Full Length Research Paper

Nurses' attitude, acceptance and use of Electronic Medical Records (EMR) in King AbdulAziz Medical City (KAMC) in Riyadh, Saudi Arabia

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Abstract

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This exploratory study aims to explore the direct and indirect effects of the Organizational factors (i.e. Organizational Support, Adequate Training, and User Involvement) and the Professional factors (i.e. Nurse Autonomy, Organizational Citizenship Behavior, and Nurse-Client Relationship) on nurses' attitude and acceptance of the Electronic Medical Record (EMR) system using the proposed model. The study is cross-sectional in nature and gathered sample data from nurses working in a regional hospital in Riyadh (i. e. King AbdulAziz Medical City KAMC), KSA. A hard copy of the questionnaire was randomly distributed among the staff constituting the sample of 333 nurses using a Stratified Random Sampling method that stratified the sample according to their nursing units/departments in the organization. This study's sampling frame was taken from among nurses working in a hospital which has already implemented an EMR system, in which nursing personnel with more than 6-month experience using the EMR system were recruited to ensure enough experience among nurses. The study unit of analysis is the individual nurse. Path analysis was used to predict the results. Chi Square was used also as a goodness of fit measure to determine if the model is an acceptable fit or not. Even though the sample was compared to different population, i.e. physicians due to the fact that the model used in this study was only used previously on physicians, nurses expressed a positive attitude towards the EMR system which is similar to the result of a previous study (3.74) on physicians attitude (Morton, 2008). The conducted correlation showed that both perceived usefulness and perceived ease of use have a positive moderate significant relationship with attitude. Nurse involvement, adequate training, and nurse client relationship have a positive weak, yet statistically significant relationship with attitude. Management support, nurse autonomy, and Organizational Citizenship behavior have a positive weak, but insignificant relationship with nurses' attitude. Based on the result of this study, nurses have a positive attitude towards the EMR system. Yet, a source of conflict with management might be present. Perceived usefulness was found to be the factor most strongly related to the dependent variable attitude towards EMR usage and acceptance. The results also showed that nurses preferred group setting training and felt that both nurses and executives are in consensus regarding their attitude towards EMR adoption. Nurses repeatedly indicate their need for more support from their management and the need for another form of training that adapt to each user individual needs and method of learning.

Keywords: Nurse, attitude, Acceptance, Use, TAM, Training, Users Involvement, Management Support, Autonomy, Nurse-Client relationship (NCR), Organizational-Citizenship Behavior (OCB).

INTRODUCTION

Many health care institutions have heavily invested in and implemented numerous Electronic Medical record (EMR) systems worldwide and in the kingdom in particular to improve patient healthcare. Other reasons as those reported by Altuwaijri (2008) such as enhanced outcomes, increased healthcare efficiency, reduced medication errors, and unnecessary cost elimination have contributed to such investment.

At the same time, how humans react to change should be taken into consideration and not be minimized when planning and writing strategies of an implementation of a healthcare information system (HIS), considering that the associated psychological impact of such change in the workplace could bring stress, uncertainty, and role confusion (Schoolfield and Orduna, 1994).

Furthermore, an *EMR* refers to "an electronic record of health-related information on an individual that is created, gathered, managed, and consulted by licensed clinicians and staff from a single organization who are involved in the individual's health and care" (The National Alliance for Health Information Technology (NAHIT) Report to the Office of the National Coordinator for Health Information Technology on Defining Key Health Information Technology Terms (April 28, 2008). In particular, an EMR contains lists of patient problems, medications, and allergies, along with health maintenance data, ordering functions, various test results, and progress notes (Bates et al., 2003). On the other hand, an Electronic Health Record (EHR) is an EMR with interoperability and accessibility (i.e. integration with other providers' systems) characteristics (The National Alliance for Health Information Technology (NAHIT) Report to the Office of the National Coordinator for Health Information Technology on Defining Key Health Information Technology Terms (April 28, 2008).

Most often, it has been indicated that administrators are more concerned with the EMR technical aspects, and once they do, it can contribute to the low acceptance of Information Systems (ISs) by end users (Doyle and Kowba, 1997; Anderson and Aydin, 1997). The literature indicates that the attitude of practitioners is "a significant factor in acceptance and efficiency of use of IT in practice" (Ward et al., 2008). In this regard, according to Dillon and Morris (1996), Acceptance is defined as the "willingness within a user group to employ information technology to the tasks it is designed to support" (Dillon and Morris, 1996).

Similarly, many researchers argued that in a healthcare organization, multiple elements such as human, social and organizational factors play an important role in users' attitude, use, and ultimately, successful EMR adoption, since that lack of user acceptance and unfavorable staff behavior have been considered as factors that hinder EMR implementation

(Ash and Bates, 2005; Ball and Lillis, 2000; Beaty, 2007; Clemmer, 2004; Steiner, 2009).

Equally important, many studies of end users acceptance of such technology, as stated by Kossman and Scheidenhelm (2008), have focused on the physicians' perception, with little research available regarding how can EMR once implemented, affect the work of the other end users such as nurses.

In particular, nurses are a viable component that should be included and participate in the EMR planning and execution to help fulfill such promise of improved quality of care and enhanced patient safety.

In fact, Simpson (2008) claims that nurses constitute the majority of any hospital workforce, as they are the ones who are continuously engaged and provide almost 97% of the direct patient care. Yet, we only know a little about their attitude towards EMR and the kind of factors that could affect nurses' behavior and acceptance of such technology, as a study by Lu (2012) indicated that those studies that have investigated the perceptions of nurses regarding the ease of use, usefulness, or acceptance of these systems are relatively few. However, Carroll, et al. (2007) contributed that nursing informatics is considered to be a relatively new topic in the profession.

Subsequently, a study that examines the nurses' point of view regarding the EMR is a matter of necessity and extreme importance, for that ignoring the human side in such implementation is considered as an important factor in the failure of previous similar systems implementation due to users' reluctance and resistance to use the system (Anderson and Aydin, 1997).

The study in hand attempts to explore the direct and indirect effects of Organizational and Professional factors (i.e. Management Support (MS), Adequate Training (AT), and Users Involvement (UI)] and (Nurse-Patient/ Client Relationship (NCR), Organizational Citizenship Behavior (OCB), and Nurses Autonomy (NA)) respectively on nurses' attitude and acceptance of the Electronic Medical Record (EMR) system using the proposed model in King AbdulAziz Medical City (KAMC), Saudi Arabia. The main goal of this study is to provide information about nurses' technological needs and requirements that could help facilitate the future development of strategic EMR implementation plans, eliminate the expected barriers, and to make informed decisions concerning nurses' training and needed support in the future. (Table 1)
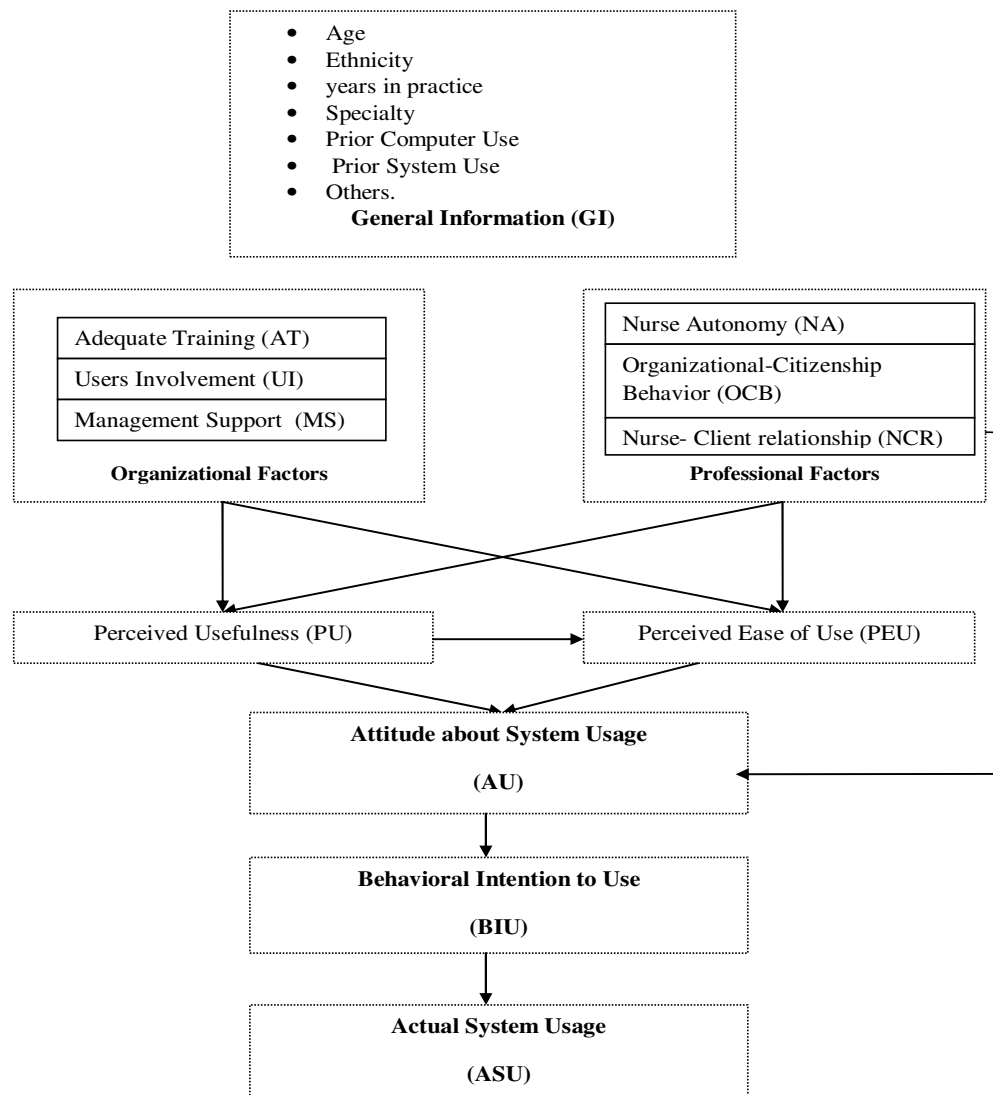
Aldosari's Modified Technology Acceptance Model (TAM)

In Aldosari's modified TAM (Aldosari, 2003), additional variables such as *human components* or professional factors (which have been represented as variables of NA,

Table 1. Previous TAM Researches

Authors	Constructs	Applications	Methodology
Davis, 1989	PU, PEOU and Usage	PROFs, XEDIT, Chart-Master, Pen draw	Survey Experiment
Davis et al.,1989	PU, PEOU, BI and Usage	Write One	Experiment
Mathieson, 1991	PU, PEOU, BI and Usage	Spreadsheet, Calculator	Experiment
Adams et al., 1992	PU, PEOU and Usage	E-mail, Voice mail, WordPerfect, and Harvard Graphics	Survey
Szajna, 1996	PU, PEOU, BI and Usage	E-mail	Experiment
Hendrickson and Collins, 1996	PU, PEOU and Usage	WordPerfect	Experiment
Chau, 1996	PEOU and PU and BI	Word, Excel	Survey
Aldossary, 2003	PV, OS, PEOU,PU, BI and usage	MIS	Survey
Morton, 2008	MS, PA, PP, PI, PU, PEOU, BI, and usage	EHR	Survey

Legend: BI= Behavioral intention, PEOU= Ease of Use, PU= Perceived Usefulness, MIS= management information system, PV= Professional Values, OS= Organizational Support, MS= Management support, PA= physician autonomy, PI= physician involvement, PP= physician-patient relationship.

Figure 2. Aldosari's modified Technology Acceptance Model (TAM).

OCB, and N-CR), and *organizational change components* or Organizational Factors (i.e. MS, NI in the EMR life-cycle and AT relevant to EMR use) were added to the Davis (1989) Original Technology Acceptance Model (Davis, 1989).

In fact, this model was used in 2003 in an unpublished study (Aldosari, 2003) that examined physicians attitude and acceptance. The model was also used in another study by Morton (2008) and was found to explain over 73% of the variance in the EHR pre-implementation attitude and acceptance. (Figure 1)

As a result, even though Aldosari's modified TAM model can be used to predict, explain and assess the various associated organizational and professional changes with the implementation of EMR in health care settings simultaneously, this model has never been previously used to examine nurses' perception. Therefore, since no previous published research concerning nurses' attitudes towards the EMR in KSA has been conducted or reported, the Aldosari's Technology Acceptance Model (TAM) is a suitable framework for this study that will be used to provide results that could contribute and serve as a starting point for further exploration and examination of nurses attitude towards EMR specifically, and technology in general in the Kingdom of Saudi Arabia.

Researcher questions

Considering the factors in the proposed TAM, the research questions of this exploratory study will be

1. Is there any direct or indirect relationship between Organizational Factors (OF) and nurses' attitudes toward the Electronic Medical Record (EMR) in King Abdulaziz Medical City in NGHA in Riyadh, KSA?
2. Is there any direct or indirect relationship between Professional Factors (PF) and nurses' attitudes toward the Electronic Medical Record (EMR) in King Abdulaziz Medical City in NGHA in Riyadh, KSA?
3. Is there any direct or indirect relationship between Perceived Usefulness (PU) and nurses' attitudes toward the Electronic Medical Record (EMR) in King Abdulaziz Medical City in NGHA in Riyadh, KSA?
4. Is there any direct or indirect relationship between Perceived Ease of Use (PEU) and nurses' attitudes toward the Electronic Medical Record (EMR) in King Abdulaziz Medical City in NGHA in Riyadh, KSA?

METHODS

The study is cross-sectional in nature and gathered sample data from nurses working in a regional hospital in Riyadh (i. e. King AbdulAziz Medical City KAMC), KSA. A hard copy of the questionnaire was randomly distributed among the staff constituting the sample of 333 nurses using a Stratified Random Sampling method that stratified the sample according to their nursing units/departments in the organization. This study's sampling frame was taken from among nurses working in a hospital which has already implemented an EMR system, in which nursing personnel with more than 6-month experience using the EMR system were recruited to ensure enough experience among nurses. The study unit of analysis is the individual nurse. Path analysis was used to predict the results. Chi Square was used also as a goodness of fit measure to determine if the model is an acceptable fit or not.

RESULTS

Descriptive Statistics on the demographic data (Q1-Q11)

With a response rate of 78% (259 out of 333), the frequency distributions show that the majority of the survey respondents are KAMC (85.7%) staff nurses (registered nurses), approximately 30 to 39 years old (49.8%) with an average age of 29 years, and mostly Far Eastern Nationals (54.8%). The majority of nurses in this study 86.1% (223) were females and 5.4% (14) were males and the least were Saudis with only 3.1%. The majority were registered nurses with 59.1% followed by staff nurses (33.8%) which indicates that most of the staff nurses are licensed as Registered nurses. Almost 41.7 % had work experience that ranged between 5-10 years followed by those with less than 5 years experience with 34.7%. Those with a work experience of 11-15 years and those with over fifteen years experience had the least percentages with 10.8% and 10% respectively. The majority of responses were obtained from pediatric wards (25.8%) followed by oncology departments (21.0%). The least responses were reported from Dialysis, Operating Room, and the department of Education.

Moreover, this descriptive data indicates that a considerable majority of the participants are frequent users of their currently available KAMC system (86.0%) while only 0.8% of them reported that they have never used it before with an identical percentage that reported they have used it in the past but not currently. 3.8% have used an EMR other than that of KAMC. Additionally, most of the respondents use their Personal Computers (PCs) or handheld devices to access their Email (38.8%) and Patient Medical Information (34%). 26% of them use such technology to access Health Journals and other clinical resources with only 9% use it for other reasons.

Furthermore, while 18.9% of the sample had a formal Nursing School Training, the majority of the sample (53.2%) adopted a Self Guided method in their lear-ning. The formal 1st year staff nurses orientation training

Table 2. Most significant findings of the demographic data (Q1-Q11)

Variable	Percentage%	Findings
Gender	86.10%	Females
Age	49.8%	30 to 39 years old
Ethnicity	54.8%	Far Eastern Nationals
Period of employment	41.7 %	Work experience that ranged between 5-10 years
Medical information system usage	86.0%	Frequent users of their currently available KAMC system.
Personal computer Usage	38.8%, 34%	Access their Email and Patient Medical Information
Position	59.1%	Registered Nurse
Training Experience	53.2%	Self Guided
Computer user Sophistication	44.8	General (described themselves as starting to become well rounded and knowledgeable

Table 3. Descriptive data on the model variables

Variable	Mean
Attitude about the system Usage and Acceptance (AU)	3.57
Perceived Usefulness (PU)	3.54
Perceived Ease of Use (PEU)	3.66
Professional Factors (PF)	
Nurse Autonomy (UA)	4.08
Organizational-Citizenship Behavior (OCB)	4.29
Nurse- Client relationship (NCR)	3.00
Organizational Factors (OF)	
Adequate Training (AT)	3.77
Users Involvement (UI)	3.91
Management Support (MS)	4.40

constitutes the learning experience for almost 16.2 % of the sample. In terms of how sophisticated a user sees him/her self in using computers, only about 5.4% considered themselves to be advanced and experienced users while 44.8 % of the sample described themselves as starting to become well rounded and knowledgeable. With relatively similar results, 33.6% of the sample were described as a novice or beginner users with limited skills and privileges and 13.5% of them as seen themselves in the level of advanced beginner or technicians. (Table 2)

Cross-Tabulation analysis

Cross-tabulation analysis was used to investigate the relationships between reported system usage and gender, age, work experience, job title, and computer access. It shows that most frequent users of the system are Far Eastern females registered nurses, 30-39 years old (110) who have an experience between 5-10 years and use it mostly to primarily access their emails than to view patient medical information.

Descriptive Statistics of Model Variables (Q12-Q20)

Descriptive data on the model variables are presented in Table 3. Items of the study variables which are rated on a five point Likert scale from low (strongly disagree) to high (strongly agree) and then averaged to produce an overall variable score (Average mean). The data showed that the means for Nurse- Client relationship (NCR) are the lowest (3.00) while Management Support (MS) is the highest (4.4) among all the other variables followed by Organizational-Citizenship Behavior (OCB) and Nurse Autonomy (NA) that scored 4.3 and 4 out of 5 respectively. On the other hand, the attitude about MIS usage and acceptance (AU) is relatively high, with a mean of 3.6 Out of 5 which indicates a positive attitude and is similar to the result of a previous study (3.74) on physicians attitude (Morton, 2008). The department of oncology (4) and pediatric (3) reported the highest scores in terms of their attitude towards the system. Perceived Usefulness (PU), Perceived Ease of Use (PEU), Adequate Training (AT), and Users Involvement (UI) have a relatively similar rating of +-3. (Table 3)

Table 4. Result of regression 1

R Square	0.42
ANOVA (F)	90.66
Standardized beta coefficients for PU to attitude	0.51
Standardized beta coefficients for PEU to attitude	0.19

Open-ended Questions (Q21, 22, 23, 24)

Thirty-five (11%) of the sample answered the open ended questions. In terms of how nurses feel that nurses (Q23) and executive (Q24) are in consensus regarding their attitudes towards the EMR adoption, the results were relatively similar. One hundred sixty-three of the nurses (63%) thought that nurses are in consensus regarding their attitudes towards the EMR adoption, while 135 of them (52%) thought the same about how executives perceive EMR systems. When it comes to the nurses' opinion regarding the role of their management in Q22 and training in Q21, nurses repeatedly reported that management support, providing them with sufficient training along with them being involved in the entire process of the system deployment are very important aspects and steps in the EMR implementation.

Training

In terms of training, 113 of the sample (44%) thought that group setting is how they learn best, while 25% (64) thought that a combination of individual and group settings is better. Those who believed that solo learning is better constituted only 16% (41) of the sample.

Nurses and executive consensus and the role of management

The nurses thought that management had an essential and significant role to play along with a lot of responsibilities towards nurses to ensure that they are well informed regarding the entire system implementation process.

Testing the nurses acceptance model

In order to address the study's questions and inspect the validity of the theoretical relationships presented in the research model, path analysis was conducted. By using the means of correlation analysis, the associations between the independent variables were measured to decide if whether multi-collinearity existed among any of the predictor variables. Also, the association between the dependent variable and each independent variable was measured as well using the same technique to determine

which independent variables had a strong relationship with the dependent variable (attitude).

The correlation table (attached in appendix E) summarizes the association between independent variables. Correlations between the independent variables ranged from -0.003 to 0.599 for the total respondents. Although these correlations (<.85), the data suggest that the variables are likely distinct and independent, however, the effects of some degree of multi-collinearity cannot be ignored (Davis, 1989; Aldosari, 2003). The Correlation table also revealed that the conducted correlation showed that both perceived usefulness and perceived ease of use have a positive moderate significant relationship with attitude. Nurse involvement, adequate training, and nurse client relationship have a positive weak yet statistically significant relationship with attitude. Management support, nurse autonomy, and Organizational Citizenship behavior have a positive weak insignificant relationship with nurses' attitude. Perceived usefulness (PU) was found to be the factor most strongly related to the dependent variable attitude (0. 63) towards EMR usage and acceptance (AU). This result suggests that nurses are more likely to use the EMR system when they perceive that the system is useful for them and therefore, it's critically important to understand and investigate any issues that could affect the usefulness of a given system. The latter result is consistent with the results of the previous studies of Davis (1989), Chau (1996), Anderson and Aydin (1997) and Aldosari (2003). The individual characteristics were found to be significant except for MS, NA, and OCB. However, the entire proposed contextual factors were found to be insignificant predictors, except for the "Perceived Usefulness" and "Perceived Ease of Use", of the EHR adoption attitude.

Summary of multiple regression analysis

The multiple regression enables us to identify and to find out the effect of a set of predictor variables which together provide a useful estimate of a participant's likely score on a criterion variable (Brown et al., 1999).

Regression 1

Dependent (DV)

Attitude about System Usage (AU).

Table 5. Result of regression 2

R Square	0. 20
ANOVA (F)	10.63
Standardized beta coefficients for OCB to PU	0.09
Standardized beta coefficients for AT to PU	0.35
Standardized beta coefficients for UI to PU	0.11
Standardized beta coefficients for NCR to PU	0.04
Standardized beta coefficients for NA to PU	0.04
Standardized beta coefficients for MS to PU	0.01

Table 6. Result of regression 3

R Square	0.36
ANOVA (F)	23.82
Standardized beta coefficients for OCB to PEU	0.05
Standardized beta coefficients for AT to PEU	0.47
Standardized beta coefficients for UI to PEU	0.16
Standardized beta coefficients for NCR to PEU	0.11
Standardized beta coefficients for NA to PEU	0.04
Standardized beta coefficients for MS to PEU	0.03

Table 7. Result of regression 4

R Square	0.36
ANOVA (F)	143.72
Standardized beta coefficients for PEU to PU	0.60

Table 8. Indirect effects of the professional and the organizational factors on attitude

Factor	Its Indirect effects
OCB to attitude	0.0045
AT to attitude	0.1645
UI to attitude	0.0176
NCR to attitude	0.0044
NA to attitude	0.0016
MS to attitude.	0.0003

Independent (IV)

Perceived Usefulness (PU), Perceived Ease of Use (PEU).

$Attitude = α + β_1*PU + β_2*PEU + Error…………………(1$

Regression 2

Dependent (DV)

Perceived Usefulness (PU).

Independent (IV)

Professional factors [Nurse Autonomy (UA), Organizational-Citizenship Behavior (OCB), Nurse-Client relation

ship (NCR)], Organizational Factor (Adequate Training (AT), Users Involvement (UI), Management Support (MS)).

$PU= α + β_1*Professional\ Factors+ β_2*Organizational\ Factors + Error…………………(2$

Regression 3

Dependent (DV)

Perceived Ease of Use (PEU)

Independent (IV)

Professional factors [Nurse Autonomy (UA), Organizational-Citizenship Behavior (OCB), Nurse- Client

relationship (NCR)], Organizational Factor [Adequate Training (AT), Users Involvement (UI), Management Support (MS)].

PEU= α + $β_1$*Professional Factors+ $β_2$*Organizational Factors + Error………………..(3
(Table 6)

Regression 4

Dependent (DV)

Perceived Usefulness (PU),

Independent (IV)

Perceived Ease of Use (PEU).
PU= α + β $_1$*PEU + Error......................(4
 (Table 7)

Indirect effects of the professional and the organizational factors on attitude are obtained by multiplying the effects along each indirect path. Meaning that the coefficients of each variable (e.g OCB) to both PU (0.05) and PEU (0.09) will be multiplied to obtain the indirect effect of that factor on the attitude.

The results are as follows: the standardized beta coefficients are (0.05*0.09=0.0045) for OCB to attitude, (0.47*0.35=0.1645) for AT to attitude, and (0.16* 0.11=0.0176) UI to attitude. (0.11* 0.04=0.0044) for NCR to attitude, (0.04*0.04=0.0016) for NA to attitude, and (0.03*0.01=0.0003) for MS to attitude.

If the result of the Chi square suggests that the model is an acceptable fit, then the path coefficients in the model must be interpreted.

Goodness of fit measure (Chi square)

Out of a number of appropriate measures, Chi square was used as a goodness of fit measure in this study to examine the nurses acceptance model and determine if the model being tested should be accepted or rejected as an inadequate explanatory model.

The predicted Chi-square values were 0.436, which supports good model fit. The R Square result shows that 44% of the variance in attitude towards EMR usage can be predicted or accounted for by the combination of these eight variables. The Chi-square p-value significance level of 0.509> 0.05 indicates that the model fits really well and is an acceptable fit. Finally, standardized structural (path) coefficients and the critical ratios (t-value) were tested. Standardized structural (path) coefficients, which are based on standardized data including correlation matrices, were examined to compare the direct effects of the proposed model's independent variables on the dependent variable. The results of the coefficient table that resulted from the

multiple regression suggest that PU (0.00) and PEU (0.01) are significantly related to attitude both on their own or in combination with other variable. Nurse Autonomy, involvement and management support are negatively yet still insignificantly related to attitude when combined together with other variables.

The model contains the following variables:
1. Observed, endogenous variables:
PU, PEU, AU.
2. Observed, exogenous variables:
Organizational Factors (OF), professional Factors (PF).
3. Unobserved, exogenous variables:
e1, e2, e3.
(Table 9,10)

DISCUSSION

The results of this study indicate that nurses are confident that the EMR does not interfere with their professional judgment and autonomy in providing clinical care as well as their relationship with their patients which contradict with previous results (Aldosari, 2003). Additionally, it appears that nurses have positive attitudes about using the EMR and about its usefulness to them in supporting their clinical practice. Furthermore, the respondents show confidence in their ability to use the EMR based on their response to the ease of use of the system, as indicated by the ease of use (PEU) mean score of 3.7. The similar mean scores of 3.8 and 3.9 for Adequate Training (AT) and Users Involvement (UI) suggests that nurses view involving them in the system design and entire implementation and providing them with sufficient training as a very important aspect of the system deployment process which is supported with the responses in the open-ended questions section. The highest score of 4.40 for Management support (MS) indicates a potential source of conflict between the nurses and the organization's key management relative to EMR implementation. High rating of Organizational-Citizenship Behavior (OCB) suggest that nurses highly identify themselves with their organization. The results of the correlations and multiple regression suggests that perceived usefulness then perceived ease of use of the EMR has the most significant relationship with the nurses' attitude towards the system usage and acceptance. Perceived usefulness was found to be the factor most strongly related to the dependent variable attitude towards EMR usage and acceptance. The latter result is consistent with the results of the previous studies of Davis 1989; Chau, 1996; Agarwal and Prasad, 1999; Hu et al.,1999; Chau and Hu, 2001; Seligmen, 2001; Aldosari, 2003; and Morton, 2008. However, the entire proposed contextual factors were found to be insignificant predictors, except for the "Perceived Usefulness" and "Perceived Ease of Use", of the EHR adoption attitude, which somehow contradicts with earlier results (Aldosari,

Table 9. Model variables

	Weights	Covariances	Variances	Means	Intercepts	Total
Fixed	3	0	0	0	0	3
Labeled	0	0	0	0	0	0
Unlabeled	8	1	5	0	0	14
Total	11	1	5	0	0	17
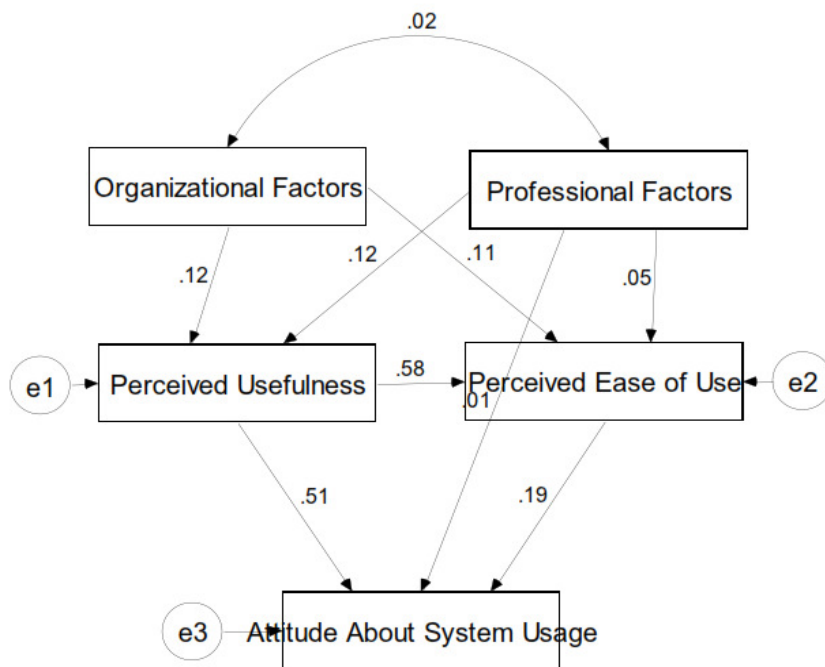
Table 10. Model fit summary

Model	No. of Parameter	Chi.square Minimum (CMIN)	DF	P	CMIN/DF
Default model	14	.436	1	.509	.436
Saturated model	15	.000	0		
Independence model	5	266.524	10	.000	26.652

2003; Davis, 1989).

The results of the coefficient table that resulted from the multiple regression which suggested that PU (0.00) and PEU (0.01) are significantly related to attitude both on their own or in combination with other variable as well as that nurse autonomy, involvement and management support are negatively yet still insignificantly related to attitude when combined together with other variables indicate that, on the basis of this statistical analysis, the proposed nurses acceptance model can be accepted at least as it applies to KAMC systems' nurses.

Nurses and executive consensus and the role of management

Nurses thought that management had a major, active, and significant role to play and a lot of responsibility

towards nurses (especially bedside nurses) to make them well informed regarding the system implementation process which was consistent with the result of a previous study (Ward et al., 2008).

The nurses asked that their management should do a lot of things such as engaging them more in the entire system life cycle that start from designing and not end with implementation, engage them in the decision making process and support their suggestions since that the they are at the end the one who do the work as one nurse describe it, and focus more on the training especially of the newly employed staff and using hands on training and regular (at least monthly) in-service follow ups. Additionally, some suggest that management should give lectures, seminars, updates about the EMR systems, and orientations for the staff as a part of their important role towards their employee and ensure proper education and the teaching of them, particularly prior to implementation, as well as listening to their problems and concerns with the learning system. One nurse suggests that management should also know how the system works and that it doesn't mean less paperwork or faster and easier workflow. Involving the nurses in the entire system life cycle to have a higher success rate of adoption and ensure providing them with enough training to have a better favorable attitude was consistant with the results of a previous study (Alquraini et al., 2007).

Nurses also complained about the existing redundancy and duplication of work as they have to do documentation both electronically and on paper. They also repeatedly stressed on how this is so time consuming and how that interfere with their bedside manner and communication skills and negatively affect their patient care and their attendance to the patient's needs. Other nurses express their fear that using an EMR is dehumanizing and make the nurse distant from her patient and only focused on the technical aspect of the care (become more like a technician rather than professional nurses). More vigilant monitoring of the patients' confidentiality was one of the nurses' concerns as well. One nurse thought that an exclusive EMR is a good thing but management should ensure that first to avoid duplication of the work. Another suggests adding keyboard shortcuts to the system to make it easier to use and more user friendly as well as removing any errors from the system. Another nurse complained about the same matter of not fully implementing the system and how this affect nurses as they also have to help some doctors in data entry since that they are, as she describe it, "poor users".

Training

A number of nurses believe that training is inadequate and thought that a gradual form of training

which proceeded from an overview to group sessions that are classified according to the individual levels such as from beginners to advanced according to the user sophistication as well as being adaptable to each user learning method is much better than the current form of training. Other suggested one on one training and free additional courses while others advise having return demonstration, super user discussion and more continuous, practical and hands on training that is supervised by experts. A new nurse complained that the short training period that's done only by her preceptor had limited her utilization of the proper usage and the full functionalities of the system. Some nurses complained about how the different templates used in different departments (e.g. Main hospital and cardiac unit) made it difficult for them to document and retrieve data appropriately. Addressing computer illiteracy that many nurses suffer from should be a major priority for the management to handle as its constitute a big obstacle for a lot of nurses.

Limitations

This study is limited to a single organization, the user experience with a single system, and the small sample size that doesn't allow for generalization. Also, The snapshot nature of this study does not provide long term indications. Additional research is needed to confirm the results of this study on the long run.

Implications of the study

The results of this study can help the management for better understanding of their nursing staff technical and training needs which could help develop better implementation plans in the future. Also, EMR developers can use such findings to develop systems that accommodate more to the different specialties and users levels and needs. Management should recognize their significant role in a successful EMR implementation with their involvement and support of the nursing users prior to implementation and long after that.

CONCLUSION

The EMR has the potential to reduce cost, improve efficiency and quality of care, enhance patient safety and reduce error. Furthermore, Little is known about nurses attitude. However, nurses vary in their attitude towards EMR/EHR, but the majority have a positive attitude including the nurses of KAMC. According to the results of this study, nurses preferred group settings training and felt that both nurses and executives are in consensus

regarding their attitude towards EMR adoption. The conducted correlation showed that both perceived usefulness and perceived ease of use have a positive moderate significant relationship with attitude. Nurse involvement, adequate training, and nurse client relationship have a positive weak yet statistically significant relationship with attitude. Management support, nurse autonomy, and Organizational Citizenship behavior have a positive weak insignificant relationship with nurses' attitude. The individual characteristics in the study were found to be significant except for MS, NA, and OCB. However, the entire proposed contextual factors were found to be insignificant predictors, except for the "Perceived Usefulness" and "Perceived Ease of Use", of the EHR adoption attitude which contradict with earlier results [21]. Perceived usefulness was found to be the factor most strongly related to the dependent variable attitude towards EMR usage and acceptance.

Authorship

Hanan Asiri is the first author of this paper. She took the responsibilities for the conception and design of the study. In addition, she was responsible for collecting, analyzing and interpreting the data. She also helped to compile the submitted article and made the required modification. Dr. Bakheet Aldosari is the second author of this study. He provided assistance and guidance in the design of the research as well as the interpretation of the results and approved the final version for this paper to be submitted. Dr Basema Saddik is the third author of this study. She provided assistance in designing the research and proposing sufficient research concepts and strategies as well as approving the final version for this paper to be submitted. All authors read and approved the final version of this paper.

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Statement on conflict of interest

The authors report no conflict of interest.

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