Investigating the Adoption of Telemedicine in Health Care System in Iraq

Ammar Wisam Abdulzhraa Altaher

Assistant. Lecturer., Ministry of Higher Education & Scientific Research -Foundation of Technical Education, AL-Furat AL-Awsat Technical University

Abstract: *The purpose of this research paper is toinvestigate the adoption of Telemedcine in the Health Care system of Iraq. It explores the relationship between the various variables tested and to propose strategies for adoption and its impact for the strategic Health care Management System implementation in Iraqi Health Care sector. This paper was designed and constructed with the aim of exploring relationships between the dependent variable (adoption of Telemedcine in Health care system of Iraq) and the independent variables (Easy to Use, Usefulness, Efficiency and Quality) researched and then testing the results using Spearman's correlation matrix and multiple regression analysis. From the statistical tests conducted on the research variables and the results gotten it was found out that a significant positive relationship exists between each of the independent variables (Easy to Use, Usefulness, Efficiency and Quality) and the dependent variable (adoption of Telemedcine in Health care system of Iraq) and this was tested by means of a Spearman's correlation Matrix. The Spearman's correlation coefficient (r) for the Independent Variables (Ease of Use, Usefulness, Efficiency and Quality) equals to 0.523, 0.702, 0.629 and 0.715 respectively which showed that a strong positive correlation exists between each of the independent variables (Ease of Use, Usefulness, Efficiency and Quality) and the dependent variable (adoption of telemedicine in Iraq Health care System). Also a multiple regression analysis conducted on the research variables showed that the dependent variable (adoption of Telemedcine in Health care system of Iraq) was significantly dependent on the independent variables (Easy to Use, Usefulness, Efficiency and Quality) to the extent of 79.5%*

Keywords: Telemedcine, health care, hospital,

1. Introdection

In this Information Age, health care is being shifted, from hospital-based acute care to prevention, promotion of wellness, and maintenance of function in community and home-based facilities. Telemedicine, a method of health care which is carried out at a distance, can facilitate this shift [1]. Telemedicine can provide second opinion medical e-consultation from renowned consultants or physicians of top hospitals or medical centers located around the world. Broadly it may be defined as the use of telecommunications technologies to provide medical information and services.

The mentionable aspect of telemedicine is the use of electronic signals to transfer information from one site to another [2]. Another definition of telemedicine is 'Telecommunication that connects a patient and a healthcare provider through live two-way audio, two way video transmission across distances and that permits effective diagnosis, treatment and other healthcare activities' [3].

The recent developments and improvements in technology and telecommunications have resulted in renewed and earnest interest in telemedicine. The concept of telemedicine is reserved, in many contexts, for applications where the subject is to render health services dependent on application of telecommunication.

In this classical sense, forms of remote consultations and remote diagnoses within various medical specializations can be included in the field of telemedicine. 'The investigation, monitoring and management of patients and the education of patients and staff using systems which allow ready access to expert advice and patient information no matter where the patient or relevant information is located.' From efficient use of telecommunications or telemedicine, the public health service has a lot to do. Telecommunications can contribute to

a more effective utilization of resources through tying the resources of the health sectors resources together in a large number of tele medical services [4].

As evidence suggests, the upcoming challenge for the public health services will be – the population during the next ten years will be changed with regard to the composition of age groups, more specifically in a developed country.

In light of these challenges telemedicine can be evaluated as a tool for more efficient utilization of available resources. Telecommunication will never replace the physician or other health workers concerned in a patient relation. Alternatively, it provides an opportunity of increasing the combination between various health care services and in this way contributes to better care directed towards the patients. So telemedicine or Telemedicine service can be an important medium for economical benefit of health sectors of a country [5].

However, many Telemedicine systems have proven problematic situations to implement in the organization. Therefore, it is necessary that the views, purposes and experiences of the users and providers of health care services are sought to enable problems to be resolved and issues addressed before telemedicine is fully implemented [6].

The framework of information infrastructure and negotiations of actor network, according to actor-network theory (ANT), therefore, are needed to set up or implement a telemedicine tool. Information infrastructures (IIs) are a set of interconnected structural components which can make a framework supporting a whole structure through exchange of information. It requires more than the combination of traditional approaches and strategies for

development of telecommunications solutions and information systems to be succeeded [7].

All researchers concerning information technology (IT) and health sciences have admitted that information technology plays a very important role in health care services. Now, patients need not to see physicians directly at first to take care of their physical or mental illness. E-mediated communication with their physicians can help them to get treatment by sitting their own homes.

This is the information technology – plays a vital role to get the patient admitted in a hospital, treatment by the technology during staying in hospital, again treatment information can be provided to the given patients, if patient stays at their home after taking emergency treatment from hospital. But developing or implementing an IT application in health care practices can never be process of simply using a new technology. 'Developing a comprehensive medical information system is a more complex task than putting a man on the moon had been[8].

2. Problem Statement

There are problem with the current manual system for record keeping in the Iraqi health care system. The problems that might be faced by the various medical personnel are that the records of each individual have to be kept manually in the normal document form [9]. This raises the problem if they want to check the medical record of the system they have to check all the files one by one. The other problems with this manual system are that there is no practical backup of these records. If it is lost or by mistake some disaster happens then everything is destroyed. The replacement of analogue forms of communication with digital methods, combined with a rapid drop in the cost of Information and Communication technology, have sparked wide interest the world over and including the Iraqi society in the application of telemedicine among health-care providers, and have enabled health care organizations to envision and implement new and more efficient ways of providing care .

The Iraqi society since the start of the 2001 war was heavily devastated infrastructural and experienced a decline in technological innovations. The end of the war has brought a renewed interest in the reconstruction of the country in all spheres of a modern day system hence the need to create a platform for technological application and advancement in the health care industry which is a pivot of the nation (The Economists (2013).

When healthcare providers have to rely on paper records, the sharing of information and the delivery of care become challenging and often impossible. Without full and secure access to patient records, healthcare services providers would give up the vital insight provided by the patients' health history.

''While hospitals and other care providers have long been quick to adopt breakthrough technology in medical devices, procedures and treatments, far less attention has focused on innovations in networking and communications. This is partly because of concerns about breaches in security and patient privacy, and because healthcare until recently was a service always performed locally and in person.'' [10] . In Iraq, the trend still goes on using paper based system to operate in various hospitals and health care centers.

This have over time not only caused problems in time taken for the medical test results to come out but also prone to a high percentage of human error since most of the vital processes and routine are done manually. The American Association for Clinical Chemistry in 2002 stated clearly that "the problem of medical errors has recently received a great deal of attention, which will probably increase". Further explanation reveals that "focus on this issue in the fields of medicine". The problem arises herein to investigate on the potential impact to be created by the use of an automated Health Management System that can be used as a platform to fully improve the quality of health care through telemedicine.

3. Research Objectives

1. Identify the most prevalent factors/variables that influence the adoption of telemedicine in the Health care system of Iraq
2. To Determine if there is any significant positive correlation between each of the independent variables (Easy to Use, Usefulness, Efficiency and Quality) and the dependent variables (adoption of Telemedicine in the health care system of Iraq).

4. Research Process

The research process involved collecting, analyzing and interpretation of information and the five steps that characterized the systematic nature of the research process. The paths that led to finding answers to the research questions constituted the research methodology
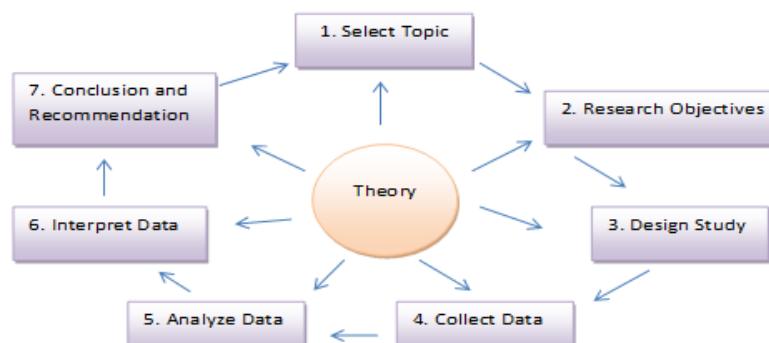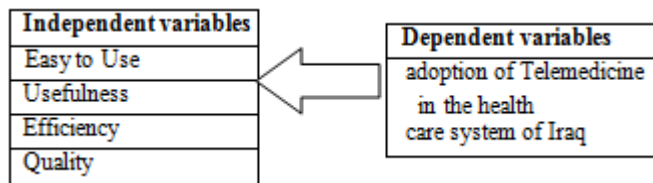

Figure 1: Steps in the Qualitative Research Process [11

Figure 2: Conceptual Frame Work

5. Sample Size

Non-probability convenience sampling method was very useful in this study. The samples were selected because they were accessible to the researcher. Subjects were chosen simply because they were easy to recruit. This technique is considered easiest, cheapest and least time consuming and it provided an opportunity in which rapport and trust was well established with the respondents and this obtained the insiders' view, getting in-depth of information concerning causes or reasons, it permitted continual clarification of ideas and information and on the other hand, it did not involve the high cost. The disadvantage was the bias introduced in the selection process.

The sample consist of nationwide Iraq Hospitals that are working in different fields, first criteria was on the bases of type of Hospital in various areas and states. Major focus is Baghdad and suburbs areas. Secondly consider the number of employees, who are working in these Hospitals and the number of patients for the particular hospitals, it is from less than 150 to more than 400 employees, which shows that how many companies have implemented technology which have less than 150 employees considered small organization and how many have implemented which have more than that, at last consider the financial strength.

To avoid introducing bias, a large enough sample size was estimated, large enough to provide confidence in the data captured. Factors such as precision and confidence, population size and time have been taken into consideration before determining the sample size. Thus the rule of thumb utilized here for the selection of sample size was Roscoe's rule of thumb "a sample of 30 to 500 is large enough sample"[12].

6. Data Collection Method

For the purpose of the research, various resources were used which paved the understanding and deep knowledge of secondary data and also it was useful for the analysis of primary data.

6.1 Primary Data Sources

A personally administrated questionnaire was used as a source for primary data collection in order to gain relevant information from the target population which is:
- Baghdad Teaching Hospital
- Al Kindi General Teaching Hospital
- Al Karkh General Hospital

7. Result and Desiccations

7.1 Descriptive Analysis (Demographic Information)

This first section was purpose to establish a general profile of the respondents by including descriptive information about the following characteristics, using frequencies and cross tabulations. Therefore to check on respondents' profiles, the following analyses were carried out.

Table 1: Statistics

		Gender	Age Group	Education Level	Occupation	Average Monthly Income
N	Valid	120	120	120	120	120
	Missing	0	0	0	0	0

Table 2: Frequencies of Age Group

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	18 to 25	38	31.7	31.7	31.7
	26 to 33	43	35.8	35.8	67.5
	34 to 41	32	26.7	26.7	94.2
	42 and above	7	5.8	5.8	100
	Total	120	100	100	

Table 3: Frequencies of Educational Level

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Certificate	20	16.7	16.7	16.7
	Diploma	28	23.3	23.3	40
	Degree	61	50.8	50.8	90.8
	Post Graduate	11	9.2	9.2	100
	Total	120	100	100	

Table 4: Frequencies of Occupation Category

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Education	29	24.2	24.2	24.2
	Food / Beverage	12	10	10	34.2
	Medical Services	28	23.3	23.3	57.5
	Travel / Tourism	13	10.8	10.8	68.3
	Financial Services	19	15.8	15.8	84.2
	Sports / Entertainment	6	5	5	89.2
	Manufacturing / Industrial	13	10.8	10.8	100
	Total	120	100	100	

Table 5: Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Easy.To.Use	120	2.5	5	4.0604	0.5
Efficiency	120	2.5	17.5	4.1646	1.32228
Usefulness	120	2.5	5	4.1146	0.53245
Quality	120	2.5	4.75	3.9667	0.43475
Challenges	120	2.75	5	4.1646	0.44967
Adoption	120	2.67	5	4.0028	0.5692
Valid N (listwise)	120				

7.2 Reliability Analysis

To test the internal consistency of the variables measured, a reliability analysis was conducted. In order to measure the

reliability of Cronbach's Alpha value, guidelines from George and Mallery [13] was used. These were as follows:
Values Greater than 0.8 = Excellent
Values Greater than 0.7 = Good
Values Greater than 0.6 = Acceptable
Values Greater than 0.5 = Questionable
Values Greater than 0.4 = Poor
Values Greater than 0.3 = Unacceptable

Table 6: Reliability Analysis

Variable	Cronbach Alpha	No. of Items	Interpretation
Easy to Use	0.791	5	Good
Usefulness	0.796	5	Acceptable
Efficiency	0.822	5	Acceptable
Quality	0.684	5	Acceptable

The above table 6 shows the reliability with respect to the constructs employed in the research framework. The Cronbach Alpha for the variables were all above 0.6 meaning that all the items/measurement employed in this study are considered reliable and valid

Table 7: ANOVA Analysis

	Model	Sum of Squares	df	Mean Square	F	Sig.
1	Regression	3.659	4	.915	**6.970**	.000ᵃ
	Residual	15.093	115	.131		
	Total	18.752	119			
a. Predictors: (Constant), Quality, Usefulness, Easy to Use, Efficiency						
b. Dependent Variable: Adoption of telemedicine in the health care system of Iraq.						

The above table of ANOVA is explained that. The F-value of the model used for this research is 6.970 (Sig. = 0.000), indicating significance of model at 0.05, the chosen level of significance. As a result, confirming the strength of the model which indicates that there is statistically significant relationship between each independent variable and the dependent variable which is the "adoption of telemedicine in the health care system of Iraq."

Table 8: Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	*t*	*Sig.*
		B	Std. Error	Beta		
1	(Constant)	**4.115**	.474		8.676	**.000**
	Easy to Use	**.200**	.067	.252	2.962	**.004**
	Efficiency	**.067**	.026	.223	2.604	**.010**
	Usefulness	**.025**	.063	.033	.393	**.025**
	Quality	**.308**	.077	-.338	4.020	**.000**
a. Dependent Variable: Adoption of telemedicine in the health care system of Iraq.						

The Coefficients table above explains that each of the four selective independent variables had a significant effect on the Adoption of telemedicine in the health care system of Iraq (dependent variable). The P-value for each of the four independent variables is also less than 5% (0.05), the selected

level of significance, indicating that all four selective practices had significant impact on Adoption of telemedicine in the health care system of Iraq. This indicates that there is a statistically significant relationship between them.

The **beta coefficients (β) values** from the table above 8; Quality (β=0.308) has the maximum impact on 'Adoption', followed by 'Easy to use' (β=0.200), 'Efficiency' (β=0.067), 'Usefulness' (β=0.025).

7.3 Estimated Regression Equation:

Adoption of Telemedicine = 4.115 + 0.200 (Easy to use) + 0.067 (Efficiency) + 0.025 (Usefulness) + 0.308 (Quality)
The Model is a Multiple Regression which corresponds to the Multiple Regression Equation
$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4$
Where Y = Adoption of telemedicine in the health care system of Iraq
$X_1, X_2, X_3,$ and X_4 = Independent Variables (Easy to Use, Efficiency, Usefulness and Quality respectively)
β_0 = Intercept (Constant)

8. Conclusion

Objective 1: Identify the most prevalent factors/variables that influence the adoption of telemedicine in the Health care system of Iraq

This objective sets out to identify the most prevalent factors/variables that influence the adoption of Telemedicine in the health care system in Iraq. This report reviewed current literature and opinions about this innovative health management information system technology. It also reviewed the factors, characteristics and social influences that affect adoption. From all these it was found out that a multiplicity of factors are responsible for the adoption of this technology and these factors includes "Ease to use, Perceived Benefits/Value, Usefulness, Usefulness, Trust, Security, Awareness, Efficiency, Social influences, Quality and Cost". Out of these factors, four were chosen to be studied in this research in Iraq and these four factors researched on were "Easy to Use, Usefulness, Efficiency, and Quality"

Objective 2:To Determine if there is any significant positive correlation between each of the independent variables (Easy to Use, Usefulness, Efficiency and Quality) and the dependent variables (adoption of Telemedicine in the health care system of Iraq)

A Spearman's correlation matrix was conducted to achieve this objective and from the results obtained it was seen that the p-value from correlation test between independent variables and dependent variables all are less than 0.05, the chosen significant level. This show that four independent variables are positively significant related to Telemedicine's Adoption in Iraq.

Furthermore, the Spearman's correlation coefficient (r) for the Independent Variables (Ease of Use, Usefulness, Efficiency and Quality) equals to 0.523, 0.702, 0.629 and

0.715 respectively which shows that a strong positive correlation exists between each of the independent variables (Ease of Use, Usefulness, Efficiency and Quality) and the dependent variable (adoption of telemedicine in Iraq Health care System).

This therefore means that as the system increases in the Ease of Use, Usefulness, Efficiency and Quality Parameters, there would be a corresponding increase in the adoption profile of telemedicine in Iraq Health care System.

9. Recommendation

Initiating organizational or industry-wide change process is a daunting task. It is therefore pertinent that proper education about the change process, the desirable endpoint, as well as the roles each stakeholder contributes to achieving the set goals and objectives. Therefore for a successful business process reengineering which usually takes time requires proponents and facilitators to set possible realistic time frame for the attainment of significant results. While a standard benchmark of five years have been proposed, five to ten year duration may be considered consequential to high threshold imposed by the several limitations.

Knowledge about the EHS as an emerging component of the Health Information System amongst healthcare workers is still unsatisfactory hence educational programmes such as training, refresher courses and retraining may be organised to bring health professionals up to speed on emerging trends in the health information system especially the integrated Electronic health System as well as innovative health technologies.

It is also proposed that the medical training curriculum may be revised to include an extensive training on healthcare informatics mostly in the areas of clinical documentation and computerized order entry and decision support (areas which was unanimously agreed upon to be most relevant to clinicians and non-clinicians in the healthcare system-primary, secondary and tertiary).

With the high incidence of medical/ medication-error related morbidity and mortality, EHS facilitates an improvement of patient safety profile by minimising errors accruing from faulty and repetitive patient profiling, misdiagnosis and poor decision support, polypharmacy and other Drug Therapy Problems. This implies that patients are guaranteed safe and quality health services while care givers are less pressurized by litigation and related issues. Individually, patients also enjoy privacy and security protection by restricting unauthorised access to patient health records. This also can improve overall patient satisfaction and engagement.

The effect if an integrated electronic health system being a component of the Healthcare reengineering process as it relates to the diagnosis and treatment of disease, healthcare research and outreach, as well as health promotion and disease prevention cannot be over emphasized. Consequential to the fact that an integrated electronic health system can help improve healthcare efficiency while reducing errors and healthcare costs, an improvement in care coordination implies that diagnosis and treatment are better coordinated while the ease of collecting and analysing epidemiological data enhances clinical decision and improves overall public health. An improved health information system also would support health promotion and disease prevention campaigns as both patients and care giver have been brought closer in a well integrated platform.

The successful implementation of EHS requires collaboration and acceptance amongst stakeholders (patients, care givers and the Government). Proper education must be carried out to enlighten and reinforce the expectation about the potential benefits of the EHS compared with erstwhile convention (the paper-based system). Proper education may also help dispel misconceptions and fears about the EHS especially as it affects a perceived disruption of workflow, employee layoff, and exposure of professional lapses and breach of personal privacy, amongst others.

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