

MEDICAL STUDENTS' BEHAVIORAL INTENTION TO ADOPT ELECTRONIC HEALTH RECORD SYSTEM

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ABSTRACT: *Electronic Health Record (EHR) is a computerized system that collect, store and display the data of patients. The use of EHR systems is increasing globally and numbers of countries, both developed and developing, have invested in EHR with a hope of developing their health sector. Accordingly, Bangladesh, a developing country, has shown its keen interest on digitization of health sector. However, very limited information is available on medical professionals' perception towards EHR. Therefore, the current study aims to understand the level of behavioral intention towards EHR among medical students of two selected medical colleges in Bangladesh. The study also investigates the predictors of behavioral intention. The study adapts Unified Theory of Acceptance and Use of Technology (UTAUT) to match the context. Self-administered questionnaire survey method was used to collect data among 238 medical students from the two selected medical colleges using convenient sampling. Upon completion of data collection, the data were analyzed using SPSS 16 (Descriptive analysis) and AMOS 16 (Measurement model and Structural model). The results showed that the respondents are moderately intended to adopt EHR while Performance Expectancy (PE) and Effort Expectancy (EE) are strong determinants of intention to adopt EHR. EE's positive effects on EE and Social Influence (SI) also established. The findings of this study might help the policy makers in Bangladesh in their strategy formulation, especially in the health sector, in the future.*

1. INTRODUCTION

Digitization has transformed the world order almost in every sector, including health sector. There are numbers of Information and Communication Technology (ICT) based tools and applications in the health sector. Electronic Health Record (EHR), one of such popular ICT based systems, is an electronic record system that acts as a depository of patients' past and present medical records. Clinical documentation, clinical test and imaging results, computerized order entry system and decision support system are all comprised in HER [1]. The EHR can construct an errorless data management system for quality, safety and efficient health sector.

EHR has both merits and demerits. From merit prospective, trying to avoid the fragile ambiguity of the human mind to process a larger amount of data EHR will help the physicians. Patient can achieve the leverage of esthetic knowledge in medical science and also can augment the learning capacity of medical students [2]. Meantime, it helps information portability, accessibility, epidemic disease control, and averting unnecessary test [2]. From the negative perspective, to establish such a system with hardware and software, and upgrade and maintain the whole system on a regular basis is very challenging and costly. It may cause unwanted pause or break in the middle of their work [2] and create security concern of patient's medical records [3].

Nevertheless, numbers of countries already have started to adopt such systems in their health sector. For example, the family physician's adoption rate of EHR reached 68% in USA [4, 5]. To embrace the EHR US government financed \$30 billion to persuade physicians, Australian government financed AU\$1 billion and United Kingdom (in 2005) invested \$18 billion in the health care industry to reduce medical errors and increase efficiency [6]. In Asia pacific region except India and Philippine's, almost every country use EHR at least partially [7].

Similarly, the government of Bangladesh has also initiated a new era of automation in the health sector by introducing ICT in three hospitals; National Institute of Kidney Diseases & Urology (NIKDU), Government Employees' Hospital, and Azimpur Maternity Hospital from 2012 (Directorate General

of Health Service, n.d.b). As one of the third world countries, Bangladesh face a daunting challenge to provides a healthier health service. Over 159 million people live in Bangladesh; population density is 881 people per square KM, more than 60% people live below the poverty line, and 77% people lives in rural areas [8]. The doctor patient ratio is 1: 2000 [9], thus, the Bangladesh is one of 55 countries which have a shortage of health workforce [10]. As a result, on aggregate level almost 40.21% people obtain their treatment from dispensary or pharmacy, 24.46% visit private doctors, 14.34% go to government doctors and 15.57% people are not getting any treatment at all [11].

Hence, to overcome the barrier in the health sector the government has initiated few projects; mHealth or Health Service via Mobile Phone for 24/7, Geographical Information System (GIS) for disease surveillance, SMS pregnancy care, telemedicine care, electronic birth registration in one district, Health Enterprise Architecture system which collected the 120 million patient data in rural areas [10]. Similarly the private sector also has taken some initiatives to digitize the patient records. For example, Bangladesh Secretariat Clinic, Apollo Hospital, Square Hospital, United Hospital, Medinova hospital and popular diagnostic center have their own database system of patient record system [10]. However, most of the Governmental and private hospitals yet to introduce ICT [12]. Most of the manual record at hospitals been destroyed time to time; Bangabandhu Sheikh Mujib Medical University Hospital and Holy Family Hospital are stored the patient record in paper and destroy the document after 5 years [12].

In this context, it is believed that the EHR adoption can improve the health sector. However, according to some studies in Bangladesh, the adoption of EHR among the physicians is a myth despite the fact of cost, workload, and stagnation of innovation [12, 13]. Nevertheless, it is hard to find information on the perception of medical students, the future medical professionals, of Bangladesh towards EHR.

To bridge the above mentioned gap, the objectives of this study are two folds; 1st to understand the level of perceived behavioral intention to adopt EHR by the medical students,

and the 2nd is to understand the predictors of the behavioral intention.

2. RESEARCH FRAMEWORK

The research framework for this study mainly developed based on the unified theory of Acceptance and Use of Technology (UTAUT) [14] to study the behavioral intention to adopt EHR and the factors that influence such intention among students in two selected medical colleges in Bangladesh. Since, the respondents (students) yet to be in practice and not yet get into a real working environment, this study limits to investigate their intention to adopt EHR though the original UTAUT measures up to use of technology (behavior). Similarly, only Performance Expectancy (PE), Effort Expectancy (EE) and Social Influence (SI) were considered as independent variables as facilitating condition, the other variable in the UTAUT, is linked to use behavior. The moderating effects in the original UTAUT also not tested in this study. Fig.1 depicts the research model used in this study.

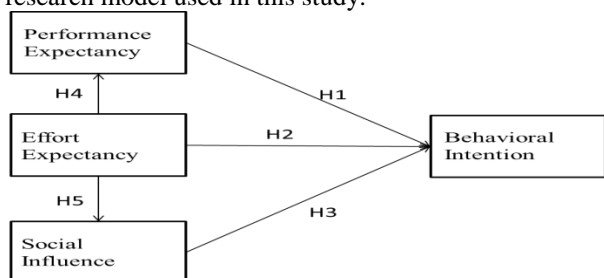


Fig. 1: Research Model

PE has been defined as EHR use will increase the medical student job performance while EE has been defined as the degree of feeling easy to adapt to EHR environment. The SI means other people like organization (hospitals), friends, and family will influence to use EHR. In the UTAUT model PE is one of the stronger predictors of Behavior intention. By using EHR will accomplish their task quickly, increase productivity, increase chances of getting raises. EE and SI also proved to have a positive effect on behavior intention. There are number of studies in different context, such as [15, 16, 17] and, including in the medical field, [18] that prove these significant relationships. In addition, the Technology Acceptance Model (TAM) posits that EE has a positive effect on PE. Accordingly the studies of [15, 16] has tested these

relationships while some other studies, such as [19, 20] have tested the relationship between EE and SI. Based on these theoretical and empirical supports, the following hypotheses were proposed:

- H1: Performance Expectancy will have a positive effect on the behavior intention to use EHR.
- H2: Effort Expectancy will have a positive effect on the behavior intention to use EHR.
- H3: Social Influence will have a positive effect on the behavior intention to use EHR.
- H4: Effort Expectancy will a have positive effect on the Performance Expectancy
- H5: Effort Expectancy will a have positive effect on the Social Influence.

3. METHODOLOGY

Self-administered questionnaire survey method was used to collect data from 238 medical students from the Ibn Sina Medical College and Aici Medical College in Bangladesh, using the convenient sampling. The questionnaire items for all variables; Performance expectancy, Effort Expectancy, Social Influence and Behavior intention, were adapted from UTAUT [13] and the respondents were asked to indicate (on a 5-point Likert scale ranging from “strongly disagree” to “strongly agree”) their level of agreements on statements. 93.7% of respondents (238) are in the age range of 20 to 25 years and the rest are in their 26 to 30 years. Most of them (62.2%) are female (37.8% are male). 31.5% of them are 1st year students while 14.3% (2nd year), 9.7% (3rd year), 29.8 (4th year) and 14.7% (fifth year) their studies.

Initially, exploratory factor analysis was performed to see the data pattern. All the questionnaire items, except EHR15 and EHR 16, loaded cleanly to the respective variables. The questionnaire items EHR15 and EHR16 are supposed to measure SI (Social Influence), however, these two items loaded with BI (Behavioral Intention). With the intention of getting good model fit indices, both these items were treated as BI items when performing the confirmatory factor analysis using AMOS 16. To assess the convergent validity, factor loadings, composite reliability (CR) and the average variance extracted (AVE) were examined. The factor loadings exceeded the recommended value of 0.5 as shown in Table 1.

Table 1: Results of Convergent Validity Assessment

Model constructs	Questionnaire Item	Code	Loading	Composite Reliability (CR)	Average Variance Extracted (AVE)
Performance Expectancy (PE)	I would find the EHR useful in my future medical profession.	EHR_5	.775	0.857	0.600
	Using the EHR would enable me to accomplish tasks more quickly.	EHR_6	.758		
	Using the EHR would increase my productivity.	EHR_7	.769		
	If I use the EHR, I would increase my chances of getting a raise.	EHR_8	.795		
Effort Expectancy (EE)	My interaction with the EHR would be clear and understandable.	EHR_9	.680	0.760	0.442
	It would be easy for me to become	EHR_10	.669		

	skillful at using EHR.				
	I would find the EHR easy to use.	EHR_11	.609		
	Learning to operate the EHR will be easy for me.	EHR_12	.698		
Social Influence (SI)	People who influence my behavior would think that I should use EHR.	EHR_13	.834	0.815	0.688
	People who are important to me would think that I should use EHR.	EHR_14	.825		
(Behavioral) Intention to adopt EHR (BI)	The senior management would be helpful in the use of EHR	EHR_15	.590	0.856	0.549
	In general the organization will support the EHR.	EHR_16	.600		
	I intend to use EHR in future	EHR_17	.762		
	I predict I would use EHR in future.	EHR_18	.858		
	I plan to use HER in Future.	EHR_19	.849		

Table 2: Results of Discriminant Validity Assessment

	PE	EE	BI	SI
PE	0.774			
EE	0.739	0.665		
BI	0.634	0.693	0.741	
SI	0.527	0.754	0.492	0.830

Legend: PE = Performance Expectancy; EE = Effort Expectancy; SI = Social Influence; BI = Intention to Adopt HER

Table 3: Fit Indices of Measurement and Structural Model

Fit Index	Fit Criteria	Measurement Model
Chi Square (χ^2)		197.602
P-value (probability)	≥ 0.5	.000
GFI (Goodness of Fit Index)	≥ 0.9	.906
RMSEA (Root Mean Square Error of Approximation)	≤ 0.05	.076
RMR (Root Mean Square Residual)	≤ 0.05	.047
NFI (Normed Fit Index)	≥ 0.9	.891
CFI (Comparative Fit Index)	≥ 0.9	.934
AGFI (Adjusted Goodness of Fit Index)	≥ 0.8	.866
PNFI (Parsimonious Normed Fit Index)	≥ 0.5	.713

Finally the measurement model (Fig. 2) was assessed in terms of its fitness. As shown in Table 3, the model fulfilled most of the fit indices requirements.

With the intention of achieving the 1st research objective of understanding the level of behavioral intention to adopt EHR, a descriptive analysis was performed using SPSS 16 and the results are shown in Table 4.

Table 4: Findings of Descriptive Analysis (Behavioral Intention)

	Mean	Std. Deviation
EHR_15	3.70	.91
EHR_16	3.58	.91
EHR_17	3.77	.95
EHR_18	3.71	.93
EHR_19	3.79	.92
Average (BI)	3.71	.73

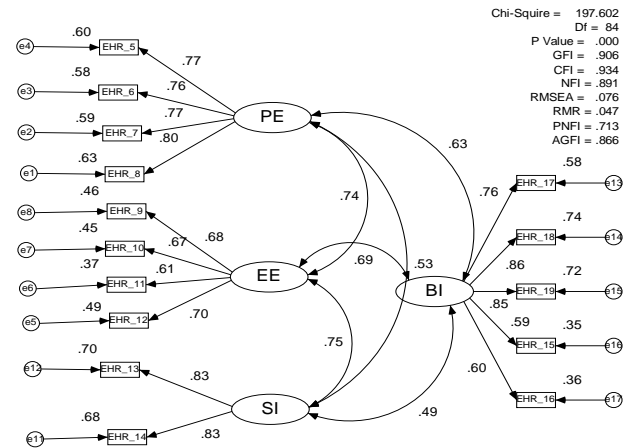


Fig. 2: Measurement Model

It shows that the respondents' perceived intention to adopt EHR is moderate with the mean value of 3.71 (SD 0.73). To test the hypotheses, a path analysis was performed through the structural model (Fig. 3). As shown in Table 5, the overall results indicate that all hypotheses, except H3 (Social Influence will have a positive effect on the behavior intention to use EHR) were fully supported as the p-values for all paths are well below 0.05 and the coefficient values (β) range between 0.291 and 0.993.

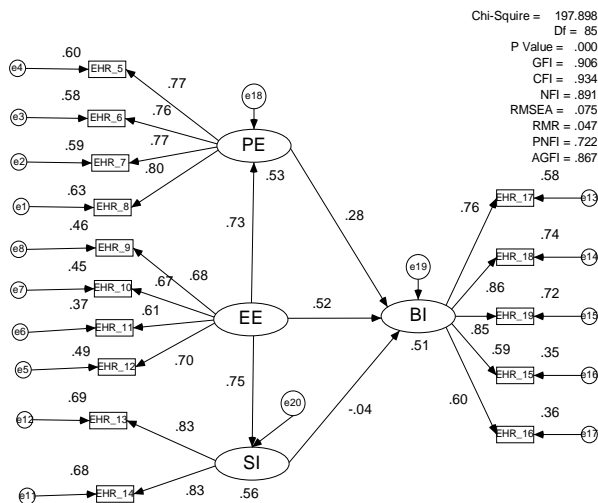


Fig.3: Structural Model

Table 5: Results of Hypotheses Testing

Hypothesis	Estimates	S.E.	C.R.	p-value	Results
H1: PE → BI	.291	.111	2.624	.009	Supported
H2: EE → BI	.663	.208	3.188	.001	Supported
H3: SI → BI	-.040	.110	-.364	.716	Not Supported
H4: EE → PE	.893	.110	8.084	.000	Supported
H5: EE → SI	.993	.123	8.098	.000	Supported

4. CONCLUSION

The current study was performed to investigate the level of behavioral intention towards EHR by the selected two Bangladesh medical college students and to examine the influencing factors or the predictors of their behavioral intention. Accordingly, the results of the study have revealed that the respondents are moderately willing to adopt EHR. Similarly, the findings suggest that PE (Performance Expectancy) and EE (Effort Expectancy) are strong determinants of intention to adopt EHR and EE positively influences PE and SI. Therefore, if the Bangladesh policy makers or the government or the hospital management really want to implement EHR in their health sector in future, they have to educate the current and future medical professional about the benefit of EHR to perform their daily duties and how it can benefit for their career as well. Furthermore, the policy makers have to show them (practitioners) that the adoption of EHR doesn't require addition effort and it will be easy to customize to it. However, similar kinds of studies have to be performed at different context and with different sample to generalize the findings throughout the country. The current researchers believe the findings of this study should be useful to both researchers and practitioners.

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