

Research Article

The Effect of Patient Privacy on Telemedicine Implementation in Developing Countries: Iraq Case Study

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Abstract: The aim of this research is to measure patient privacy factor of adopting telemedicine project in Iraq since it plays a central role in adopting telemedicine in developed countries or even in Developing countries this research measures the importance of patient privacy in developing countries and take Iraq as case study, Questionnaire used as instrument of collection data. First was the pilot study and 35 questionnaire were distributed at Baghdad medical city and 500 were distributed to physicians, some of these questionnaire were ignored because they was not completed thus 312 respondent only were used for the final result.

Keywords: Adopting telemedicine, patient privacy, telemedicine

INTRODUCTION

Confidentiality and privacy: Confidentiality and privacy are potential significant human factors barrier (Kelly and McKenzie, 2002). The public concern regarding the privacy and security of medical data can be significant barrier to the widespread use of telemedicine applications and the development of computer-based patient record systems. Transmission of medical information through the telecommunication network and the usage of computer-based patient record systems represent the basis of success in most telemedicine applications at present. Their integration in health information systems has become a necessity since it provides significant benefits in terms of health services and improving healthcare quality. For example, the telemedicine domain allows medical providers to have instantaneous access to a patient's medical record and offers the ability to exchange this information within the healthcare institution or over distance.

These confidential medical record databases, which contain information about all patients, become jeopardized if left unprotected (Khan *et al.*, 2007). The need for proper handling of medical records and guaranteed data protection during transmission has prompted governmental institutions and the private sector in many countries to create policies to address these issues. Confidentiality and security laws need to be enacted inline with country privacy practices. At present, teleconsultation sessions cannot be held until permission has been received from the patient (Abu-dalbouh, 2014).

The need to ensure the security and privacy of patient records has additionally reduced the adoption and utilization of telemedicine technology. The importance of keeping up privacy of telemedicine services to be most critical and prompt obstruction to telemedicine adoption (Abu-dalbouh, 2014). This depends on the level of privacy of each association that gives it regulations to securing healthcare records, averting healthcare misrepresentation and misuse and implements the privacy and security of all patient information. In Iraq, disappointment to conform authoritative regulation is common in healthcare sectors (Jaber *et al.*, 2014).

Kvedar *et al.* (2014) have addressed the detainment of privacy and its possible predictor of one's attitude to use technology. In view of that, while technology may better absorb, store and offer quiet information; physicians are still not certain how well it will secure patient information. Late features of rupture of patient-record privacy just serve to fuel physician concerns. Patient record privacy should then be ensured secure before physicians will feel great utilizing telemedicine technology. Therefore, this study aims at investigated the effect of patient's privacy in telemedicine on physicians' attitude to use it in the Iraqi healthcare sectors.

Information security and privacy: Without providing security for users and businesses, e-technology will not achieve its desired objectives. This requires strengthening of the legal framework to address privacy protection and prosecution of computer crimes, creation

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of effective certification authorities, authorizing of digital signatures and enabling a public key or web of trust infrastructure. A survey of existing or “in gestation” legislations in the Arab countries shows that there are either no laws, or there are only draft laws (Mohan and Baburaj, 2014; Saidi and Yared, 2003).

Privacy in developed countries: There are some issues that have been raised by telemedicine in developed countries such as privacy and confidentiality (Abdul *et al.*, 2015). Telemedicine practice was inhibited in the past by the law, because of the patient privacy issues and medical licensure. For example, in the USA, doctors cannot consult with patients in a different state unless the doctor is licensed to practice in that state. Therefore, the State Medical boards from different States have come up with a few solutions to ease the licensure barriers between them, in order to facilitate the practice of telemedicine (Kantor and Irving, 1997). Privacy is an issue that is facing the application of telemedicine in developed countries, for example, in some cases, patients’ records need to be shared between more than one states in the USA. A conflict between States and federal laws relating to the privacy and confidentiality of the patient’s record will appear (Demiris, 2003).

Developed countries have utilized telemedicine and have benefited from it. The next section will show the developing countries’ experience with telemedicine and the need for its application in those countries (Ghani *et al.*, 2015).

Patient privacy in Iraq: The demand to ensure the security and protection of patient records has furthermore diminished the selection and use of telemedicine technology (Olanrewaju *et al.*, 2013). Tended to the significance of keeping up the security of telemedicine administrations to be more basic and brief check to telemedicine appropriation. This relies on upon the level of protection of each one affiliation that provides for its regulations to securing medicinal services records, deflecting health awareness distortion and abuse and executes the security and security of all patient data. In Iraq, frustration to acclimate legitimate regulation is normal in social insurance divisions.

Hypothesis: Patient privacy will induce a positive impact on adopting telemedicine in Iraq.

METHODOLOGY

The survey method was employed in this study because surveys are prevalently used to begin reports and is a suitable method for examining factors and hypotheses. The questionnaire methodology is used for data collection. Sekaran and Bougie (2010) showed that the questionnaire design relies on three criteria, namely,

Table 1: Items description

Factor	Items	References
Privacy	3 items	Buabbas (2013); Checchi <i>et al.</i> (2002)

Table 2: Demographic characteristics

Variable	% of participants	
	No. of respondents	Percentage
Gender		
Male	24	80.0%
Female	6	20.0%
Age		
Less than 30	3	10.0%
From 30 to 40	21	70.0%
From 41 to 50	5	16.7%
More than 50	1	3.3%
Education level		
Bachelor	21	70.0%
Master	8	26.7%
PhD	1	3.3%

the manner by which the questions are written, planning for the classification of variables and the appearance of the questionnaire.

The instruments are designed based on the content of each factor. Suggestions and various advice from colleagues and supervisors were taken into consideration to improve the design of the instruments, as well as to build the questionnaire. The questionnaire is written in English and then translated into Arabic, which is the official language in Iraq. Table 1 shows the penalization of the factors and items.

Pilot study: In the pilot study, questionnaires were distributed amongst physicians who are working in Baghdad medical city. However, among the 35 questionnaires that were collected, five were not correctly answered. Table 2 illustrates the demographic characteristics of the pilot study of this research.

Reliability of questionnaire: As per (Sekaran and Bougie, 2010), "the unwavering quality of a measure shows the degree to which it is without inclination (lapse free) and consequently guarantees steady estimation crosswise over time and over the different things in the instrument." Therefore, an exploration instrument that is reliable, steady and unsurprising is thought to be solid. In increase, the more elevated amount of consistency and reliability in the examination instrument, the higher its unwavering quality (Smith, 2012). The dependability of the exploration may be resolved through two techniques, in particular, interior and outer consistency strategies (Smith, 2012).

The current study takes after the inner consistency methodology on the reason that it needs to quantify the inquiries of the same sensation by hanging the aftereffect of answers that connected from the respondents together as a gathering (Smith, 2012). The

Table 3: Reliability statistics

Cronbach's Alpha	N of Items
0.756	3

examination of the inside consistency measures can be led by means of two modes, to be specific, between thing consistency unwavering quality and part half dependability (Sekaran and Bougie, 2010). As indicated by Sekaran and Bougie (2010), "the between thing consistency dependability is a test of respondents' responses to all the things in a measure."

The most well-known test of this measure is Cronbach's alpha (Cronbach, 1946). The Cronbach's alpha test has qualities running from 0 to 1; a more elevated amount of extent suggests a more prominent estimation of reliability. Estimations of 0.8 or more show that the dependability of the exploration instrument is great; values over 0.6 additionally mean a satisfactory unwavering quality (Hair *et al.*, 2007). Besides, values running from 0.5 to 0.6 are somewhat adequate for the dependability of exploration of the connection of new applications or circumstances.

To make the estimation of survey unwavering quality up to 0.74, (Smith, 2012), suggested that the scientist ought to take after specific steps, for example, blowing up the amount of things, institutionalizing the organizational systems, assuring that the respondents shrewdly stamp things in the canvass and guaranteeing that the things in the poll pass on a sensible sentiment, are elegantly composed and outfit for the answerers. The between thing consistency dependability is chosen for the present study to test the respondents' responses for all the things utilizing Cronbach's alpha. The Table 3 above shows the Cronbach's Alpha value is 0.756 which is reliable.

Regression: The method of multiple regressions was used step by step in order to test forth hypotheses of the study. SPSS version 20 was served as the instrument for the statistical analysis. The dependent variables involved for this test was participation in adopting

telemedicine while the independent variables included is privacy (Table 4).

Were found to be significant determinants of participation in adopting telemedicine. However, cost, privacy and culture were excluded statistically from the model by the step by step regression method. The statistics for the removed variables from the model and remained in the model are displayed respectively in Table 5 and 6. Additionally, Table 6 even illustrates the model which summaries the statistics results that are obtained from the regression analysis.

Factor analysis: Data were analyzed by utilizing principal component factor analysis using promax rotation with Kaiser Normalization technique. In order to find the prepare component Kaiser-Guttman Rule (Eigenvalues greater than one) and scree plot were utilized (Nunally and Bernstein, 1978). Table 7 illustrates the results of the factor analysis of the principal component. The factor analysis found out the items that captured for the later analysis, thus, seventeen distinct factors were been indicated within the dependent variable.

In order to provide the best solution, the analysis should be based upon both convergent validity and discriminant validity. Therefore, the convergent validity was established depending on all the strong loaded instruments according to their respective factors (loading>0.50) (Chau and Tam, 1997). However, any particular factor loaded strongly on its respective factor instead of another factors (Chau and Tam, 1997). Table 7 shows the value of each item.

Discussion on the feedback of the Iraqi physicians readiness toward telemedicine: Response of this research's survey has been rate and analyses in this section. Moreover, it consists of the discussed of response rate and, missing data and screening data.

Response rate the sampling frame for this study consisted of five public hospitals in Iraq. The total physicians who work in the 5 hospitals are 1386. The size of the sample is 500. Out of these 5 hospitals, 324

Table 4: Model summary

Model	R	R ²	Adjusted square	Std. Error of the estimate
1	0.026 ^a	0.001	-0.003	0.61561

a. Predictors: (Constant), Pri; R²: R Square

Table 5: ANOVA^a

Model		Sum of squares	Df	Mean square	F	Sig.
1	Regression	0.079	1	0.079	0.209	0.648 ^b
	Residual	117.483	310	0.379		
	Total	117.562	311			

a. Dependent Variable: DV; b. Predictors: (Constant), Pri

Table 6: Coefficients^a

Model		Unstandardized coefficients		Standardized coefficients		
		B	S.E.	β	t	Sig.
1	(Constant)	2.728	0.181		15.061	0.000
	Pri	-0.024	0.053	-0.026	-0.457	0.648

a. Dependent Variable: DV; S.E.: Standard Error

Table 7: Communalities

	Initial	Extraction
Pri1	1.000	0.777
Pri2	1.000	0.741
Pri3	1.000	0.610

Extraction Method: Principal Component Analysis

of them returned the questionnaires back, the rate response is 64.8%. From the returned questionnaires, 12 of them were incomplete or giving random answers so they were dropped from subsequent analyses, yielding 312 usable responses and a usable response rate of 62.4%.

Missing data and screening data: Missing data refers to not available information for a subject (or case) in the questionnaire (Hair *et al.*, 2010). Missing data cause by the respondent's refusal or forget to answer one or more questions. Therefore, the questionnaire has been include a guidelines in order to decrease the missing data or answering twice for one item. However, 12 cases were removed for having double answers for questions or because of not answering most of the questionnaire, which made them not usable for this study.

To check the error, the researcher needs to look for values those fall out the range of right values for the items (Pallant, 2013). Moreover, there is an important need to check the errors before starting the analysis because these errors can distort it. In order to check the errors this study has done frequencies for each item. Therefore, now the data are screened and cleaned to do the analysis in SPSS.

CONCLUSION

Patient privacy is an important aspect to measure before implementing any technology such as telemedicine, the aim of the research is to measure the privacy of patient in developing countries in general and Iraq to be a case study. A pilot study has been done to measure the reliability of the questions and it shows that the value is accepted, 35 questionnaires was distributed at Baghdad medical city 5 had missing data and it had been ignored. The total physicians who work in the 5 hospitals are 1386. The size of the sample is 500. At 5 hospitals from Baghdad medical city, 324 of them returned the questionnaires back, 12 of them were, thus 312 usable responses and a usable response rate of 62.4%. The result showed patient privacy has negative effort and it does not support the telemedicine project in Iraq.

REFERENCES

Abdul, Y., A.S. Aldeen, M. Salleh, M.A. Razzaque and F.Computing, 2015. A survey paper on privacy issue in cloud computing. Res. J. Appl. Sci. Eng. Technol., 10(3): 328-337.

Abu-dalbouh, H., 2014. A proposed mhealth model for improving the quality care in hospitals. Res. J. Appl. Sci. Eng. Technol., 7(7): 1215-1219.

Buabbas, A., 2013. Investigation of the adoption of telemedicine technology in the Kuwaiti health system: Strategy and policy of implementation for overseas referral patients. Ph.D. Thesis, Ali Buabbas School of Information Sys, (February).

Chau, P.Y.K. and K.Y. Tam, 1997. Factors affecting the adoption of open systems: An exploratory study. MIS Quart., 21(1): 1-24.

Checchi, R.M., G.R. Sevcik, K. Loch and D.W. Straub, 2002. An instrumentation process for measuring ICT policies and culture. J. Mack Robinson College of Business, Georgia State University. Retrieved from: [http://www.cis.gsu.edu/~dstraub/Research/ACITA_PIT/Endnote/Publications/Checchi\(2002\).pdf](http://www.cis.gsu.edu/~dstraub/Research/ACITA_PIT/Endnote/Publications/Checchi(2002).pdf). (Accessed on: March 29, 2009)

Cronbach, L.J., 1946. Response sets and test validity. Educ. Psychol. Meas., 6(4): 475-494.

Demiris, G., 2003. Integration of telemedicine in graduate medical informatics education. J. Am. Med. Inform. Assoc., 10(4): 310-314.

Ghani, M.K.A., M.M. Jaber and N. Suryana, 2015. Barriers faces telemedicine implementation in the developing countries: Toward building Iraqi telemedicine framework. ARPN J. Eng. Appl. Sci., 10(4): 1562-1567.

Hair, J.F., A.H. Money, P. Samouel and M. Page, 2007. Research methods for business. Educ. Train., 49(4): 336-337.

Hair, J., W.C. Black, B.J. Babin and R.E. Anderson, 2010. Multivariate Data Analysis. 7th Edn., Pearson Education International, Upper Saddle River, New Jersey.

Jaber, M.M., M.K.A. Ghani and N.S. Herman, 2014. A review of adoption of telemedicine in middle east countries: Toward building iraqi telemedicine framework. Sci. Int., 26(5): 1795-1800.

Kantor, M. and L. Irving, 1997. Telemedicine report to congress. US Department of Commerce. Retrieved from: <http://scholar.google.com/scholar?hl=en&btnG=Search&archandq=intitle:Telemedicine+Report+to+Congress#4>.

Kelly, G. and B. McKenzie, 2002. Security, privacy, and confidentiality issues on the internet. J. Med. Internet Res., 4(2): e12.

Khan, H., M. Qurashi and I. Hayee, 2007. Tele-health: The Modern face of Healthcare. COMSATS Headquarters, Islamabad.

Kvedar, J., M.J. Coye and W. Everett, 2014. Connected health: A review of technologies and strategies to improve patient care with telemedicine and telehealth. Health Affair., 33(2): 194-199.

- Mohan, N.R.R. and E. Baburaj, 2014. Design and analysis of adaptive load balancing approach in cloud infrastructure. *Res. J. Appl. Sci. Eng. Technol.*, 8(6): 736-745.
- Nunally, J.C. and I.H. Bernstein, 1978. *Psychometric Theory*. McGraw-Hill, New York.
- Olanrewaju, R.F., N.B. Ali, O. Khalifa and A. AbdManaf, 2013. ICT in telemedicine: Conquering privacy and security issues in health care services. *Electron. J. Comput. Sci. Inform. Technol.*, 4(1): 1-6.
- Pallant, J., 2013. *SPSS Survival Manual*. McGraw-Hill Education, UK.
- Saidi, N. and H. Yared, 2003. eGovernment: Technology for good Governance, Development and Democracy in the MENA Countries. Retrieved from: <http://citeseerx.ist.psu.edu/viewdoc/download?Doi=10.1.1.134.3731andrep=rep1andtype=pdf>.
- Sekaran, U. and R. Bougie, 2010. *Research Methods for Business: A skill building approach*. John Wiley and Sons, New Jersey.
- Smith, A.M., 2012. *Research methodology: A step-by-step guide for beginners*. *Nurs. Edu. Pract.*, 12: 405, Doi: 10.1016/j.nepr.2011.11.008.