

Effect of Educational Program on Nursing Staff Knowledge and Attitude toward Electronic Medical Record at Tanta International Teaching Hospital

¹Reda Abd El-Fatah Abo Gad, ²Amal Hamdy Abou Ramadan

¹Assistant professor, Nursing Services Administration, Faculty of Nursing, Tanta University, Egypt

²Lecturer of Nursing Services Administration, Faculty of Nursing, Tanta University, Egypt

Abstract: Nursing staff considered the main probable users to EMR. They play a vital role in planning and implementation of EMRs. So the aim of study was to evaluate the effect of an educational program on nursing staff knowledge and attitude toward electronic medical record at Tanta International Teaching Hospital. Subjects and method: quasi-experimental (pretest-posttest control group) design was used and the study was carried out in medical and surgical units at Tanta International Teaching Hospital. The subject consisted of all (130) available nursing staff working at previous mentioned setting, and randomly assigned into study and comparison groups. Tool of the study was questionnaire sheet which consisted of five parts; nursing staff characteristics, computer experience assessment questions, attitude toward electronic medical record questions and questions on nursing staff electronic medical record knowledge. Results: There were statistically significant differences between study and comparison groups' EMR knowledge and attitude pre than post the program. Post program study group's knowledge levels and attitude significantly improved while, no changed in comparison group. Conclusion: An improvement was noted in studied nursing staff levels of knowledge and attitudes about EMR after implementing an educational program as indicated by upgrading their EMR knowledge scores and positively changed related attitude subscales. Recommendations: providing initial and ongoing staff education on EMR through the use of simulation training can increase the potential for its success. Also, nursing faculties need to integrate IT into their undergraduate and graduate curriculum.

Keywords: Electronic medical record, Nursing staff, Tanta International Teaching Hospital.

I. INTRODUCTION

The rapidly changing environment in healthcare industries to improve quality of care and reduce cost makes the information technology in the top priorities. The nursing staff operates in an active environment where they are required to provide services to lots of patients in effective and efficient manner, in addition documents all patients' care they delivered. Nursing documentation protects nurses and their patients from various financial, legal and medical problems. So, in order to manage complex medical data of patients effectively, many hospitals begin to use electronic documentation as a replacement for paper documentation (Clements, 2018; Liston and Mckinnon, 2017; Adams, 2015; Miller, 2014).

Electronic medical record (EMR) is a type of healthcare information system used to simplify communication between caregiver and recall patients' information easily (Balestra, 2017; Ali, et al., 2011). It includes information about the patients such as patients' history, health problems, patients' progress, medications used and care plan. EMR has the capability of recording, processing, storing, and transferring health information (Okpala, 2013; Steiner, 2009). The

EMR's functions include patient billing, electronic ordering and receiving of investigations' results, electronic prescribing and recording of clinical information, and in some circumstances decision support software (Jones et al 2012; Nandikove et al., 2018). Through the use of the EMR, nursing staff can avert many problems that may present in paper documentation. It can reduce medical errors, regulate care, and reduce cost by reducing repeated efforts and workload (Carpeggian & Macerata, 2015; Furukawa, et al.,2011). Additional benefits include preventing of legal problems issues (Raymond et al 2015).

Electronic medical record's system has remarkable benefits and impacts in healthcare organizations (Waithera et al, 2017), but, many of developing countries still unable to implement it in all care areas. The major hindrances are the lack of infrastructure, limitations on number of devices, lack of skilled computer proficiency staff and unfamiliarity of health care provider to use it, in addition to resistance of staff when change system from paper documentation to electronic documentation (Ota, 2018; Waithera et al., 2017; Denisco & Barker, 2016; Khalifa, 2013). Another EMR's barriers are, it is expensive to develop, slow processing, and not being user-friendly. Adding to that, lack or poor interoperability between the electronic medical records systems can hinder other providers to communicate effectively (Fatt, 2016).

Essentially, nursing staff considered the main probable users to EMR. They play a vital role in the planning and implementation of EMRs and their individual computer expertise and/or attitude and knowledge of EMRs could be important in the successful implementation. So, they need to be motivated to use EMR to improve their performance and provide safe and effective nursing care (Aldosari, et al., 2018) Abell & Alexander, 2015). But, a large number of nursing staff have not received computer training on their job and not have prior experience with an EMR system. This lack of training affects their attitudes and increases their resistance to implement an EMR in the workplace (Abu Raddaha, 2018).

Significant of the study:

Tanta International Teaching Hospital is the biggest hospital in the Middle East. It had a lot of departments and specialties. Nursing staff working in this hospital found themselves overwhelmed by the new format and lots of patients' information (Abo Shanab, 2014). To apply EMR system successfully, a thorough understanding is essential. Nursing staff knowledge, experience and attitude on information technology are very important to use EMR system in patient-centered nursing care activities (Abell & Alexander, 2015). Consequently, continuous training to provide nursing staff with the fundamental and specific knowledge for using EMR and improve their attitude about the use of EMR system is very important and needs to be accessible to all nursing staff (Edwards, 2012).

1.1. The aim of the Study:

The aim of current study was to evaluate the effect of an educational program on nursing staff knowledge and attitude toward electronic medical record at Tanta International Teaching Hospital.

1.2. Research hypothesis:

An educational program expected to reinforce nursing staff knowledge and attitude toward electronic medical record at Tanta International Teaching Hospital.

2. SUBJECTS AND METHOD

Subjects:

2.1 Research design:

Quasi-experimental (pretest-posttest control group) research design was adopted.

2.2 Setting:

The study was carried out in medical and surgical units at Tanta International Teaching Hospital.

2.3 Subject:

consisted of all (130) available nursing staff working at above-mentioned setting. They were randomly assigned into study (n=65) and comparison groups (n=65).

2.4 Tool:

To collect data for this study, a questionnaire was employed. The questionnaire included four parts.

Part one: included nursing staff personal characteristics such as age, gender, marital status, years of experience, level of education, department.

Part two: incorporated nursing staff computer experience assessment questions. This part was modified by the researchers based on Al-Azmi et al., (2009) and Gürdas et al., (2015), to assess the experience of nursing staff about the computer. It consisted of 8 items that asked about previous PC experience, a computer at home, daily PC use frequency, typing ability, ease of data input, computer error frequency, training in IT and EMR using.

Part three: contained nursing staff attitude toward using of electronic medical record items. This part was developed by the researchers based on Almutairi & McCrindle, 2016; Al-Harbi, 2011; Masrom, 2007, and related literature (Nandikove, et al., 2018; Lehrman et al. 2015; Gürdas & Kaya, 2015) to assess the attitude of nursing staff about EMR. It composed of 38 items covering the following areas: general attitude toward EMR using (9 items), perceived usefulness of EMR (10 items), perceived motives to the use of EMR (9 items), perceived barriers to use EMR (8 items).

Scoring system: Attitude of nursing staff was measured using five points Likert scale ranging from (5) strongly agree, (4) agree, (3) uncertain (2) disagree; to (1) strongly disagree. The positive responses corresponded with scores for 5, 4 while negative attitude corresponded with scores for 1, 2.

Part four: of the questionnaire entailed questions on the nursing staff electronic medical record knowledge. It was developed by the researcher guided by Gyamfi, et al, 2017; Borycki, et al., 2011; Steiner, 2009, and related literature (Nandikove, et al., 2018; Abell & Alexander, 2015) to assess nursing staff knowledge regarding the electronic medical record. It consisted of 25 questions in form of true and false, match, and complete that cover definition and differences between paper record and EMR (5 questions), importance (5 question), function (5 questions), components (5 questions) and barriers of EMR (5 questions).

Scoring system: Responses of nursing staff was measured according to nursing staff answers (true = 1 and false = 0). Levels of nursing staff knowledge were as follows; good knowledge $\geq 75\%$, fair knowledge $< 60-75$, and poor knowledge $< 60\%$.

Method:

2.5 Procedures:

The present study tool was judged by five experts in the area of specialty (nursing administration - Faculty of Nursing at Tanta University) to check the content validity of the tool. A pilot study was carried out on 10 % of the nursing staff (n=7) who excluded from the study sample; to ascertain the clarity and applicability of the tools, identify any obstacles that may occur at the data collection, and to estimate the needed time to complete the questionnaire. The tool was modified based on the comments of pilot study and jury. Reliability of the tool (parts; 2, 3, 4) was tested using Cronbach's alpha coefficient test its value was 0.81, 0.89 and 0.95 for parts; 2, 3, 4, respectively.

2.6 Ethical considerations:

- Official permission to conduct the study was obtained from Tanta International Teaching Hospital responsible authorities.
- To gain the nursing staff cooperation, the purpose of the study was clarified, and then informed consent to participate in the study was taken from nursing staff. They were secured that their data will be kept confidential, and their right to withdraw was ascertained.

2.7 Fieldwork:

It involved four phases as follow;

(1) Assessment phase: Pre-implementation of the educational program, researchers conducted a pre-test to assess nursing staff (study and comparison groups) computer experience, attitude and knowledge baseline about EMR by using a written exam method at their work units through questionnaire sheet (parts 2,3,4), then the questionnaire assembled immediately after finished it.

(2) Planning phase: Researchers designed an educational program, specified its objectives, content, and methods of teaching after an extensive review of related literature and assessment of nursing staff level of knowledge and attitude about EMR. Teaching methods included lecture and group discussion were employed; also the researchers used different teaching aids including handouts, paper and pen, and data show projector.

(3) Implementation phase: Researchers executed an educational program about EMR for nursing staff. This program aimed at reinforcing nursing staff attitude and knowledge on EMR through focuses on definition and differences between paper record and EMR, importance, function, components, and barriers of EMR. The program first conducted for the study group in 10 hours; 2hrs for each session, one session every day. The program was done in the conference room at International Teaching Hospital. The data collection phase completed throughout two months (October and November 2016). At the end of the study, the same EMR educational program was done for the comparison group.

(4) Evaluation phase: by the end of the educational program, both groups (study and comparison) of nursing staff attitude and knowledge on electronic medical record were re-assessed (immediate post-test) to determine the effect of the EMR educational program using the same questionnaire sheet (parts 3,4) pre-program. Study group nursing staff results and comparison groups results were compared pre than post the educational program.

2.8 Statistical analysis:

Collected data were entered into the personal computer using Microsoft Excel. Statistical analysis was done using Statistical Package for Social Sciences (SPSS/version 20) software. Data were displayed using descriptive statistics for qualitative variables; frequencies and percentages were used, and for quantitative variables; means and standard deviations were employed. For categorized parameters, a chi-square test was used while, for numerical data, the t-test was used to compare two groups while for more than two groups ANOVA test was used. The level of significance was 0.05.

3. RESULTS

Table (1): Distribution of nursing staff according to their personal characteristics

Variables	Study group (n=65)		Comparison group (n=65)	
	N	%	N	%
Age (years)				
• 20 – 30	34	52.3%	33	50.8%
• 31 – 40	19	29.2%	23	35.4%
• 41 – 50	10	15.4%	9	13.8%
• More than 50	2	3.1%	0	0.00%
Mean± SD	31.276±9.181		30.584±7.923	
Experience (years)				
• < 5	23	35.4%	25	38.5%
• 5 - 10	9	13.8%	10	13.8%
• 11 – 15	17	26.2%	14	21.5%
• 16 – 20	6	9.2%	8	12.3%
• More than 20	10	15.4%	8	12.3%
Mean± SD	12.00±10.325		11.738±9.391	
Gender: Female	65	100.0	65	100.0
Education				
• Diplomas of Nursing	28	43.0%	34	52.3%
• Technical Institute of Nursing	33	50.8%	27	41.5%
• Bachelors’ degree	4	6.2%	4	6.2%
Department				
• Medical	33	50.8%	36	55.4%
• Surgical	32	49.2%	29	44.6%
Marital status				
• Single	17	26.2%	12	18.5%
• Married	48	73.8%	53	81.5%

Table (1): illustrates the distribution of nursing staff according to their personal characteristics. More than half (52.3% & 50.8%) of study and comparison nursing staff groups had 20 – 30 years old, and more than one-third (35.4% & 38.5%) of them had less than 5 years of experiences, respectively. More than half (50.8%) of the study group had Technical Institute of Nursing degree, while, more than half (52.3%) of comparison nursing staff group had Diplomas of Nursing degree. More than half (50.8% & 55.4%) of study and comparison nursing staff groups worked at medical units, respectively. All nursing staff was female and most (81.5% & 73.8%) of comparison and study groups were married, respectively.

Table (2): Distribution of study and comparison groups' nursing staff computer experiences pre-program

PC variables	Study group (n=65)		Comparison group (n=65)	
	N	%	N	%
Previous PC experience				
• Yes	42	64.6%	45	69.2%
• No	23	35.4%	20	30.8%
Computer at home				
• Yes	47	72.3%	50	76.9%
• No	18	27.7%	15	23.1%
Daily PC use frequency				
• No use	38	58.5%	44	67.7%
• Moderate	27	41.5%	21	32.3%
• Many times	0	0	0	0.00%
Typing ability				
• Bad	23	35.4%	29	44.6%
• Moderate	34	52.3%	25	38.5%
• Good	8	12.3%	11	16.9%
Data input				
• Easy	25	38.5%	30	46.2%
• Difficult	40	61.5%	35	53.8%
Computer mistake frequency				
• Always	25	38.5%	28	43.1%
• Sometimes	33	50.8%	29	44.6%
• Seldom	7	10.7%	8	12.3%
Training:				
• Had training in IT	19	29.2%	16	24.6%
• Did not have training in IT	46	70.8%	49	75.4%
Using EMR				
• Yes	0	0.00%	0	0.00%
• No	65	100.0%	65	100.0%

Table (2): shows the distribution of study and comparison groups' nursing staff computer experiences. More than two thirds (64.6%, 69.2%) of study and comparison nursing staff groups had previous PC experience, respectively, as well most (72.3%, 76.9%) of study and comparison had computer at home and around one-third (41.5% & 32.3%) of both groups had moderate use PC as daily frequency. More than half (52.3%) of the study group had moderate typing ability, compared to 38.5% of the comparison group. More than half (61.5%, 53.8%) of study and comparison group had input data difficulty, respectively. And, 50.8%, 44.6% of both groups had sometimes computer mistake frequency. A high percent (70.8%, 75.4%) of study and comparison group did not have training in IT, while, all (100%) nursing staff (study and comparison group) had not use EMR.

Table (3): Distribution of study and comparison nursing staff groups' knowledge levels on electronic medical record pre and post educational program

Knowledge on EMR dimensions	Study group (n=65)			Comparison group (n=65)			X ² P
	Poor	Fair	Good	Poor	Fair	Good	
• Definition and differences Pre	36	28	1	42	20	3	0.233

between paper record & EMR (5 items)		55.3%	43.1%	1.5%	64.6%	30.8%	4.6%	0.834
	Post	7 10.7%	14 21.5%	44 67.8%	39 60%	19 29.2%	7 10.8%	34.62 .000*
• Importance of EMR (5 items)	Pre	37 56.9%	19 29.2%	9 13.9%	34 52.3%	22 33.8%	9 13.8%	0.978 0.671
	Post	6 9.2%	10 15.4%	49 75.4%	37 56.9%	22 33.8%	6 9.2%	33.86 .000*
• Functions of EMR (5 items)	Pre	37 56.9%	17 26.2%	11 16.9%	32 49.2%	20 30.8%	13 20.0%	.277 .104
	Post	9 13.8%	9 13.8%	47 72.3%	28 43.1%	26 40.0%	11 16.9%	27.54 .000*
• Components of EMR (5 items)	Pre	43 66.1%	18 27.7%	4 6.2%	37 56.9%	16 24.6%	12 18.5%	0.218 0.817
	Post	6 9.2%	11 16.9%	48 73.9%	38 58.4%	17 26.2%	10 15.4%	16.32 .006*
• Barriers of EMR (5 items)	Pre	34 52.3%	24 36.9%	7 10.8%	32 49.3%	19 29.2%	14 21.5%	.355 .554
	Post	7 10.7%	8 12.3%	50 76.9%	25 38.5%	23 35.4%	17 26.1%	43.65 .000*
Total EMR knowledge (25 items)	Pre	39 60.0%	19 32.3%	7 10.8%	35 53.8%	21 32.3%	9 13.9%	0.956 .422
	Post	10 15.4%	6 9.2%	49 75.4%	33 50.8%	22 33.8%	10 15.4%	39.89 .000*

Table (3): illustrates the distribution of study and comparison nursing staff groups' knowledge levels on electronic medical record pre and post educational program. There were statistically significant differences ($p \leq 0.05$) between study and comparison group's total and all EMR knowledge dimensions pre than post the program. At pre-program, more than half (66.1%, 56.9%, 55.3%, 52.3%) of study group had poor knowledge levels regarding to components, functions and importance, definition, differences between paper record & EMR and, barriers of EMR, respectively, while, about half (ranged from 64.6% to 49.2%) of comparison group had poor knowledge levels in all dimensions. Post-program, study group's knowledge levels significantly improved to be high percent (ranged from 76.9%, 67.8%) of them had a good level in all EMR knowledge dimensions, while, no changed in comparison group knowledge.

Table (4): Comparison between study and comparison nursing staff groups' knowledge mean and standard deviation scores on EMR pre and post educational program

Knowledge on EMR dimensions	Study group (n=65)		T (P1)	Comparison group (n=65)		T (P1)	T (P2)
	Mean (SD)			Mean (SD)			
	Pre	Post	Pre	Post			
• Definition and differences between paper record & EMR (5 items)	2.215 (.857)	3.585 (1.059)	-11.683 0.000	2.550 (1.159)	2.631 (1.153)	1.217 .228	-11.804 .000*
• Importance of EMR (5 items)	2.338 (1.108)	3.662 (.834)	-10.649 0.000	2.369 (1.098)	2.185 (1.074)	2.753 .454	-12.51 .000*
• Functions of EMR (5 items)	2.431 (.968)	3.615 (.930)	-8.554 .000	2.723 (1.053)	2.569 (.984)	1.488 0.142	-12.35 .000*
• Components of EMR (5 items)	1.785 (1.166)	3.815 (0.966)	-13.967 .000	2.385 (1.271)	2.185 (1.322)	2.082 .131	-11.97 0.000*
• Barriers of EMR (5 items)	2.400 (.94868)	3.662 (.871)	-6.450 0.000*	2.492 (1.147)	2.800 (1.201)	1.330 .123	-12.89 0.000*
Total knowledge (25 items)	11.431 (3.283)	18.338 (2.056)	-17.901 .000	12.15 (3.173)	12.72 (3.434)	0.196 .762	-15.42 0.000*

* Significant at $p \leq 0.05$

P1 comparison between pre and post in the same group

P2 comparison between the post in each group

Table (4); reveals comparison between study and comparison nursing staff groups' knowledge mean scores on EMR pre and post educational program. There were statistically significant differences ($p \leq 0.05$) between study and comparison groups' EMR knowledge pre than post the program. Pre-program, the highest mean score (2.431 ± 0.968 & 2.723 ± 1.053) was for functions of EMR among study and comparison groups, respectively, while, the lowest (1.785 ± 1.166) mean score was for components of EMR among study group and importance of EMR (2.369 ± 1.098) among comparison group. Post-program, study group's mean scores knowledge were improved in total and all knowledge dimensions, with statistically significant differences pre than post-program ($p \leq 0.05$), while, the comparison group's knowledge mean scores were not changed with no statistical differences.

Table (5): Distribution of study and comparison nursing staff groups' attitude towards using electronic medical record pre and post educational program

Nursing staff attitude toward EMR	Study group (n=65)			Comparison group(n=65)			X ² P-Value
	Negative N (%)	Neutral N (%)	positive N (%)	Negative N (%)	Neutral N (%)	positive N (%)	
Pre intervention							
• General attitude toward EMR using	36 55.4%	10 15.4%	19 29.2%	29 44.6%	23 35.4%	13 20%	24.538 .176
• Usefulness of EMR	34 52.3%	14 21.6%	17 26.1%	28 43.1%	16 24.6%	21 32.3%	23.384 .215
• Motives to the use of EMR	45 69.2%	13 20%	7 10.8%	32 49.2%	12 18.5%	21 32.3%	19.835 .152
• Barriers to use EMR	35 53.8%	18 27.7%	12 18.5%	25 38.4%	17 26.2%	23 35.4%	23.643 .137
Post intervention							
• General attitude toward EMR using	8 12.3%	13 20%	44 67.7%	27 41.6%	19 29.2%	19 29.2%	30.692 .004*
• Usefulness of EMR	5 7.7%	10 15.4%	50 76.9%	24 36.9%	21 32.3%	20 30.8%	31.169 .020*
• Motives to the use of EMR	6 9.2%	7 10.8%	52 80.0%	23 35.4%	20 30.8%	22 33.8%	34.677 .010*
• Barriers to use EMR	7 10.8%	17 26.1%	41 63.1%	24 36.9%	23 35.4%	18 27.7%	52.415 .000*

* Significant at $p \leq 0.05$

Table (5); represents distribution of study and comparison nursing staff groups' attitude towards using EMR pre and post educational program. There were statistically significant differences ($p \leq 0.05$) between study and comparison groups' regarding their entire EMR attitude subscales pre compared to post-program. Pre-program, more than two thirds (69.2%) of study group had negative attitude related to motives to the use of EMR, as well more than half (55.4% & 52.3%) of them had negative attitude toward general attitude toward using EMR, barriers to use EMR and usefulness of EMR, which statistically significant ($p \leq 0.05$) changed to positive (80% - 63.1%) attitude post-program. While, 49.2%, 44.6%, 43.1% & 38.4% of the comparison group had a negative attitude toward motives to the use, general attitude, usefulness and, barriers to use EMR pre-program, which no changed post-program.

Table (6): Relationship between study and comparison nursing staff groups' total EMR knowledge and their training, daily computer use, and attitude toward EMR post educational program

Variables	Total EMR knowledge					
	Study group (n=65)		X ² p	Comparison group (n=65)		X ² P
	Good	poor		Good	poor	
Training:						
• Had training in IT	15 (23.1%)	4 (6.2%)	38.73	7	9 (13.8%)	32.19

			.000*	(10.8%)		.000*
• Did not have training in IT	34 (52.3%)	12(18.4%)		11 (16.9)	38 (58.5%)	
Daily PC use frequency:						
• No use	26 (40.0%)	12(18.5%)	17.843	16 (24.6%)	28 (43.1%)	15.431
• Moderate	19 (29.2%)	8 (12.3%)	.000*	14 (21.5%)	7 (10.8%)	.002*
• Many times	0	0		0	0	
Attitude toward EMR						
• General attitude toward EMR using	43 (66.2%)	22(33.8%)	26.277 .050*	30 (46.2%)	35 (53.8%)	13.615 .401
• Usefulness of EMR	52 (80%)	13 (20%)	35.246 .000*	37 (56.9%)	28 (43.1%)	25.000 .095
• Motives to the use of EMR	47 (72.3%)	18(27.7%)	42.077 .000*	31 (47.7%)	34 (52.3%)	26.578 .315
• Barriers to use EMR	39 (60%)	26 (40%)	39.765 .000*	38 (58.5%)	27 (41.5%)	16.734 .273

* Significant at $p \leq 0.05$.

As evidenced in **table 6**, post educational program there was statistically significant relationship ($p \leq 0.05$) between study and comparison nursing staff groups' total EMR knowledge and their training and daily PC use frequency. As well as, there was a statistically significant relationship ($p \leq 0.05$) between study group total EMR knowledge and their entire attitude subscales, but there was no relation between comparison nursing staff group total EMR knowledge and their entire attitude subscales.

Table (7): Relationship between study nursing staff group's total EMR knowledge, attitude and their personal characteristics post educational program

Variables	Total EMR knowledge			Total EMR attitude		
	Mean ±SD	F	p	Mean (SD)	F	p
Age (Years):						
• 20 – 30	18.382 ±1.969	.094	.201	132.64±12.047	-.572	.636
• 31 – 40	18.375 ±1.893			137.19±9.282		
• 41 – 50	18.538 ±2.401			133.77±13.53		
• More than 50	16.00 ±2.828			136.00±1.414		
Experience (years):						
• < 5	18.773±1.77	.894	.995	133.68±14.180	.831	.511
• 5 - 10	17.222±2.333			132.77±5.739		
• 11 – 15	18.286±1.976			128±8.794		
• 16 – 20	17.75±1.258			138.00±4.320		
• More than 20	18.455±2.345			136.36±39.345		
Education:						
• Diplomas of Nursing	18.893±2.025	2.523	.018*	136.75±10.582	1.621	.005*
• Technical Institute of Nursing	17.788±2.043			131.394±11.278		
• Bachelors' degree	19.00±1.224			137.75±15.237		

* Significant at $p \leq 0.05$.

As noticed in **table 7**, post educational program study nursing staff group's total EMR knowledge found to have no statistically significant relationship with their age ($p = .201$) and years of experiences ($p = .995$) while, there was a positive relationship with their education ($p = .018$). Also, there was a statistically significant relationship between study nursing staff group's total EMR attitude and their education ($p = .005$), while there was no relationship between their attitude and their age ($p = .636$) and years of experiences ($p = .511$).

4. DISCUSSION

Nursing staff constitutes the biggest cohort in the healthcare area. So, they will be the biggest group for using the healthcare technology (Lu et al., 2012). As well, they would be extremely influenced by electronic medical record's application. It is suggested that an effective application of electronic medical record can largely reinforce the nursing practice and help them to offer high quality of care via refreshing nursing actions and are instituting decision maintaining techniques (Deese and Stein, 2004).

Nursing staff computer experiences:

The current study results revealed that more than two-thirds of the study and comparison nursing staff groups had previous PC experience, as well most of them had a computer at home and around one-third of both groups had moderate use PC as daily frequency. These results are finest indicators for nursing staff positive attitude regarding EMR, as those nurses might not fright from the un-humanized action of technology on patient care, as well it encourages them to employ EMR.

The capacity to utilize IT system is a significant precondition for nurses, whom in clinical practice can take its advantages of abstaining health and nursing information by computers (Kaya et al, 2008; Kaya, 2011). Pine, (2011) has depicted that information technology is a basic ingredient of the healthcare reform to fit persons who want health care and those who offer such care. So, to ascertain efficient and functional application of information technology in healthcare, it is essential to evolve strategies that allow nurses to take the advantages of and recognize their attitudes in respect of utilizing of computers in healthcare (Kaya, 2011; Huryk, 2010; Shoham & Gonen, 2008).

Staggers, et al., (2007) pointed out that better and prolonged experience with a computer can foster applying of EMR. And, André et al., (2008) proposed that the better index for nurses' employ of computers in healthcare were their favorable attitude to adopt it. The current findings are along with Al-Azmi, et al., (2009) who found that most of the participants owned a computer at their job. Also, Al-Harbi, (2011) revealed that the majority of the participants notified that they always use computers' applications.

Present findings showed that more than half of study group had moderate typing ability compared to more than one-third of the comparison group. Also, more than half of study and comparison groups had data input difficulty. And about half of both groups had sometimes computer mistake. The present findings reflect nursing staff PC skill level, as those nursing staff actually had sometimes computer mistake and most healthcare workers already had lack of computer skills, hence, it might affect their data entry abilities and as a result affecting their attitude, since a more constructive attitude to EMR is held by those who had well typing ability.

It noticed that by skillful usage of computer technology, as in the EMR, nursing staff can provide more efficiently patients' care through supplying the nursing staff with better, competent, suitable, and secured EMR (Locsin, 2005; Deese & Stein, 2004). Whereas, computer mistakes can come from various sources, including EMR issues, hardware, and network stoppage. Any failure in the EMR system that can consume time until it repairs by technicians and over this time the nurse returns to the paper-record system. These difficulties can discourage and increase nurses' discontent and avoidance of EMR (Al-Azmi, et al., 2009).

The current result was inconsistent with, Al-Azmi, et al., (2009) who showed that about half of subjects stated that they had good typing ability, and minor percent revealed as bad ability. Also, they found that vast majority of participants possess easy ability to enter data, while, minority owed difficult ability. As well as, most of the subjects cited as a rare computer error, about half was sometimes and marginal always had computer mistake.

Nursing staff knowledge levels on electronic medical record:

Present study results showed that at pre-program, more half of study and comparison nursing staff groups had poor EMR knowledge regarding components, functions, importance, definition, differences between paper record & EMR and, barriers of EMR. The current findings denote that scanty official update-knowledge concerning EMR took place in a significantly inconstant work environment as reflected by the fact that all studied nursing staff groups (study and comparison) had no IT training. Applying of healthcare computer technology is determined essentially by nurses' willing to acquire that knowledge and can be encouraged by efficient learning conditions. Thus, EMR information needs to be included early in nursing students' courses and, constantly presented into continual and in-service training courses.

This result is sensitive since nursing staff EMR knowledge has an impact on their performance. As a weakly EMR system performance cannot indicate good nursing care. Consequently, to preserve the efficient patient care outcomes, nurses need to know when getting on its usage. Ultimately, this understanding stimulates their wish to persist in learning on the important issues that are needed for successful EMR application, so this knowledge facilitates their efficient employ of EMR (Steiner, 2009). The current result confirmed by Powell-Cope, et al., (2008) who declared that to use EMR successfully, nurses need skills and knowledge; training and in-service education are best methods to increase that knowledge.

The current findings clarified that post-program, study group's EMR knowledge levels significantly improved to be a high percentage of them had a good level in all EMR dimensions, while there was no change in comparison group's knowledge with statistically significant differences between two groups' total and all EMR knowledge dimensions pre than post-program. This result entails the effect of the educational program and suggests that EMR education and training has to start at the nurses' pre-employment level. Thus, faculties of nursing need to ascertain that undergraduate set of courses encompass the recent IT system.

It is proposed that the philosophy of information technology acquisition at the International Teaching Hospital need to be altered at all levels if EMR will be applied in any department. Recognizing any prevalent deficits in informatics skill and knowledge can help nursing educators and nursing directors in healthcare practice environments understand what needs to be well-done to enhance nursing education and, accordingly, greatest direct nurses to utilize EMR successfully in healthcare settings (Miller et al. 2014).

The success of nurses' EMR implementation is attributed to several bases including selecting a design that suitable to the organizational culture's demands, nurses themselves as an end EMR users, management support, affording enough technological support besides, presenting ongoing staff training to advance (Blavin et al., 2013; Waneka and Spetz, 2010). Likewise, Hegney, et al., (2007) mentioned that when nurses are going to start their work life, managers have to create accessible ongoing specialized education to make certain that those nurses possess the strength to employ the IT in their work environment, through including IT training intended for all nursing staff in hospital's training budgets. In this regard, Steiner, (2009) mentioned that the nurses' use of the EMR was allied with a lack of success if there is not adequate education offered; additionally, careful education was linked with nurses' EMR satisfaction. Also, McLane (2005), declared that providing sufficient training to nurses which simply fit with their schedules, introduced by the specialists of EMR, shared in an extremely successful EMR execution.

The current result is along with Blavin et al., (2013) who declared that training is the finest practices through evaluating the nurses' skill level and harmonizing training to their need, applying numerous training methods, and expanded the zone of "go-live" to optimal EMR implementation. Also, DesRoches, et al., (2011) specified that applying EMR system had to happen subsequent to an education level had completed. Also, Adams, (2015) concluded that to hold an effective use of an IT structure, it is essential to afford sufficient time to educate staff and delineate the profits of implementation. On the other hand, Andre et al. (2008) contradicted the present study findings and illustrated that about half of participants reported they did not engage in either training or educational program concerning employing the IT system.

Nursing staff groups' attitude towards using electronic medical record:

Exiting findings showed that pre-program, more than one-third of comparison group had a negative attitude toward motives to the use, general attitude, usefulness and, barriers to use EMR with no changed post-program. These results denote the lack of training courses as well, that nursing staff might lack confidence in the EMR efficiency and performance as a supporting device for patient care, since nursing staff often see that the technology is not suitable for the individual nature of caring given by them and they can not appreciate its merits for their clinical workflow, as well as, there might be some hindrances to use EMR that can drive nursing staff negative's attitude. Therefore, might dishearten the computer systems application in patient care. These obstacles will be diminished rapidly as more nursing staff are becoming equipped with health IT training.

Electronic medical record -as a new technology- have to offer apparent usefulness for nursing staff as advancing the quality of nursing care or decreasing their workload (de Veer & Francke, 2010). Many researchers illustrated that nursing staff outlook can inspire the effective application of an EMR format (Lynch et al., 2014; Furst et al., 2013; Hsu

et al., 2013). If nurses realized that the advantages of EMR exceeding than its obstacles, subsequently their attitude will be positive. But, if they had lack of time management skills and IT education and, were overwhelmed with technology, they will have negatively EMR attitude (**Whittaker et al., 2009**). So, in order to encourage the successful application of EMR method, organizations need to charge their employees' levels of knowledge, abilities, and attitudes (**Furst et al., 2013; Kaya, 2011; Nkosi et al., 2011**).

The current results are along with **Laramee et al., & Phaneuf, (2012)** who found that there was a minor but not significant progress in participants' attitude after one and half year period of training. Also, **Adams, (2015)** concluded that there was a positive increase in the nurses' attitude toward the HER system after attending simulated training on EHR. On contrary, **Dahm and Wadensten, (2008)** depicted that the nurses had negative attitudes towards emergent computer application in healthcare. As well, **Kaya (2011)** revealed in general that healthcare employees had positive attitudes towards computer application in healthcare.

Existing results found that there were statistically significant differences between study and comparison nursing staff groups' entire EMR attitude subscales pre compared to post-program. This finding possibly reveals the effect of providing training in EMR, as well as reveals that nursing staff perceived that the EMR applications in International Teaching Hospital are valuable and useful to patients and hospital together, as nurses' attitude is essential in achieving the optimal computerization in the health division.

Generally, nurses did not reject applying IT and acknowledged the necessity to know about IT due to its possibility to advance; access to information, communication, and care of patients (**Hegney, et al., 2007**). In addition, it is essential to remember that nurses constitute the largeness of technology providers in healthcare organizations (**Ochieng & Hosoi, 2005**), their acceptance, adoption, and attitude (positive or negative) toward IT usage is a crucial determinant of its successful performance (**Laramee et al., & Phaneuf, 2012**). So, it is imperative to exert great efforts to detect ways to meet nurses' requirements concerning computer uses.

McLane, (2005) suggested that wide education and engaging of nurses in the IT planning process confirmed effective EMR achievement. Evaluating pre-implementation nurses' attitudes permitted execution managers to recognize the interests of the staff and adapt education to their requirements. Involving nurses in the EMR design procedure supports their acceptance and, as a result, an improved possibility of its execution success. Along with the present findings were **de Veer and Francke (2010)** revealed that participants who attended training on EMR and utilized it, had more positive and acceptance to use technology compared to nurses who had not as well as, they provided role models for applying of EMR in the future. Also, **Ochieng & Hosoi (2005)** clarified that to reinforce EMR extension, thorough training of healthcare staff must be taken place to enhance positive attitudes to computer practice in the clinical area.

The relationship between the study variables:

As shown in the present study results there were statistically significant relationship between study and comparison nursing staff groups' total EMR knowledge, their training and daily PC use frequency post-program. This result means that the higher the EMR knowledge, the more nurses will merge the EMR system into their practice, Since, nursing staff who had EMR knowledge can smoothly accept technology that they recognized it as more beneficial and easier when use.

This result is consistent with **Kaya, (2011)** who showed that when the nurses utilize PC at home and work more repeatedly, they had more knowledge and attitude. **Al-Harbi, (2011)** mentioned that nursing staff who attended IT training program recognize fewer hindrances to employ IT than those who had no IT training. Also, she not found significant differences between nurses who attend IT training and others who had not take any training regarding their awareness towards obstacles to employ health's IT

As evidenced in the current results, study nursing staff group's total EMR knowledge had a statistically significant relationship with their entire attitude subscales, but there was no relationship between comparison nursing staff group total EMR knowledge and their entire attitude subscales. These results propose that EMR knowledge might influence the nursing staff attitudes, which sequentially affects their EMR application. Actually, appropriate EMR training of nursing staff will raise their computer skill and their trust in the applying of it. Besides, it aids them to resolve several uncomplicated computer's troubles. Eventually, this is probably reinforcing nursing staff positive viewpoint towards EMR.

The current results are supported by **Ward, et al., (2008)** who demonstrated that Chinese nurses had moderate levels of the total computer knowledge and skills along with neutral computer's attitudes, with no significant correlation. Also, **Ketikidis et al., (2012)** found a constructive correlation between nurses' recognition for ease of utilizing IT and their attitude that leads to improving the realized IT performance. As well, **Positioning Nursing in a Digital World (2014)** confirmed that one-third of nurses had not take IT training, and the deficiency of that training impacts their attitudes and reinforces their resistance to use EMR. **Haugen, (2012)** recommended conducting simulated EMR training to avert its application's resistance and failure as well as, to relieve nurses' feeling of overwhelmed and help them to be more trusted with EMR technology.

Exiting results pointed up that study nursing staff group's total EMR knowledge found to have no statistically significant relationship with their age and years of experiences while, there was a positive relationship with their education, post-program. These findings indicate as nursing staff age increased, little EMR knowledge was captured. The possible explanation of these results is that the older nursing staff is unwilling and reluctant to apply new technology, especially computer systems. Therefore, the need for offering information about EMR likely positive application's outcomes is approved.

Since the execution of EMR takes place in any healthcare organization, plans for additional training time might be desired directed to specific groups of staff (**Abell, et al., 2015**). **Hegney, et al., (2007)** declared that overall nurses with less working years of experience in nursing are more expert and trust with IT; most probably this is related to more up to date varsity education affording training in IT. Along with the current results **Hegney, et al., (2007)** who revealed that through various nursing levels; the more senior nurses are evenly more expert and trust with IT than nurses at the junior positions.

Post educational program, exiting results showed that there was a statistically significant relationship between study nursing staff group's entire EMR attitudes and their education, while there were no relations between their attitude and their age and years of experiences. These results reflect that the higher the job degree, the more favorable the attitude toward EMR. Worth mentioning, nurses' attitude affects their capability to employ the EMR effectively. Since, older nurses were more liable to evade employing computers, less expected to believe education was necessary, more possible to rebut that computers decrease errors and replication, or supported access to easier life. Hence, once the organization put a plan for applying or shifting to EMR system, education about the importance of EMR is an essential element of nursing staff preparation.

Nurses' attributes can do a significant function in whether recent work procedures are executed and indeed used (**Francke et al., 2008**). Applying EMR means a modern way of forming work. E.g. the nurse should possess an access to the computer in order to check or complete a patient file; as a result, the recorded information will be more consistent. So, nursing staff has to be capable, ready, and enthusiastic to work with computers. Previously, **Nksoi et al., (2011)** pointed out that utilizing PC create a sense of fright and worry among some nurses and this subsequently influenced their attitude toward EMR usage, this fact did not agree with nurses who had past experience with or attend an IT training. **Ward, et al., (2011)** revealed that nurses with preceding experience on an EMR retained a favorable attitude compared to nurses who did not possess EMR experience. Also, **Hegney, et al., (2007)** showed that nurses who had no experience in IT were notably older when compared to nurses who had experience.

An effective shifting to apply IT in practice relies on a supportive educational environment (**Huryk, 2010**). **Abell, et al., (2015)** supported that present result and noted a statistically significant correlation between nurses' educational levels and their EMR belief. Furthermore, he found that younger nurses possess a more propensity to give a positive reaction in relation to the outcomes of EMR. Conversely, **Kaya (2011)** revealed that there was a little significant difference in the nurses' demographics as he found that younger nurses had more positive attitudes regarding IT. **Moody, et al., (2004)** demonstrated that nurses' age had a weak significant correlation with their total EMR attitude. Also, they showed that nurses' years of experience had no significant correlation with their entire response to EMR attitude scale.

5. CONCLUSION AND RECOMMENDATIONS

An improvement was noted in studied nursing staff levels of knowledge and attitudes about EMR after implementing an educational program as indicated by upgrading their EMR knowledge scores and positively changed related attitude subscales. Nurses' knowledge and attitudes of EMR can be a key element in its effective application. So, nursing staff can utilize EMR to achieve the greatest and up to date care in favor of their patients. Based on current results, the study recommends the following:

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For Education:

- Nursing faculties need to integrate IT into their undergraduate and graduate curriculum.
- Informatics EMR skills training should be provided for students who do not own a fundamental level of proficiency.

Nursing Practice: healthcare leaders can increase the likelihood of successful EMR implementation through:

- Providing initial and ongoing staff education on EMR through the use of simulation training can increase the potential for its success.
- Changing hospital's work procedures and instituting new EMR policies and practices to promote strategic integration and adoption.
- Involving nurses in the selection and design of the EMR can increase their acceptance.
- Setting up a feedback system, to ensure prompt response and support by EMR leaders when problems are encountered.

Further research: needs to determine the factors that contribute to successful EMR implementation e.g organizational, staff factors.

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