FACTORS AFFECTING THE IMPLEMENTATION OF ELECTRONIC MEDICAL RECORDS SYSTEMS (EMRs) IN JORDANIAN HOSPITALS

BILAL ALI YASEEN ALNASSAR

DOCTOR OF PHILOSOPHY
UNIVERSITI UTARA MALAYSIA
2012

Awang Had Salleh
Graduate School
of Arts And Sciences

Universiti Utara Malaysia

PERAKUAN KERJA TESIS / DISERTASI

(Certification of thesis / dissertation)

Kami, yang bertandatangan, memperakukan bahawa
(We, the undersigned, certify that)

BILAL ALI YASEEN AL-NASSAR

calon untuk Ijazah
(candidate for the degree of) PhD

telah mengemukakan tesis / disertasi yang bertajuk:
(has presented his/her thesis / dissertation of the following title):

"FACTORS AFFECTING THE IMPLEMENTATION OF ELECTRONIC MEDICAL RECORDS SYSTEM IN JORDANIAN HOSPITALS"

seperti yang tercatat di muka surat tajuk dan kulit tesis / disertasi.
(as it appears on the title page and front cover of the thesis / dissertation).

Bahawa tesis/disertasi tersebut boleh diterima dari segi bentuk serta kandungan dan meliputi bidang ilmu dengan memuaskan, sebagaimana yang ditunjukkan oleh calon dalam ujian lisan yang diadakan pada : ***23 Mei 2012.***
That the said thesis/dissertation is acceptable in form and content and displays a satisfactory knowledge of the field of study as demonstrated by the candidate through an oral examination held on: ***May 23, 2012.***

Pengerusi Viva: *(Chairman for Viva)*	Prof. Dr. Che Su Mustaffa	Tandatangan *(Signature)*
Pemeriksa Luar: *(External Examiner)*	Assoc. Prof. Dr. Sharifah Mastura Syed Mohamad	Tandatangan *(Signature)*
Pemeriksa *Dalam*: *(Internal Examiner)*	Dr. Haslina Mohd	Tandatangan *(Signature)*
Nama Penyelia/Penyelia-penyelia: *(Name of Supervisor/Supervisors)*	Dr. Mohd Syazwan Abdullah	Tandatangan *(Signature)*
Nama Penyelia/Penyelia-penyelia: *(Name of Supervisor/Supervisors)*	Assoc. Prof. Dr. Wan Rozaini Sheik Osman	Tandatangan *(Signature)*

Tarikh:
(Date) *May 23, 2012*

Permission to Use

In presenting this thesis in fulfilment of the requirements for a postgraduate degree from Universiti Utara Malaysia, I agree that the Universiti Library may make it freely available for inspection. I further agree that permission for the copying of this thesis in any manner, in whole or in part, for scholarly purpose may be granted by my supervisor(s) or, in their absence, by the Dean of Awang Had Salleh Graduate School of Arts and Sciences. It is understood that any copying or publication or use of this thesis or parts thereof for financial gain shall not be allowed without my written permission. It is also understood that due recognition shall be given to me and to Universiti Utara Malaysia for any scholarly use which may be made of any material from my thesis.

Requests for permission to copy or to make other use of materials in this thesis, in whole or in part should be addressed to:

Dean of Awang Had Salleh Graduate School of Arts and Sciences
UUM College of Arts and Sciences
Universiti Utara Malaysia
06010 UUM Sintok

Abstrak

Sistem Rekod Perubatan Elektronik (EMRS) merupakan satu aplikasi yang membolehkan akses dan dapatan semula data sejarah perubatan pesakit. Pada masa kini pelaksanaan EMRS hanya meliputi tidak lebih 50% daripada hospital di Jordan, dan penyelidikan untuk mengenal pasti faktor utama yang mempengaruhi pelaksanaan EMRS di Jordan juga adalah terhad. Kajian ini bertujuan untuk meninjau faktor yang mempengaruhi pelaksanaan EMRS di hospital di Jordan. Model konsep, disesuaikan daripada Model Penerimaan Teknologi (TAM), yang dibangunkan untuk mengaitkan Faktor Organisasi (OF) dan Faktor Ciri Individu (ICF) dengan pelaksanaan EMRS di hospital di negara Jordan. Soal selidik tadbir kendiri telah digunakan untuk mengumpul data daripada kakitangan profesional penjagaan kesihatan di dua buah hospital utama yang melaksanakan EMRS sepenuhnya. Penemuan menunjukkan bahawa OF mempunyai hubungan signifikan dengan Tanggapan Kemudahan Penggunaan (PEOU) dan Tanggapan Kebergunaan (PU), ICF mempunyai hubungan yang signifikan dengan PEOU, hubungan Pengguna - Pesakit mempunyai kaitan yang signifikan dengan PU kecuali Autonomi pengguna, PEOU pula mempunyai kesan yang signifikan dengan PU, PU mempunyai hubungan yang signifikan dengan Sikap terhadap Penggunaan (ATU) kecuali PEOU, dan ATU mempunyai hubungan yang signifikan dengan Niat Tingkahlaku Penggunaan. Hasil kajian ini menyumbang kepada peningkatan pengetahuan berasaskan teori tentang penggunaan TAM dalam domain informatik kesihatan. Kajian ini telah menambahbaik model TAM yang menggabungkan PEOU dan PU, dengan mempertingkatan pemboleh ubah OF dan ICF. Maka, dapatan kajian ini boleh membantu pembuat keputusan dalam merangka strategi-strategi pelaksanaan EMRS di Jordan.

Kata kunci: Sistem Rekod Perubatan Elektronik, Model Teknologi Penerimaan, Faktor Organisasi, Faktor Ciri Individu

Abstract

An Electronic Medical Record System (EMRS) is an application that enables access and retrieval of a patient's medical history. Currently EMRS implementation does not encompass more than 50% of the hospitals in Jordan, and limited research has been done in Jordan to identify the main factors affecting the implementation of EMRS. The aim of this study is to explore the factors that affect the EMRS implementation in Jordanian hospitals. A conceptual model, adapted from Technology Acceptance Model (TAM), was built to relate Organizational Factors (OF) and Individual Characteristic Factors (ICF) to EMRS implementation in Jordanian hospitals. Self-administered questionnaires were used to collect the data from healthcare professionals in two major hospitals that have full implementation of EMRS. Findings indicated that OF has significant relationships with Perceived Ease of Use (PEOU) and Perceived Usefulness (PU), ICF has significant relationships with PEOU, User – Patient relationship has significant relationships with PU with exception of User Autonomy, PEOU has a significant effects with PU, PU has significant relationship with Attitude Toward Using (ATU) exception of PEOU, and ATU has a significant relationship with Behavioural Intention to Use. The finding of this study has led to the enhancement of the theoretical knowledge of TAM's application in the health informatics domain. This study has extended the current model comprising PEOU and PU, by adding the OF and ICF. Consequently, the findings can assist decision makers in formulating EMRS implementation strategies in Jordan.

Keywords: Electronic Medical Record System, Technology Acceptance Model, Organizational Factors, Individual Characteristic Factors

Acknowledgement

In the name of Allah and His mercy, the more you learn, the more you realize how little you know. We come to understand that our accomplishments are not possible without the help of Allah. The following are just a few of the countless people who have helped me to complete my Ph.D. studies.

This research project would not have been possible without the support of many people. First I wish to express my gratitude to my supervisor, Dr. Mohd Syazwan Abdullah who has been very helpful and offered invaluable, support and guidance. Deepest gratitude is also due to Associate Professor Dr. Wan Rozaini Bt Sheik Osman.

I am very grateful to my father Ali, Shrifa, and my mother, who gave me life, my brothers and their sons, Abu Ali, Abrahim, Esam, Yaseen, Jalal, Salam and Moad, who supported me during my study and my sisters and their sons who constantly inspired me, and had unending faith in me, and nourished my passion for learning. They indulged my endless hours on numerous occasions with memorable conversations and lessons that have lasted a lifetime. May Allah extend their ages for their good deeds and worship.

I had a very fortune to study at UUM College of Arts and Science, for without their assistance, this study would not have been successful. Special thanks also to all my graduate friends from the Information Technology Department for sharing ideas and for their invaluable assistance. I would also like to thank my best friends, Dr. Ahmad, Dr. Omar, Meshal, Rafy, Stam, Dr. Abu Zad and Alaa Eddin. The completion of a Ph.D. program was only possible because of their support and help. Lastly, I dedicate this thesis to the spirit of my grandmother Mariam and my cousin Samia who died by medical error at the end of 2006, and I thank the Malaysian people for their hospitality.

Table of Contents

List of Tables

List of Figures

List of Appendices

List of Abbreviations

ACR	American College of Rheumatology
ATB	Attitude Toward Behaviour
BI	Behavioural Intention
CBPR	Computer-Based Patient Record
CCD	Continuity of Care Document
CDO	Care Delivery Organization
CDR	Clinical Data Repository
CEO	Chief Executive Officer
CPOE	Computerized Physician Order Entries
CPT	Current Procedural Terminology
DOI	Diffusion of Innovation Theory
DTPB	Decomposed Theory of Planned Behaviour
DV	Dependent Variable
EFA	Exploratory Factor Analysis
EHR	Electronic Health Record
EMRs	Electronic Medical Record System
EPR	Electronic Patient Record
HIT	Healthcare Information Technology
HS	Healthcare System
ICD	International Classification of Diseases

ICT	Information Communication Technology
ICU	Intensive Care Unit
IT	Information Technology
IV	Independent Variable
JH	Jordan Hospital
KAUH	King Abdullah University Hospital
MI	Medical Informatics
MIS	Management Information System
MoH	Ministry of Health
MSA	Measure of Sampling Adequacy
PCB	Perceived Behavioural Control
PE	Performance Expectancy
PEOU	Perceived Ease of Use
PMR	Paper Medical Record
PU	Perceived Usefulness
SCT	Social Cognitive Theory
SN	Subjective Norm
SNOMED	Systematizes Nomenclature of Medicine-Clinical Terms
SPSS	Statistical Package for Social Science
TAM	Technology Acceptance Model
TAM2	Technology Acceptance Model 2
TPB	Theory of Planned Behaviour
TRA	Theory of Reasoned Action

UMHC	University Mississippi Health Care
UI	User Interface
USA	United States of America
UTAUT	Unified Theory of Acceptance and Use of Technology
UUM	Universiti Utara Malaysia
WHO	World Health Organization

CHAPTER ONE
INTRODUCTION

This chapter presents the background information of the research, the research motivation, problem statement and the study's objectives. The chapter also presents the scope of the study and the research contributions. Finally, this chapter ends with a discussion on research strategy and the organization of this thesis.

1.1 Background

Traditionally, hospitals keep paper-based profiles of patients to keep track of patients' illness history, their development and their overall general health conditions. Though this traditional technique has long been adopted, it is not without practical problems. One living example of the shortcoming of traditional hospital profiling systems of patients' data was demonstrated by Hurricane Katrina in New Orleans in the United States of America in 2005. Hurricane Katrina destroyed the hardcopies of medical records of untold numbers of people, hence bringing new attention to the need for electronic medical records. Lost medical records expose patients to considerable risk of medical mistakes because physicians were unable to draw connections between the current health conditions of the patients and their medical history namely on diagnosis, drugs, effects and surgery risks assessment (Terry, 2009).

The increasing numbers of hospitals and the number of patients in recent years have posed a burden to the profiling system of patients, rendering it inadequate or precisely

The contents of the thesis is for internal user only

REFERENCES

Aaronson, J., Murphy-Cullen, C., Chop, W., and Frey, R. (2001). Electronic medical records: The family practice resident perspective. *Family Medicine-Kansas City, 33* (2), 128-132.

Aarts, J., and Koppel, R. (2009). Implementation of computerized physician order entry in seven countries. *International Journal of Technology Assessment in Health Care,, 28*(2), 404-414. doi :410.1377/hlthaff.1328.1372.1404.

Ahyagna, Y. (2009, October 29). Jordanian hospitals provide attractive offers to attract patients from the Western countries. *Newspaper Alarb Alyawm,* p. 27. Retrieved from http://www.alarabalyawm.net/pages.php? news_id=191523.

Akel. (1999). *The Using of Information Technology Tools in the Competitive Jordanian Banks*, Phd Thesis, Faculty of Economics and Administrative Sciences, Yrmok University, Irbid- Jordan.

Al-Gahtani, S., and King, M. (1999). Attitudes, satisfaction and usage: factors contributing to each in the acceptance of information technology. *Behaviour and Information Technology, 18*(4), 277-297.

Aladwani, A., and Palvia, P. (2002). Developing and validating an instrument for measuring user-perceived web quality. *Information and Management, 39*(6), 467-476 . doi:410.1016/S0378-7206 (1001)00113-00116.

Alanazy, N. (2006). *Factors associated with implementation of electronic health records in Saudi Arabia.* Phd Thesis, School of Health Related Professions, Department of Health Informatice, University of Medicine and Dentistry of New Jersey, United States,New Jersey.

Alazmi, S., Al Saleh, K., and Al Ojayan, O. (2009). Physicians perceptions about the newly implemented electronic medical records systems at the primary healthcare centers in kuwait. *International Journal of Technology Assessment in Health Care, Volume 44 (2008), 44*(1).

Albert, B., and Manda, B. (2010). Barriers to the acceptance of electronic medical records by physicians from systematic review to taxonomy and interventions. *International Health Services Research, 10*(1), 32 . doi:10.1186/1472-6963-1110-1231.

Aldosari, B. (2003). Factors affecting physicians 'attitudes about the medical information system usage and acceptance through the mandated implementation of integrated medical information system at the saudi arabia national guard health system: A modified technology acceptance model. *Dissertation Abstracts International 64*(07), 3169B. (UMI No. 3097602).

Ali, N. A., Mekhjian, H. S., Kuehn, P. L., Bentley, T. D., Kumar, R., Ferketich, A. (2005). Specificity of computerized physician order entry has a significant effect on the efficiency of workflow for critically ill patients. *Critical Care Medicine, 33*(1), 110.

Alwan, A. d. (2005). *Health in jordan an outline of the current situation and the main challenges health development in jordan. amman, jordan: world health organization and jordan ministry of health,* (1ed): Ministry of Health Care in Jordan, Amman.

ALyaseen, A. (2011). Personal communication- Manager of information System Department in KAUH - December 15, 2011- Tell: 00962799998539- Email :Ibrahimn@just.edu.jo Jordan-Irbid.

Amatayakul, M. (2004). *Electronic health records: A Practical Guide for Professionals and Organizations,* (2 ed): Chicago.

Amer, M., and Ammari, S. (2006). Medical technology management in jordan. *Jordan University of Science and Technology, Faculty of medical, Healthcare Department 2*(1), 3-12.

Anderson. (1997). Clearing the way for physicians' use of clinical information systems. *International Journal of Technology Assessment in Health Care, 40*(8), 83-90.

Anderson, and Aydin, C. (2009). Evaluating the impact of health care information systems. *International Journal of Technology Assessment in Health Care, 13*(02), 380-393.

Anderson, and Knickman. (2001). Changing the chronic care system to meet people's needs. *International Journal of Technology Assessment in Health Care, 20*(6), 146-160 . doi :110.1377/hlthaff.1320.1376.1146.

Archer, and Cocosila. (2009). *Improving EMR system adoption in canadian medical practice: A Research Model.* Paper presented at the World Congress on Privacy, Security, Trust and the Management of e-Business . New Brunswick, Canada.

Ash, J. (1997). *Factors affecting the diffusion of the computer-based patient record.* Paper presented at the American Medical Informatics Association. 1997;795-799.

Ash, J., Anderson, J., Gorman, P., Zielstorff, R., Norcross, N., and Pettit, J. (2000). Managing change analysis of a hypothetical case. *Journal of the American Medical Informatics Association, 7*(2), 125-134. doi :110.1136/jamia.2000.0070125.

Ash, J., and Bates, D. (2005). Factors and forces affecting EHR system adoption. *Journal of the American Medical Informatics Association, 12*(1), 8-12 .doi:10.1197/jamia.M1684.

Ash, J., Gorman, P., Lavelle, M., Payne, T., Massaro, T., and Frantz, G, (2003). A cross-site qualitative study of physician order entry. *Journal of the American Medical Informatics Association, 10*(2), 188-200 . doi: 110.1197/jamia.M1770.

Aydin, C. E., and Ischar, R. (1994). Predicting effective use of hospital computer systems: An evaluation. In J. G. Anderson, C. E. Aydin andS. J. Jay (Eds.). *Evaluating Healthcare Information Systems: Methods and Applications*, (pp245–259).Thousand Oaks, CA: Sage Publications, Inc.

Ayers, D., Menachemi, N., Ramamonjiarivelo, Z., Matthews, M., and Brooks, R. (2009). Adoption of electronic medical records: the role of network effects. *Journal of Product and Brand Management, 18*(2), 127-135. doi :110.1108/10610420910949022.

Babakus, E., and Mangold, W. G. (1992). Adapting the SERVQUAL scale to hospital services: an empirical investigation. *Health Services Research, 26*(6), 767. doi :710.1108/03090569610105762.

Barki, H. (1994). Measuring user participation, user involvement, and user attitude. *Journal of Computer Information System, 18*(1), 59-82.

Baron, R., Fabens, E., Schiffman, M., and Wolf, E. (2005). Electronic health records: just around the corner? Or over the cliff ? *Annals of Internal Medicine, 143*(3), 222-226 . doi:210.1197/jamia.M1218.

Bataineh, S. (1995). An expert computer system- based for managing complex diction- making system. *Journal of Computer Information System 17*(2), 101-104.

Beaver, K. (2003). *Healthcare information systems,* (2 ed): United State of America: CRC Press.

Behrens, S., Jamieson, K., D, J., and Cranston, M. (2005). *Predicting system success using the Technology Acceptance Model: A case study.* Paper presented at the 16th Australasian conference on Information Systems predicting Success using TAM, Sydney, Australia, 9 Nov – 2 Dec 2005.

Berger, A., Neame, R., andKluge, E. (1999). Why do people worry about computers? *British Medical Journal, 319*, 1295-1295 . doi: 1210.1136/bmj.a1479.

Blumenthal, D. (2009). Stimulating the adoption of health information technology. *The New England Journal of Medicine, 360*(15), 1477.

Brookstone, A. (2004). Ectronic medical record : Creating the environment for chang. *British Columbia Medical Journal,46(5), 233-235.*

Cambridge, M. J., K Paxton, H., Baker, K., Sussman, EJ., and Etchason, J. (2010). Association of health information technology and teleintensivist coverage with decreased mortality and ventilator use in critically ill patients. *Journal of Computer Information System, 170*(7), 648.

Castells, M. (2003). *The internet galaxy: Reflections on the internet,business and society*, (2th): New York, NY, Oxford University Press, USA.

Chan, W. (2001). Increasing the success of physician order entry through human factors engineering. *Journal of Healthcare Information Management, 16*(1), 71.

Chang, P., Tzeng, Y., Wu, S., Sang, Y., and Chen, S. (2003). *Development and* comparison of user acceptance of advanced comprehensive triage PDA support system with a traditional terminal alternative system graduate institute of health care management, National Taipei College of. *Journal of the American Medical Informatics Association, 26 (2).140-144.*

Chau. (1996). An empirical Investigation on Factors Affecting the Acceptance of CASE by Systems Developers. *Information and Management, 30* (6), 269-280 .doi :/210.1016/S0378-7206(1096)01074-01079.

Chau, and Hu. (2002). Investigating healthcare professionals' decisions to accept telemedicine technology: an empirical test of competing theories. *Information and Management, 39*(4), 297-311.

Chau, P., and Hu, P. (2001). Information technology acceptance by individual professionals: A model comparison approach. *Journal of the American Medical Informatics Association, 32*(4), 699-719.

Cheney, P. H., Mann, R. I., and Amoroso, D. L. (1986). Organizational factors affecting the success of end-user computing. *Journal of Management Information Systems 3*(1), 65-80.

Chismar, W. G., and Wiley-Patton, S. (2003). *Does the extended technology acceptance model apply to physicians.* Paper presented at the in 36th Hawaii International Congress on System Sciences (HICSS'03), Big Island, Hawaii, USA, IEEE Computer Society. 6-9 Jan. 2003.

Cimino, J., Teich, J., VL, P., and Zhang, J. (1999). What is wrong with EMR? *Journal of the American Medical Informatics Association, 99*(2), 23-45.

Clark, L., and Watson, D. (1995). Constructing validity: Basic issues in objective scale development. *American Psychological Assessment, 7*(3), 309-319.

Clayton, P., Pulver, G., and Hill, C. (1994). Physician use of computers:Is age or value the predominant factor ? *Journal of the American Medical Informatics Association, 5*(2), 301-305.

Coakes, S., and Steed, L. (2003). *SPSS: Analysis without anguish: Version 11.0 for Windows*: Milton, QLD: John Wiley and Sons.

Coakes, S., and Steed, L. (2009). *SPSS: Analysis Without Anguish Using Spss Version 18.0 for Windows*: John Wiley andSons, Inc.

Compeau, D., and Higgins, C. (1995). Computer Self-Efficacy: Development of a Measure and Initial Test. *Journal of the American Medical Informatics Association, 19*(2), 189-211.

Cook, T., and Campbell, D. (1979). *Quasi-Experimentation: Design and Analysis for Field Settings*, (3ed): Houghton Mifflin Boston.

Culbertson, R. A., and Lee, P. R. (1996). Medicare and physician autonomy. *Journal of Healthcare Management, 18*(2), 115 ./doi:110.1016/S1474-8231(1006)06008-06003 06191.

Dansky, K., Gamm, L., Vasey, J., and Barsukiewicz, C. (1999). Electronic medical records: are physicians ready? *Journal of Healthcare Management, 44*, 440-455.

Davis. (1986). *A technology acceptance model for empirically testing new end-user information systems: theory and results*: doctoral dissertation, MIT Sloan School of Management, Cambridge.

Davis. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *Management Information System*, 13(2) 319-340.

Davis. (1993). User acceptance of information echnology: system characteristics, user perceptions and behavioral impacts. *Journal of Manmachine Studies* (38), 457-487.

Davis, Bagozzi, R. P., and Warshaw, P. R. (1989). User acceptance of computer technology: a comparison of two theoretical models. *Journal of Management Science, 85*(8), 982-1003.

Detmer, and Friedman. (1994). Academic physicians' assessment of the effects of computers on health care. *Journal of American Medical Informatics Association*, 558-562.

Deutsch. (2005). The financial benefits of electronic medical records. *Journal of Healthcare Management, 11*(3) 54, 61.

Dick, and Steen. (1991). *The computer-based patient record: an essential technology for health care*, (3th): Washington, DC, National Academy Press.

Doll, W., and Torkzadeh, G. (1988). The measurement of end-user computing satisfaction. *Journal of Engineering and Technology Management, 12*(2), 259-274.

Donald, C. (1997). The barriers to electronic medical record systems and how to overcome them. *Journal of the American Medical Informatics Association, 4*(3), 213-221. doi:210.1136/jamia.1997.0040213.

Doolan, D., Bates, D., and James, B. (2003). The use of computers for clinical care: a case series of advanced US sites. *Journal American Medical Informatics Association, 10*(1), 94-107. doi:110.1197/jamia.

Dyck, j. (1994). Age differences in computer anxiety: the role of computer experience, gender, and education. *Educational Computing Research, 10*(3), 239-248. doi: 210.2190/e 2179 u-vcrc-e l2194e-hryv

Edmund, L., Ramaiah, C., and Gulla, S. (2009). Electronic medical records management systems: an overview. *Journal of Library and Information Technology, 29*(6), 3-12.

Edwards, P. (2006). Electronic medical records and computerized physician order entry: Examining factors and methods that foster clinician IT acceptance in pediatric hospitals. Georgia institute of technology. *Journal of Global Information Management, 2*(6), 235-249.

Fauziah, B., Ola, K., Haslina, M., and Mahmood, B. (2011). *developing an extended technology acceptance model: doctors' acceptance of electronic medical records in jordan.* Paper presented at the Proceedings of the 3rd International Conference on Computing and Informatic (ICOCI).Bandung, Indonesia,8-9 June, 2011.

Faysal, S. (2011). *Factors that affecting of using information technology (IT) in jordanian hospitals – Case study on the physicians.* phd Thesis, School of Information Technology,Universiti Yrmok, Jordan,Irbid.

Feufel, M., and Shalin, V. (2009). *Electronic medical records and ndm in us emergency departments: A preliminary analysis.* Paper presented at the Proceedings of NDM, the 9th International Conference on Naturalistic Decision Making London,UK, June 2009.

Fishbein, M., and Ajzen, I. (1975). Belief, attitude, intention and behavior: An introduction to theory and research. *Journal of Applied Social Psychology,2* (4),95-124.

Foster, S., and Franz, C. (1999). User involvement during information systems development: A comparison of analyst and user perceptions of system acceptance. *Journal of Engineering and Technology Management, 16*(3-4), 329-348.

Frhan, E., and Trawna, K. (1996). The reality of control systems and information technology in jordanian organization. *Journal of Administrative Sciences, 23*(2), 174-184.

Gadd, C., and Penrod, L. (2000). *Dichotomy between physicians' and patients' attitudes regarding EMR use during outpatient encounters.* Paper presented at the Proceedings of the *Journal American Medical Informatics Association,* Symposium.275–279.

Gadd, C., and Penrod, L. (2001). *Assessing physician attitudes regarding use of an outpatient EMR: a longitudinal, multi-practice study.* Paper presented at the Proceedings of the *Journal American Medical Informatics Association,* Symposium, 275-9.

Gaikwad, R. K. (2007). Comprehensive Evaluation of Two Electronic Medical Record (EMR) Systems in Primary Healthcare. *Journal of Health Informatics*, 13(13), 163-177.

Garceau, L., Jancura, E., and Kneiss, J. (1993). Object-oriented analysis and design: A new approach to systems development. *Journal of Systems Management, 8(44)*, 25-25.

Gardner, R., and Lundsgaarde, H. (1994). Evaluation of user acceptance of a clinical expert system. *Journal of the American Medical Informatics Association, 1*(6), 410-428. 1136/ jamia.1994.95153432.

Gefen, D., and Keil, M. (1998). The impact of developer responsiveness on perceptions of usefulness and ease of use: an extension of the technology

acceptance model. *Journal of Systems Management, 29*(2), 35-49.doi:10.1016/S0378-7206(1001)00143-00144.

Ginzberg, M. J. (1981). Early diagnosis of MIS implementation failure: promising results and unanswered questions. *Journal of Management Science, 27*(4), 459-478.

Goedert, j. (2003). Are feds supplying the spark for electronic record adoption? health data managment. *Journal of the American Medical Informatics Association, 8*(11), 10-12.

Greenhalgh, T., Macfarlane, F., Bate, P., and Kyriakidou, O. (2004). Diffusion of innovations in service organizations: Systematic Review and Recommendations. *Journal of Management Science, 82*(4), 581-629. doi: 510.1111/j.0887-1378X.2004.00325.

Groll, R. (2006). *Tools for electronic surveillance of testicular cancer (TEST): Understanding patient perspectives on access to electronic medical record(EMR)-based technology in a cancer follow-up context.* University of Toronto Canada,Toronto.

Gurley, L., and Rose, B. (2004). Advantages and disadvantages of the electronic medical record. *Journal of American Academy of Medical Administrators, 4* (5) 2-7.

Guthrie, M. (2001). Get real: what will draw physicians to the Web? Physician executive. *Journal of the American Medical Informatics Association, 27*(2), 36.

Hair, Black, W., Babin, B. J., and Anderson, R. E. (2009). *Multivariate Data Analysis.*(7 ed) : A Global Perspective.

Hair, J., Anderson, R., Tatham, R., and Black, W. (1998). *Multivariate data analysis,* (3 ed): Upper Saddle River, NJ, Prentice Hall.

Hamid, N. R. A. (2006). *An assessment of the internet's potential in enhancing consumer relationships.* phd Thesis, School of Information Technology, Victoria University of Technology, Melbourne, Australia.

Haslina, M. (2009). *A Multiple Perspective Technology Acceptance Model for Electronic Medical Records.* phd Thesis, School of Computer Science, Universitii Science Malaysia, Malaysia, Penang.

Heim, R., Prenger, R., and Evans, L. (2004). Peer advice on EMR implementation-The challenges physicians to your enterprise. *Digital Record for Todsy's practices, Proquest, UUM.*

Hidar, M. (2004). *The effects of computer–based information systems on managerial and medical acetifies - case study on Al-husien medical city.* phd Thesis, School of Information Technology, Yrmok University, Jordan, Irbid

Hill, C. E., Loch, K. D., Straub, D. W., and El-Sheshai, K. (1998). A qualitative assessment of arab culture and information technology transfer. *Journal of Global Information Management, 6*(7) 29-38.

Hirschheim, R. A. (1985). User experience with and assessment of participative systems design. *Journal of Global Information Management, 2*(22), 295-304.

Hong, S. J., Thong, J. Y. L., and Tam, K. Y. (2006). Understanding continued information technology usage behavior: a comparison of three models in the

context of mobile internet. *Journal of Information Science, 42*(3), 1819-1834.doi:1810.1016/j.dss.2006.1803.1009.

Hsu, J., Huang, J., Fung, V., Robertson, N., Jimison, H., and Frankel, R. (2005). Health information technology and physician - patient interactions: impact of computers on communication during outpatient primary care visits. *Journal of the American Medical Informatic Association/ ,12*(4),474480.doi:410.1016/S1067-5027(1005)00055-00051.

Hu, P., Chau, P., Sheng, O., and Tam, K. (1999). Examining the technology acceptance model using physician acceptance of telemedicine technology. *Journal of Management Information Systems, 16*(2), 91-112.

Hu, P., Ptricks, Y., Chau, P., Lau Sheng, O., and Tamn, K. (1999). *Investing physician acceptance of telemedicine technology.* Paper presented at the Hawaii International Conference on System Sciences (Vol, 4pp. 10).

Huang, W.-M., and Chiao-Ting Shih. (2010). An empirical study on the intentions of physicians in adopting electronic medical records with modified technology acceptance models in rural areas of taiwan. *Journal of Medical Systems, 32* (5), 473–489.

Huber, J. (2001). Patient Acceptance of Computerized Progress Note Documentation. *Information Technology for the Practicing Physician*, 114-117. New York: Springer-Verlag.

Hubona, G. S., and Blanton, J. E. (1996). Evaluating system design features. *InternationalJournal of Human-Computer Studies, 44*(1), 93-118.

Hussey, J., and Hussey, R. (1997). *Business research: A practical guide for undergraduate and postgraduate students*. MacMillan Press, London.

Hynes, D., Weddle, T., Smith, N., Whittier, E., Atkins, D., and Francis, J. (2010). Use of health information technology to advance evidence-based care: lessons from the VA QUERI program. *Journal of General Internal Medicine, 25*, 44-49. doi:10.1007/s11606-11009-11144-11600.

Igbaria, M., parasuraman, S., and Baroudi, J. (1996). A motivational model of microcomputer usage. *Journal of Management Information Systems, 13*(1), 127-143.

Igbaria, M., Zinatelli, N., Cragg, P., and Cavaye, A. L. M. (1997). Personal computing acceptance factors in small firms: a structural equation model. *Journal of Management Information Systems, 21*(3), 279-305.

Ilie, V. (2009). *How to influence physicians to use electronic medical records (EMR)? social influence tactics and their effects on emr implementation effectiveness*. Paper presented at the International Conference on Information Systems (ICIS). 7-9 ,June,2009.

Ilie, V., Van Slyke, C., Parikh, M., and Courtney, J. (2009). Paper versus electronic medical records: the effects of access on physicians' decisions to use complex information technologies. *Journal of Management Information Systems, 40*(2), 213-241.

Jamil, A. (2011). Personal communication- Managing Director in Jordan Hospital- December 11, 2011- Tell: 009625608080- Fax:009625607575- Email :jorhos@jordan-hospital.com Jordan- Amman.

Jha, A. K., Bates, D. W., Jenter, C., Orav, E. J., Zheng, J., and Cleary, P. (2009). Electronic health records: use, barriers and satisfaction among physicians who care for black and Hispanic patients. *Journal of evaluation in clinical practice, 15*(1), 158-163.doi: 110.1111/j.1365.

Jobber, D., Mirza, H., and Wee, K. (1991). Incentives and response rates to cross-national business surveys: a logit model analysis. *Journal of International Business Studies, 22*(4), 711-721.

Kaushal, R., KG, S., and Bates, D. (2003). Effects of computerized physician order entry and clinical decision support systems on medication safety a systematic review. *Journal of Computer Information System, 163*(12), 1409-1416.

Kearns, G., and Lederer, A. (2000). The effect of strategic alignment on the use of IS-based resources for competitive advantage. *Journal of Strategic Information Systems, 9* (4), 265-293.

Kerlinger, F., and Lee, H. (2000). *Foundations of behavioral research*, (4ed): Stamford: Wadsworth.

Khalig, Amir, Mwzchofi, Ari, Brobert, and Robert. (2010). Physician autonomy vs. self-regulation: you can't have one without the other. *Business Network, Health publications, 12*(2), 44-56. doi: 10.4176/071117.

Khalil, and Jones. (2007). Electronic health services an introduction to theory and application. *Libyan Journal of Medicine, 2*(4), 26-30.

Laguna, K., and Babcock, R. (1997). Computer anxiety in young and older adults: Implications for human-computer interactions in older populations. *Computers in Human Behavior, 13*(3), 317-326.

Langberg, M. (2003). Challenges to implementing CPOE: a case study of a work in progress at Cedars-Sinai. *Journal of International Business Studies, 7*(2), 21–22.

Larriviere, D. G., and Bernat, J. L. (2008). Invited article: threats to physician autonomy in a performance-based reimbursement system. *Journal of Global Information Management, 70*(24), 23-38.doi: 10.1212/1201.

Lau, F., and Hebert, M. (2002). Experiences from health information system implementation projects reported in canada between 1991 and 1997. *Effective Healthcare Information Systems, 96* (101):163-177.

Lazar, J., Jacko, J., Ratner, J., and Sears, A. (2008). User Involvement in the web development process. *International Journal of Computer Science and Network Security, 22*(55),101-110.

Lee, Y., Kozar, K. A., and Larsen, K. R. T. (2003). The technology acceptance model: Past, present, and future. *Communications of the Association for Information Systems, 12*(1), 752-780.doi:710.1016/S0378-7206 (1001) 00143-00144.

Legris, P., Ingham, J., and Collerette, P. (2003). Why do people use information technology? A critical review of the technology acceptance model. *Information and management, 40*(3), 191-204.

Leitman, H. T. A. R. (2001). U.S. Trails other english speaking countries in use of electronic medical records and electronic prescribing. *Harris Interactive ,Health Care Research, 1*(28), 121-167.

Liebhaber, A., Draper, D., and Cohen, G. (2009). Hospital strategies to engage physicians in quality improvement. *Center for Studying Health System Change* (1), 127.

Lin, C., Hu, P. J. H., and Chen, H. (2004). Technology implementation management in law enforcement. *Journal of Information Science, 22*(1), 24-36.

Liu, L., and Ma, Q. (2006). Perceived system performance: a test of an extended technology acceptance model. *Journal of Information Science. 37*(2-3), 51-59.

Long, L. (2009). *Why do people use or not use an information technology: an interpretive investigation on the adoption and use of an electronic medical records system.* phd Thesis, College of Information Systems, Virginia Commonwealth University, Richmond, Virginia.

Loomis, G., Ries, J., Saywell, R., and Thakker, N. (2002). If electronic medical records are so great, why aren't family physicians using them? *Journal of Family Practice, 51*(7), 636-664.doi:610.1197/jamia.142187. 142111.

Lorenzi, and Riley. (2000). Managing change: an overview. *Journal of the American Medical Informatics Association, 7*(2), 116.

Lorenzi, Riley, Blyth, Southon, and Dixon, B. (1997). Antecedents of the people and organizational aspects of medical informatics: review of the literature. *Journal of the American Medical Informatics Association, 4* (2), 79-73.doi:10.1136/jamia.1997.0040079.

Ludwick, and Doucette, J. (2009). Adopting electronic medical records in primary care: lessons learned from health information systems implementation

experience in seven countries. *International Journal of Medical Informatics, 78*(1), 22-23. doi:10.1016/j.ijmedinf.2008.1006.1005.

Lyons, L. E. (2007). A descriptive and exploratory analysis of documented electronic medical records technology and its impact on the education of healthcare workers in the United States *International Journal of Medical Informatics, 18*(3), 82-93.

Mandi, K. D., Szolovits, P., and Kohane, I., S. (2001). Public standards and patient's central: how to keep electronic medical record accessible but private, British Medical Journal, 322 (7181), 283-287.

MacKinnon, W., and Wasserman, M. (2009). Implementing electronic medical record systems. *Journal of American Academy of Medical Administrators, 11*(6), 50-53.

Mahata, and Lei. (2007). *Heros: A patient-centered goal-directed electronic medical record system for the homeless.* Master Thesis, School of Computer Science and Engineering, University of Texas, USA-Texas.

Malkwy. (2002). *The impact of structural characteristics of the effectiveness of technologicai information.* phd Thesis, School of Information Technology, Yrmok unversity, Jordan - Irbid.

Mathieson, K. (2001). Predicting user intentions: comparing the technology acceptance model with the theory of planned behavior. *Information systems research, 2*(3), 173-191.doi: 110.1287/isre.1282.1283.1173.

McKeen, J., Guimaraes, T., and Wetherbe, J. (1994). The relationship between user participation and user satisfaction: an investigation of four contingency factors. *Journal of Management Information Systems, 18*(2), 427-451.

McLane, S. (2005). Designing an EMR planning process based on staff attitudes toward and opinions about computers in healthcare. *Computers Informatics Nursing, 23*(2), 85-92.

Meade, B., Buckley, D., and Boland, M. (2009). What factors affect the use of electronic patient records by Irish GPs? *International Journal of Medical Informatics, 78*(8), 551-558.

Meinert, D., and Peterson, D. (2009). Perceived importance of EMR functions and physician characteristics. *Journal of Systems and Information Technology, 11*(1), 57-70.

Middleton, B. H., WE Brennan, PF and Cooper,GF. (2005). Accelerating US EHR adoption: how to get there from here. *Journal of the American Medical Informatics Association, 12*(1), 13-19.

Miller, and Sim. (2004). Physicians'Use Of Electronic Medical Records: Barriers And Solutions. *Journal of the American Medical Informatics Association, 23*(2), 116-126.doi: 110.1377/hlthaff.1323.1372.1116.

Morris, and Dillon. (1997). The influence of user perception on software utilization: application and evaluation of a theoretical model of technology acceptance. Retrieved December, 20, 2011 from ACM Digital Library of UUM.

Morton, M. (2008). *Use and acceptance of an electronic health record: factors affecting physician attitudes.* phd Thesis, School of Iformation Technology, Drexel University, Philadelphia-Drexel.

Mosley, B., and Williams, H. (2005). Computer applications in clinical practice. *Journal of Systems and Information Technology, 17*(2), 124.

Murphy, N., Partin, M., Williams, L., Harris, C., and Lauer, M. (1998). Physician use of an ambulatory medical record system: matching form and function. *American Medical Informatics Association, 19*(8)260-264.

Nissman, S. (2009). Electronic health records. *Journal of American Health Information Management Association, 116* (5), 1018-1019.

Ogrod, E. (2000). Electronic medical record systems. *Report of the Council on Medical Service, CMS Report 10-A-00, June 2000.*

Pallant, J. (2001). *SPSS survival manual: a step-by-step guide to data analysis using SPSS for Windows (Version 10)*: Open University Press.

Pearsaul, S. (2002). Connections to care: how technology makes information accessible. *Journal of American Health Information Management Association, 73*(6), 28.

Podichetty, V., and Penn, D. (2004). The progressive roles of electronic medicine: benefits, concerns, and costs. *American Journal of the Medical Sciences, 328*(2), 94.

Poon, E., Blumenthal, D., Jaggi, T., Honour, M., Bates, D., and Kaushal, R. (2004). Overcoming barriers to adopting and implementing computerized physician

order entry systems in US hospitals. *American Journal of the Medical Sciences, 23*(4), 184-190.doi: 110.1377/hlthaff.1323.1374.1184.

Pourasghar, F. (2009). *The role of information technology on documentation and security of medical data.* phd Thesis, School of Information Technology, Unviresity of Karolinska Institute, Stokholm,Sweden.

Rahimi, B. (2009). Health information system implementation: a qualitative meta-analysis. *Journal of Medical Systems, 33*(5), 359-368. doi:310.1007/s10916-10008-19198-10919.

Raitoharju, R. (2005). *When acceptance is not enough-taking TAM-model into healthcare.* Paper presented at the International Conference on System Sciences, Proceedings of the 38th Hawaii. 03-06 Jan, 2005.

Riesenmy, K. (2010). Physician sensemaking and readiness for electronic medical records. *The Learning Organization: An International Journal, 17*(2), 163-177.doi: 110.1108/09696471011019871.

Roach, D., White, S., and Byers, J. (2004). *Using technology to improve patient safety.* (3th) : Springer Publishing Company.

Rogoski. (2003). Having it your way. Three physicians who were early adopters and who remain vocal EMR advocates share their insights about the utilization, challenges and benefits of EMRs. *Health Management Technology*, 24(25), 12-16.

Roter, D. L., and Hall, J. A. (1989). Studies of doctor-patient interaction. *Health Management Technology, 10*(1), 163-180.

Sachidanandam, S. (2006). *Why physicians do or do not use computerized physician order entry systems: applying the technology acceptance model.* Unpublished phd Thesis, School of Information Technology, Bowling Green State University, United States,Ohio.

Saga, V., and Zmud, R. (1993). *The nature and determinants of IT acceptance, routinization, and infusion.* Paper presented at the International Federation for Information Processing (IFIP) Conference on Diffusion, Transfer and Implementation of Information Technology, North- Holland, Amsterdam, 13-16 Jun, 1993, p.67-86.

Satinsky, M. (2004). Electronic Medical Records and the Development of Electronic Health Records and Electronic Patient Records. *American Journal of the Medical Sciences, 3*(2), 4-9.

Saunders, M., Lewis, P., and Thornhill, A. (2009). *Research methods for business students*, (5 ed) : Pearson Education.

Sekaran. (2003). *Research methodology for business* (4 ed.): New York: John Wiley and Sons, Inc.

Seligman. (2001). Perceived value impact as an antecedent of perceived usefulness, perceived ease of use, and attitude: a perspective on the influence of values on technology acceptance. *Dissertation Abstracts International, 2*(12), 62-98.

Simon, S. R., Kaushal, R., Cleary, P. D., Jenter, C. A., Volk, L. A., and Orav, E. J. (2007). Physicians and electronic health records: a statewide survey. *Journal of Computer Information System, 167*(5), 507-512. doi:510.1197/jamia.142187. 142111.

Sittig, D., Kuperman, G., and Fiskio, J. (1999). Evaluating physician satisfaction regarding user interactions with an electronic medical record system. *American Medical Informatics Association*, 400-404.

Snyder, K., and Paulson, P. (2002). Healthcare information systems: analysis of healthcare software. *Health Management Technology, 80*(4), 5-12. doi:DOI: 10.1080/00185860209598004.

Staples, D. S., Hulland, J. S., and Higgins, C. A. (1999). A self efficacy theory explanation for the management of remote workers in virtual organizations. *Journal of Computer Mediated Communication, 10*(6), 758–776.doi: 710.1111/j.1083-6101.1998.tb00085.

Sujitparapitaya, S., Janz, B. D., Wetherbe, J. C., and Sammet, D. (2001). *Ascension Health Systems: enterprise user interface approach to organizational data management.* Paper presented at the Sysem Sciences. Proceeding of the 34th Annual Hwaii International Conference. 3-6 Jun, 2001, p.10

Sumor, S. (2011). personal communication- Director of Information Technology Department in Minsitry of Healthcare of Jordan- December 25, 2011- Tell: 009625200230-2481 - 2482, Email :itd@moh.gov.go. Amman- Jordan.

Sun, H., and Zhang, P. (2006). The role of moderating factors in user technology acceptance. *International Journal of Human-Computer Studies, 64*(2), 53-78.

Swenson, S., and Wretman. (1992). *Model Assisted Survey Sampling,* (2 ed): New York: Spring-Verlag.

Szajna, B. (1994). Software evaluation and choice: predictive validation of the technology acceptance instrument. *Journal of Computer Information System, 17*(3), 319-324.

Teich, J. M., Merchia, P. R., Schmiz, J. L., Kuperman, G. J., Spurr, C. D., and Bates, D. W. (2000). Effects of computerized physician order entry on prescribing practices. *Journal of Computer Information System, 160*(18), 2741.

Terry. (2009). Physicians are talking about the government push for electronic medical records. *Medscape Family Medicine 8*(13), 1-2.

Terry, and Standing. (2004). The value of user participation in e-commerce systems development. *Informing Science: International Journal of an Emerging Transdiscipline, 7* (21), 31-45.

Tevaarwerk, G. (2008). Electronic medical records. *Journal of Canadian Medical Association, 178* (10), 1323-1324. doi:1310.1503/cmaj.1080033.

Tonnesen, A., LeMaistre, A., and Tucker, D. (1999). Electronic medical record implementation barriers encountered during implementation. *Journal of American Medical Informatics Association Symposium, 88* (5) 624–626.

Upperman, J. S., Staley, P., Friend, K., Benes, J., Dailey, J., and Neches, W. (2005). The introduction of computerized physician order entry and change management in a tertiary pediatric hospital. *Journal of American Medical Informatics Association Symposium, 116*(5), e634-642. doi:610.1542/peds.2004-0066.

Viejo, A. (2008). Midland memorial hospital hosts kingdom of jordan e-health Team. Retrived, January, 6, from http://findarticles.com/p/articles/mi_m0EIN/is_2008_June_2/ai_n25472608/.

Waegemann, C. (2003). EHR vs. CBR vs. EMR what ever you call it, the vision is of superior care through uniform, accessible health. Retrived October,22, 2010.http://www.providersedge.com/ehdocs/ehr_articles/EHR_vs_CPR_vs_EMR.pdf.

Waegemann, C., Tessier, C., Barbash, A., Blumenfeld, B., Borden, J., and Brinson, R. (2002). Health care documentation: a report on information capture and. *Consensus Workgroup on Health Information Capture and Report Generation, Medical Records Institute, Newton, MA.p 6.*

Wager, K. A. (2002). Information systems development. *American Health Information Management Association 12*(2), 101-120.

Wager, K. A., Ward, D. M., Lee, F. W., and White, A. W. (2005). The impact of direct entry into the emr on the physician-patient relationship as perceived by patients. *Journal of American Health Information Management Association, 76*, 38-41.

Walsh, S. (2004). The clinician's perspective on electronic health records and how they can affect patient care. *British Medical Journal, 328*(7449), 1184-1187.doi: 1110.1136/bmj.1328.7449.1184.

Wang, S., Middleton, B., Prosser, L., Bardon, C., Spurr, C., and Carchidi, P.(2003). A cost-benefit analysis of electronic medical records in primary care. *The*

American Journal of Medicine, 114(5), 397-403. doi:310.1016/S0002-9343(1003)00057-00053.

Weber, D. (2004). Survey reveals physicians' love / hate relationship with technology. *Journal of American Health Information Management Association, 61*, 28-31.

Webster, L., and Spiro, R. (2010). Health information technology: A new world for pharmacy. *Journal of the American Pharmacists Association, 50*(2), 20-34.

Wei, M., and Chiao , T. (2010). *An empirical study on the intentions of physicians in adopting electronic medical records with modified technology acceptance models in rural areas of taiwan.* phd Thesis, School of Healthcare Information Management, National Chung-Cheng University, Chiayi, Taiwan, R.O.C.

Wilson, J. F. (1997). Doctors are the main barrier to computerizing records.in ACP Oberver, 1997, Retrived May,28,2009 from http://www.acponline.org/clinical_information/journals_publications/acp_internist/nov97/barrier.htm.

Wixom, B. H., and Todd, P. A. (2005). A theoretical integration of user satisfaction and technology acceptance. *Information Systems Research, 16*(1), 85-102.

Yi, M. Y., Jackson, J. D., Park, J. S., and Probst, J. C. (2006). Understanding information technology acceptance by individual professionals: Toward an integrative view. *Information and Management, 43*(3), 350-363.doi:310.1016/j.im.2005.1008.1006.

Yin, R. K. (2003). *Applications of Case study research : Design and methods* (3 ed.): Sage Publications, Inc.

Young, Mintz, J., Cohen, A. N., and Chinman, M. J. (2004). A network-based system to improve care for schizophrenia: the Medical Informatics Network Tool (MINT). *Journal of the American Medical Informatics Association, 11*(5), 358-367.doi:310.1197/jamia.M1492.