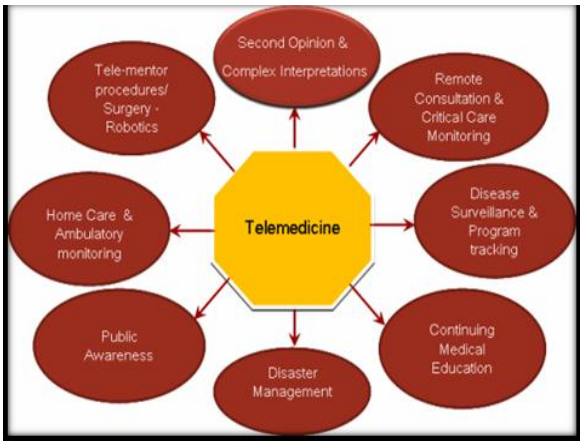

Figure-2. Areas covered by telemedicine

A. Electronic information sharing

The electronic information sharing means sharing of data or information electronically by using ICT tools also known as Information and Communication Technoloiges for example internet, email, phone, webstie and so on. Electronic Information sharing raises the amount of data that helps the decision makers to make better decisions in using the data [1,2]. Furthermore, time consumption is one of the most important factors of electronic information sharing becasuse it saves Effort and Money of getting information [3].

B. Data warehouse concept

Clinical data warehousing is a place where healthcare providers can have direct access to clinical data collected in the process of patient care from different persons at different points of time. It is also assumed that such data warehouse can give information to users in areas ranging from research to management [4, 5] to the end result. In this regard, the information collected regarding design data such as data modeling,

normalization, and their other aspects makes it easier to measure the effectiveness of the treatment for the good relationship between Causality and Treatment protocols for systemic diseases and conditions by Doctors [6].

The services which can be provided by Telemedicine are:-

a) Primary specialist care referral services
b) Remote patient monitoring services
c) Consumer medical health information
d) Medical education

The delivery of Telemedicine to the user can be done through different and following ways which are Networked Programs, Point-to-point connections, Monitoring Center Links, Web based Patient Health Services. The benefits of Telemedicine are that of Improved Access, Cost Efficiencies, Improved Quality, and Patient Demand.

C. Iraqi government health plans

Iraqi government had launched a plan to improve Health Services in Iraq by the use of information communication technology. The plan has many significant sectors in Iraq such as Ministry of Health, Municipality, Ministry of Interior, Ministry of Higher Education and Scientific Research [7].

Overall, Iraqi government has to Implement effectively the Electronic Information Sharing between the government and its organizations as well as the organizations themselves to give an impetus information sharing to Iraqi e-services [8, 9]. Iraqi hospitals and clinics need to share the information because due to sharing of such information there will mutual benefit for all the medical organizations in Iraq [10].

The inadequacy support of providing databases for electronic information sharing makes the data warehouse weak in its place [11, 12]. Data warehouse also facilitates government organizations to decrease the cost, high quality service and now-a-days it has become a more effective tool [13].

In Iraq, the information sharing flows from other facilities and District Health Office to the governorate Directorate of Health and then to the central Ministry of Health, largely using paper forms. Although some computerization has occurred at the Central Health and Vital Statistics Departments, this development has not led to improved capacity for analysis, dissemination or uses of information technology. To respond to any disease outbreaks in a timely manner in Iraq, governorates and health districts need the capacity and authority to make operational changes in services on the basis of data collected, but the centralized structure of the present health system prevents in collection of data by this approach. Building of the analytical capacity to pose and answer the Epidemiological and Demographic questions about the health issues will raise the adequacy of services in Iraq which is an important and easily reached goal.

Accourding to [15, 18]. Clarified that Critically Analyzed Issues are that which involves in in-corporating wireless technology in Tele-surgery applications. Examination and Evaluation of such type of Quality service issues in current and future wireless technologies, are essential to the successful transmission of Tele-surgery data. Suggesting a solution to overcome the problems faced in Iraq National Health service at present one needs to exchange the medical information data between the sites which are presently difficult to reach. This difficulty of exchanging of information and the data will be cut short by implementing Exchange of Medical Information data through Internet Data network in Iraq and to transfer Tele-medical application and Tele-surgical application through data sharing. Also to propose a wireless technology to support Tele-medical application within health Care organizations in Iraq.

2. ISSUES FACES TELEMEDICINE

According [14] had discussed regarding the current health care situation in Iraq and he had stressed with the increased burden on resources as impending access to health care for patients from 2003. Other important measure is to have aggressive retention policies, such as improving the work conditions, remuneration of physicians, protection and safety by using telemedicine system.

In Iraq, Telemedicine with Emails have not been used extensively. In this area clinical training has many difficulties. And moreover the people of Iraq consider maternal death as an avoidable and disaster because it suspects negligence in its part when it occurs, whereas death due to medical or surgical Illness are considered as fate. To overcome these difficulties and give best care to people the Medical Fraternity in Iraq they had approached and taken advice from specialist from [15].

According to [16] explained that Maintaining Health Records with Accuracy, Completeness and its availability would be great help to the community of Clinicians in Treating Patients. The completeness of patients' lifetime health records (LHRs) should not only be present chronologically in a single application system or health institution but also made available across different applications and different institutions.

According to [20] explained that maintaining Health records from Independent of Source it would put all the Relevant and Necessary information which would be made available, this could form the basis on which Treatment, Diagnosis and advice would be made available for seeking Health Care or Services to patients. Such type of maintaining Health records would lead too much better planning for clinicians and Medical Fraternity so that it would increase the possible to provide a continuum of care throughout a person's lifetime.

However, the above characteristics would not be achieved if health ICT applications (for example, tele-health, telemedicine and hospital information systems) are developed for supporting the clinical process as it is rigid and inflexible. These scenarios has become much worse when dealing with the inadequacy of telecommunication infrastructures and system interoperability limitations

(such as disparate set-ups of hospital information systems).

Good Health care is very important and much dependent on flexible access to previous LHRs which is also a feature of the health system of the future. According to [17] defined that Care should not be fragmented or episodic but should take into account the entire patient health history in providing a long-term outlook.

According to [10], Director of National Center for Management Development and Information Technology (NCMDIT) in the Ministry of Planning in Iraq, informed that Telemedicine or Electronic Sharing of Information is too limited among Hospitals. He had done a great survey in different locations of Iraq Baghdad, Salah Al-Deen, Basra, and Al-Anbar, as he took samples with 35 staffs of hospitals.

He came up with the conclusion having done the survey that Information Sharing through Information Control and Technology (ICT) was the sharing of information were divided into two aspects i.e., 54% in regard to sharing in Medical Organizations and secondly 34% in Authorization of Medical Organization as shown in Figure-3.

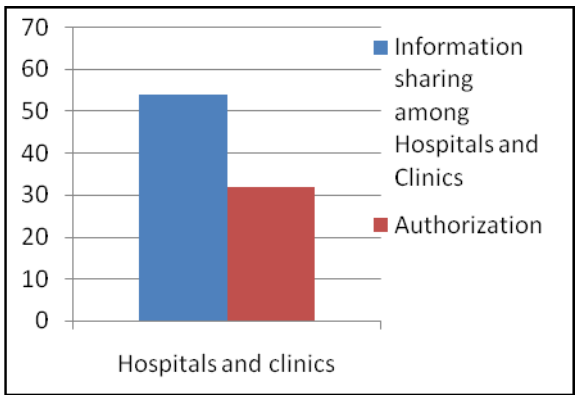

Figure-3. Information sharing and authorities in hospitals and clinics in Iraq [10].

According to [18] conclude that an unpublished study by the Ministry of Health and USAID's Primary Health-Care Project showed that 22% of deaths in Iraq were misclassified at the facility level.

There will be a substantial deterioration or decrease of quality of data by copying and Transmission process, in information moving from Hospitals to the Directorate of Health. A frequently study in regarding to discussions of web-based information system would greatly improve quality of data and time taken [20]. However, further efforts are needed to improve accuracy of disease classification and to monitor completeness of data coverage at the facility level.

For Patients outcome gaining substantially if there was a Linkage between the information system and quality improvement teams at all levels in the health system.

A. Safety in Iraq

Many doctors had left Iraq during the height of the conflict or they were killed. This outflow has now lessened, although of the 1500–1800 new medical graduates were produced each year, in which quarter of them mainly go to the UK, USA, and Australia. Table-1.2. According to survey as shown in Table-1.2 states regarding Meddle East Countries the ratio between doctors and the patient. Efforts were being made to encourage migrant Iraqi doctors to return have been largely unsuccessful due to conditions of conflict, uncertainty in Iraq.

Table-1. Comparing health care staff between some of Middle East countries per10000 person [18].

	Iraq	Jordan	Egypt	Syria
Doctors	7.8	25.5	28.3	15.7
Nurses and midwives	1.8	9.8	4.8	7.8
Pharmacists	2.0	12.66	16.3	8.2

B. Culture and norms

Within the Society of Islam and Arab culture which is characterized by strong relationships among families through the customs and norms that are shaped accordingly. The Interaction between unrelated Men and Women are considered as illegitimate are discouraged due to religious, coming into prominence this includes conversation also.

According to [19] came up with their conclusion that as the Technology is developing rapidly and as the Technology develops the Middle East is following with growth despite the Technical and Social Problems. They came up with the assumption that future of Telemedicine is bright and promising.

Some studies have revealed that culture and beliefs have an great influence on Information Technology adoption, particularly in Arab countries as there interaction will be lessened and secondly using of Internet in the Arab World according to [21, 22].

According to [23], 2003 can up with stating that despite the similarities of most of the Arab cultures, there are observable differences.

For example, in Saudi Arabia, there is largely gender segregation between men and women is one of the social norms, which is strictly implemented as per [24], secondly in Africian countries like Ethiopia there is gender inequality is very common [25]. There is an attribute that characterizes the Arab culture is the propensity for-face-to-face interaction [24].

As per [26, 27] came up a conclusion due this was the the main reason in regard for mot much Telemedicine Projects that have been successfully implemented on a Large Scale due to Culture and other related issues.

C. Sustainability of telemedicine

The studies in Australia suggested or identified a number of reasons that make Telemedicine more vulnerable and not sustainable using Quantitative Approach as per [28].

The reasons for failure include:-

a) Lack of support from parties involved
b) Resistance in regard to change
c) It is an unclear business model because study has to be made in regard to which services has to be provided and who will be paying and how much will be paid.
d) Lack of Interest on the part of some personnel and relying on only one person.
e) Insufficient funding for sustaining the Telemedicine. Un-availability of good infrastructure in regarding to High bandwidth and high grade equipment's.
f) Difficulties in approaching the goal which is intended.

Further this study came up with two supportive factors i.e.,

a) This increases co-operation and co-ordination among the Telemedicine Staff.
b) It raises good IT infrastructure that matches the requirement and need of the organization.
c) Improves access and qualify care.

3. THEORETICAL AND RESEARCH FRAMEWORK

The claim made earlier in the research objectives in terms of examining the factors within the four domain was supported by organization theory, in which [29] believed that the way of distributing information and learning resources through an organization affects the individual's ability to work, and the consequent outcomes. The outcome of a person is identified by environmental settings, such as technology, physical structure, culture, and social technology, as shown in Figure-4. Hence, understanding the effect of these aspects within organization theory can explain the current shortage of technology, culture, physical structure, and social structure in the Iraqi hospitals to use Telemedicine.

However, technical support within the organizational basis is also addressed by this theory, as specialists engaged in solving technical related issues. In general, organizational development and change are particularly important elements for establishing the skills and competency necessary for using new tools. As such, it demands deep knowledge of organizations and organizing: organization theory can provide content for executive training programs.

Meanwhile, [29]described the effects of networking and connectivity on organizational perspectives to conduct successful managing of tasks, to design effective communication systems or to diagnose ways existing systems are misaligned with an organization's needs. Therefore, we relied on these aspects to explain how organizational readiness and environmental readiness influence physicians readiness to use Telemedicine.

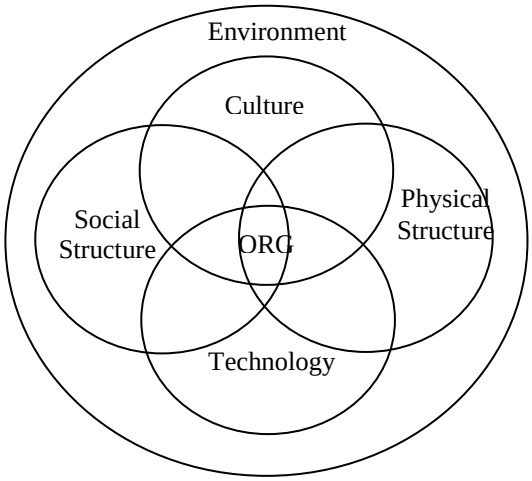

Figure-4. Organization theory [29].

In addition, [30] proposed self-determination theory as a way of explaining the effect of a certain behavior processed by individual on the foundation for high-quality performance [30]. Justified employee's ability from a self-determination theory perspective, where employees were found to process a self-competence toward their job. This was constructed based on the premise of self-determination theory that individuals sometimes lack self-motivation in which it keep them resisting changes poses from the management, display disaffection, and act irresponsibly. Therefore, providing an appropriate environment and learning resources can facilitate better use of Telemedicine. This can be controlled by the competency level and resistance to change the current technology and services, as shown in Figure-5.

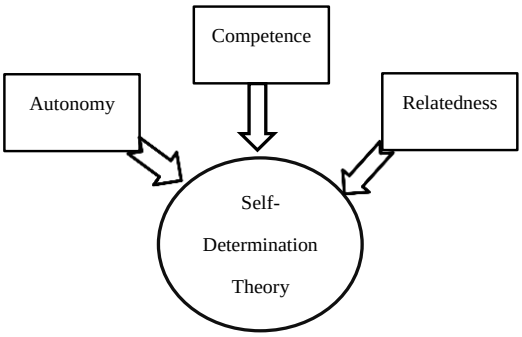

Figure-5. Self-determination theory [30].

4. RESEARCH SIGNIFICANT

The research project is expected to produce a validated flexible framework for an integrated and distributed Iraqi telemedicine system. The framework will be presented to the Ministry of Health (Iraq) for the deployment of a telemedicine system in Iraq.

Based on the current literature, this study is the first of its kind in the Iraqi hospital industry, and will provide a significant contribution toward building a readiness assessment framework for Telemedicine use. In addition, the expected benefits for Iraqi large size hospitals include:

1. Enabling the ministry of healthcare in Iraq to identify the current state of physician competency level and resistance to change to which it may explain the lacking of using Telemedicine in the Iraqi context.
2. Enabling the ministry to identify the current state of their hardware availability, software availability, capability, and compatibility level to use Telemedicine services in the selected hospitals.
3. Promoting the use of Telemedicine as a tool for engaging physician with patients based on the deployment of health monitoring services offered by Telemedicine tools.

Meanwhile, the use of Telemedicine services in the Iraqi large size hospitals is expected to improve various aspects of quality, efficiency, communication, motivation, and others by:

1. Sustaining the fostering of health monitoring of patients, where Telemedicine enables more informed decision making, based both on evidence and patient-specific data.
2. Improving precision and efficiency of care related operations by promoting shared care across boundaries.
3. Promoting better practices by emerging technology and reducing errors.
4. Improving access to effective healthcare by reducing barriers created, for example, by physical location or disability.

5. CONCLUSIONS

The aim of this research is a first step to create an integrated framework for Telemedicine System in Iraq. The literature explained what are the barriers might effect on implementing the telemedicine in developing countries as well as developed countries. Thus the system could be used from various platforms, having different devices and from distributed sites therefore data warehouse is the best for telemedicine projects. It is used for maintenance of life time health records (LHRs) of patients as well as the high accessibility and availability of Telemedicine System across different healthcare location.

REFERENCES

[1] Dawes, S. S. (1996). Interagency information sharing: Expected benefits, manageable risks. Journal of Policy Analysis and Management, 15(3), 377-394.

[2] Landsbergen Jr, D., & Wolken Jr, G. (2001). Realizing the promise: Government information systems and the fourth generation of information technology. Public Administration Review, 61(2), 206-220.

[3] Fisher, C., Lauría, E., & Chengalur-Smith, S. (2012). Introduction to information quality. Authorhouse.

[4] Sen, A., & Jacob, V. S. (1998). STRENGTH. Communications of the ACM, 41(9), 29.

[5] Ghani, M. K. A., Jaber, M. M., & Suryana, N. (2006). TELEMEDICINE SUPPORTED BY DATA WAREHOUSE ARCHITECTURE.

[6] Witten, I. H., & Frank, E. (2005). Data Mining: Practical machine learning tools and techniques. Morgan Kaufmann.

[7] IIE. (2011). Convenes Major Conference on Higher Education in Iraq. Retrieved May, 23, 2012, from http://www.iie.org/Who-We-Are/News-and-Events/Events/2012/IIE-Iraq-Conference-Quality-Assurance-and-Accreditation.

[8] Husain, M. K. (2013). E-government. Journal of Baghdad College of Economic sciences University, 439-460.

[9] Ali, A. H. (2013). Relationship with e-government program automation system of government action. Kut Journal For Economics Administrativy Sciences(9), 85-111.

[10] Al-Aqaby, K. M.B. (2012). The role of information and communication technology in the promotion of public participation. Paper presented at the Together towards Digital Inclusion", 2nd International e-Governance Conference., Baghdad, Iraq.

[11] Ellappan, V. and R. S. Ravindran (2014). "An Effective Selection of DCT and DWT Coefficients for an Adaptive Medical Image Compression Technique Using Multiple Kernel FCM." International Review on Computers and Software (IRECOS) 9(4): 628-637.

[12] Jaber, M. M., Ghani, M. K. A., Suryana, N., Mohammed, M. A., & Abbas, T. (2014). Flexible Data Warehouse Parameters: Toward Building an Integrated Architecture. vol, 7, 349-353.

[13] Aziz, J. S., Hussein, O. A., & Naoom, A. (2009). Design of telemedicine systems for rural and urban areas in Iraq. ARPN Journal of Engineering and Applied Sciences, 4(2), 71.

[14] Alhasnawi, S. (2008). Telemedicine Support for the Iraqi Health Sector: Building Bridges through Humanitarian Relief. Paper presented at A one-day exchange of ideas as to how telemedicine might be used to strengthen the health sector in Iraq, USA.

[15] Jaber, M. M., Ghani, M. K. A., & Herman, N. S. A REVIEW OF ADOPTION OF TELEMEDICINE IN MIDDLE EAST COUNTRIES: TOWARD BUILDING IRAQI TELEMEDICINE FRAMEWORK.

[16] Abd Ghani, M., Bali, R., Naguib, R., Marshall, I., Baskaran, V., Wickramasinghe, N., & Puentes, J. (2008). A flexible telemedicine framework for the continuous upkeep of patient health record. Paper presented at the Proceedings of the Fourteenth Americas Conference on Information Systems, Toronto, Canada.

[17] Suleiman, A. B. (2001) "The untapped potential of telehealth", International Journal of Medical Informatics, Vol.61, Iss.2-3, pp.103-112.

[18] Al Hilfi, T. K., Lafta, R., & Burnham, G. (2013). Health services in Iraq. *The Lancet*, *381*(9870), 939-948.

[19] Gher, L. A., & Amin, H. Y. (Eds.). (2000). Civic discourse and digital age communications in the Middle East. Greenwood Publishing Group.

[20] Irshad, H., Ibn-e-Hassan, J. I., Aghdam, A. R., & Kamalpour, M. (2013). m-HEALTH SYSTEM SUPPORT FOR LHWS WORKING IN RURAL AREAS. Science International, 25(3).

[21] Straub D., Loch K., Hill C. (2001). Transfer of information technology to the Arab world: A test of cultural influence modeling. Journal of Global Information Management; 9 (4), 6-28.

[22] Hill C., Straub D., Lock K., Cotterman W., El-Sheshai K. (1994). The Impact of Arab Culture on the Diffusion of Information Technology: A Culture-Centered Model. Paper presented at the impact of Informatics on society: Key Issues for developing Countries, IFIP 94, Havana, Cuba.

[23] Lai, Y. H. (2014). A Meta-Analysis on the Information Technology Application in Patients' Knowledge and Anxiety in Taiwan. Asian Journal of Applied Sciences, 2(2).

[24] Rouibah K. (2008). Social usage of instant messaging by individuals outside the workplace in Kuwait: A structural equation model. Information Technology and People; 21 (1), 34-68.

[25] Kifle M., Mbarika V., Datta P. (2006). Interplay of Cost and Adoption of Telemedicine in Sub-Saharan Africa: The Case of Telecardiology in Ethiopia, Information Systems Frontiers; 8(3), 211-223.
[26] MacFarlane, A., Murphy, A. W., & Clerkin, P. (2006). Telemedicine services in the Republic of Ireland: an evolving policy context. Health Policy, 76(3), 245-258.
[27] Zanaboni, P., & Wootton, R. (2012). Adoption of telemedicine: from pilot stage to routine delivery. BMC medical informatics and decision making, 12(1), 1.
[28] Wade, V., Eliott, J., Karnon, J., & Elshaug, A. G. (2010). A qualitative study of sustainability and vulnerability in Australian telehealth services. Stud Health Technol Inform, 161, 190-201.
[29] Judi, H. M., Razak, A. A., Shaari, N., & Mohamed, H. (2009). Feasibility and critical success factors in implementing telemedicine. Information Technology Journal, 8(3), 326-32.
[30] Deci, E. L., & Ryan, R. M. (2010). Self-Determination. John Wiley & Sons, Inc..