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Effectiveness of an Educational Program on Nurse's Knowledge & Practices Toward Uses of Defibrillation Cardioversion Shock at Critical Care Unit in Imam Al-Hussein Teaching Hospital

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Abstract:

Objective: To evaluate the effectiveness of an educational program in knowing nurses towards the use of cardiac defibrillation shock for patients with arrhythmias, and to evaluate the effectiveness of the educational program on the practice of nurses who use defibrillation shock for patients with arrhythmias in the critical care unit, and to identify the relationship between effectiveness Educational program and demographic characteristics (age, level of education, address, years of service) for nurses. **Methodology:** A quasi-experimental study conducted in the critical care units (cardiac resuscitation, pulmonary resuscitation, surgical resuscitation) at Imam Hussein Teaching Hospital, from(26th November 2019 To 10th May 2020) A purpose sample (non-probability) consisting of (60) nurses was tested. And a nurse is divided into two groups (30) nurses for the case study group, and 30 nurses for the control group. The data was collected in two phases: first the baseline data (before any overlap was made to the study group) and 21 days after the implementation of the educational program of the study group the test was conducted after the program, for the nurses' knowledge, and 14 days after applying the educational program of the study group For their practices. The reliability of the internal consistency was achieved by applying the alpha correlation Coefficient (r=0.85) which was statistically acceptable. The data were analyzed by applying descriptive and inferential data .**Results:** The results of this study shows that there is a highly significant differences related to nurses' knowledge and practices regarding Uses of Defibrillation Cardio version Shock at Critical Care Unit; between pre & post-test in the study group. with no statistically significances differences between demographics variables (age, gender, years of service in nursing) ,while there is statistically significances differences between demographics variables (educational level and years of service in critical care units) and effectiveness of educational program for nurse`s. **Conclusion:** Nurses' knowledge and practices regarding Uses of Defibrillation Cardio version Shock at Critical Care Unit, has been improved after implementation of the educational program in the study group, which reveal that the effectiveness of the provided program was highly beneficial. **Recommendations:** Orientation program should be utilized for newly graduated nurses in critical care units to improve their knowledge and practice.**,** Nurses in critical care units should updating their knowledge and practice through frequent attending seminars, and conferences based on their needed assessment. **,** Continuous educational program for theses nurses concerning any emergency situation in the critical care units.

Keywords: Effectiveness, Educational program, practice, Defibrillation Cardioversion Shock.

I. INTRODUCTION:

Arrhythmias abnormalities in the generation or conduction of these electrical impulses or both any heart disorder, including congenital abnormalities of structure (eg, accessory atrioventricular connection) or function (eg, hereditary ion channelopathies), can disturb rhythm. Systemic factors that can cause or contribute to a rhythm disturbance include electrolyte abnormalities (particularly low potassium or magnesium), hypoxia, hormonal imbalances (eg, hypothyroidism, hyperthyroidism), and drugs and toxins (eg, alcohol, caffeine) (Saffitz & Corradi, 2016).

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Recent years have seen rapid proliferation of ablative and antiarrhythmic therapies for treating various ventricular and supraventricular arrhythmias. yet cardioversion and defibrillation remain the main modalities to restore normal sinus rhythm. Their simplicity reliability, safety, and, most important, their efficacy in promptly restoring normal sinus rhythm are unmatched in our current treatment armamentarium (Corrado et al., 2017).

The use of automatic external defibrillators by basic life support ambulance providers or first responder in early defibrillation programs has been associated with a significant increase in survival rates. Drugs such as lidocaine, procainamide, sotalol, amiodarone, or magnesium were recommended for treatment of ventricular tachyarrhythmias in intensive care patients. Amiodarone is a highly efficacious antiarrhythmic agent for many cardiac arrhythmias, ranging from atrial fibrillation to malignant ventricular tachyarrhythmia's, and seems to be superior to other antiarrhythmic agents (Ong et al., 2018).

The need for treatment of arrhythmias depends on the symptoms and the seriousness of the arrhythmia. Treatment is directed at causes. If necessary, direct antiarrhythmic therapy, including antiarrhythmic drugs cardioversion-defibrillation, implantable cardioverter-defibrillators (ICDs) pacemakers (and a special form of pacing, cardiac resynchronization therapy), catheter ablation, surgery, or a combination (Kameli, 2015).

Direct current (DC) cardioversion or defibrillation can be delivered as monophasic or biphasic current. Monophasic current travels in one direction between the two electrodes . The biphasic device requires lower energy and has been shown to lead to higher rates of return of spontaneous circulation (ROSC). However, survival outcomes are similar in both devices. Most manual and automated external defibrillators (AEDs) are now biphasic because of increased efficiency at restoring sinus rhythm. Biphasic devices are also smaller in size (making the devices more portable(Horseman & Gonter, 2018).

IMPORTANCE OF THE STUDY

Delivery of direct current (DC) shocks to the heart has long been used successfully to convert abnormal heart rhythms back to normal sinus rhythm.(Braga & Cooper, 2018).

The American heart association (2005) reported that the chance of survival decreases from 7% to 10% for every minute that passes without defibrillation when a shock able rhythm is present. When shock is delivered within 3-5 min, the survival rate of sudden cardiac arrest secondary to ventricular fibrillation can range from 48-74%.The correlations between delaying defibrillation and survival are further strengthened from findings of initial survival rates of nearly 100% when a shock for ventricular fibrillation was delivered within 1-2 min after cardiac arrest in an in-patient setting (Rudic et al., 2017).

II. OBJECTIVES OF THE STUDY

1-To assess Effectiveness of an educational program on nurses knowledge toward uses of Defibrillation Cardioversion shock for Patients with cardiac arrhythmias at critical care unit in Imam Al-Hussein Teaching Hospital.

2-To evaluate Effectiveness of educational program on nurses practice toward uses of Defibrillation Cardioversion shock for Patients with cardiac arrhythmias at critical care unit in Imam Al-Hussein Teaching Hospital.

3-To identify the association between Effectiveness of an Educational Program and the demographic characteristics (age, level of education, address, years of service) of nurses.

III. HYPOTHESIS OF THE STUDY

1- There will be a significant difference between the pre-test and posttest knowledge and practice scores of staff nurses regarding cardioversion and defibrillation.

2- There will be a significant association between the pre-test knowledge and practice of staff nurses regarding cardio version and defibrillation with selected socio-demographic variables.

IV. MATERIALS AND METHODS

The quasi-experimental design (two-dimensional demonstration of two-group pre-test and post-test design) was conducted on maintenance Effectiveness of an Educational Program on nurse's knowledge and practices toward uses of defibrillation cardio version shock at critical care unit. It was conducted with application of pre and post- test approach for the study group and control group in assessing their knowledge and practice and the application of education program for the study group. It was carried out in order to achieve the initial stated objectives. The study started from(26th November 2019 To 10th May 2020).

V. SETTING OF THE STUDY

The study was conducted in al Nasiriya City at AL-Hussein Teaching Hospital Critical Care Units department which include: (Coronary Care Unit), (Intensive Care Unit), (Respiratory Care Unit).

THE SAMPLE OF THE STUDY

A non - probability purposive sample was randomly selected from Nurses who are working in critical care units at Al Hussein Teaching Hospital in Di Qar city. The sample consist of (60) nurses which are divided into two groups

(30)nurses considered as study group, and another (30) nurses considered as control group. The study group was exposed to an education program, while the control group was not exposed to the program. Random allocation of the sample was done to avoid bias selection and to control for potential confounding.

INSTRUMENT OF THE STUDY For the purpose of the present study , a questionnaire was conducted by the researcher depending on : Extensive review of available related literatures and studies about cardioversion and defibrillation use The questionnaire was used before and after conducting a special program designed to increase the knowledge of the sample . The purpose behind that is to assess the knowledge of the sample prior to the intervention and after in order to check the effectiveness of the program self-administered questionnaire was constructed by the researcher in the purpose of data collection regarding Nurse's knowledge about cardioversion and defibrillation use .It consisted of Five parts**:**

Part I: Socio-Demographic Characteristics Questionnaire:

It consists of (8)items related to the socio-demographic characteristics of the sample which include nurses'(Age, gender, level of education , years of experience, years of experience in Critical Care Units, and training sessions, Pre-use).

Part II: Nurse's knowledge toward The heart anatomy and physiology:

This part includes (10) items (multiple choice questions) related to heart anatomy.

Part III: Nurse's Knowledge about electrocardiography and arrhythmia:

It consists totally (10) items (multiple choice questions) related to electrocardiography and arrhythmia.

Part IV: Nurse's Knowledge related about cardioversion and defibrillation:

It consists totally (13)items (multiple choice questions) about of cardioversion and defibrillation.

Part V: Practice rating scale related to Cardio version and defibrillation uses:

The observational checklist was composed of (17) items covered cardioversion and defibrillation use. The researcher observed and checked for correct or not correct performance and then the practices as mean (3) or (2) corrects episodes were rated as always, (one) correct practice was rated as sometime and non-correct practice rated as never.

VALIDITY OF THE INSTRUMENT

The content validity for the early developed instrument and instructional program was determined through the use of panel of experts to investigate the content of the instructional program and to determine the clarity, relevancy, and adequacy of the questionnaire in order to achieve the study objectives. A questionnaire, and instructional program were designed and presented to (15) experts. They are (6) faculty members from College of Nursing / University of Baghdad, (2) faculty members from College of Nursing /University of Babylon, (2) faculty members from College of Nursing /Al-Muthanna University, (1) faculty member from College of Nursing /University of Kufa, (1) faculty member from College of Nursing /University of Al-Ameed and (3)specialized physician in Cardiology specialist Those experts were provided

with copy of study instruments and were asked to review and evaluate the instrument for its content clarity and adequacy.

Reliability of the instrument

Pilot study was carried out from(19th of January, 2020 to 28th January \2020). Ten nurses were randomly selected from AL-Hussein Teaching Hospital; the nurses in the pilot study had the same criteria of the original study sample. The results of the reliability present alpha correlation coefficient were (r=0.815) which considered statistically acceptable.

STATISTICAL METHODS

The analysis of the data was used through descriptive statistics (frequencies, percentages, and the arithmetic mean and standard deviation) and statistical inferential (T-Test) in order to find the differences between the study group and the control group.

VI. RESULTS OF THE STUDY

Table (1): Distribution of The Study Sample by Socio- Demographic Characteristics for (Study and Control Group) N= 60 Nurses**:**

Basic Information	Groups	Study group		Control group		Total Sample	
		F	%	F	%	F	%
Age groups	20 - 25	21	70.0	11	36.7	33	55.0
	26 – 30	4	13.3	8	26.7	12	20.0
	31 – 35	2	6.7	5	16.7	7	11.6
	36 – 40	2	6.7	3	10.0	4	6.7
	41 and above	1	3.3	3	10.0	4	6.7
	Total	30	100.0	30	100.0	60	100
	$\bar{x} \mp S.D.$	26.0∓1.102		23.0∓1.343		24.5 ∓ 1.526	
Gender	Male	9	30.0	13	43.3	22	36.7
	Female	21	70.0	17	56.7	38	63.3
	Total	30	100.0	30	100.0	60	100
Educational Level	Secondary Nursing school	6	20.0	9	30.0	15	25.0
	Nursing Institute graduate	13	43.3	9	30.0	22	36.7
	Nursing college graduate	11	36.7	12	40.0	23	38.3
	Total	30	100.0	30	100.0	60	100
Years of service in Nursing	1 - 5	21	70.0	16	53.3	37	61.6
	6 -10	6	20.0	6	20.0	12	20.0
	11 – 15	1	3.3	5	16.7	6	10.0
	16 -20	1	3.3	3	10.0	4	6.7
	20 and above	1	3.3	0	0.0	1	1.7
	Total	30	100.0	30	100.0	60	100
Years of service in critical units	1 - 5	24	80.0	18	60.0	42	70.0
	6 -10	5	16.7	12	40.0	17	28.3
	11 – 15	1	3.3	0	0.0	1	1.7
	Total	30	100.0	30	100.0	60	100
Have you ever used a defibrillator	Yes	23	76.7	12	40.0	35	58.3
	No	7	23.3	18	60.0	25	41.7
	Total	30	100	30	100.0	60	100.0

F=Frequency, %= Percent, $\bar{x} \mp S.$ *D*= Arithmetic Mean and Standard Deviation.

This table (1) revealed that the majority 21 (70.0 %) of nurses in the study group are within the age group (20-25 years) and 11 (36.7%) of nurses in the control group are within the same age group and 33 (55.0%) of nurses all

study sample of in within the age group (20-25 years). Related to the gender the study group were females and 21 (70.0%) of nurses, while 17 (56.7%) in the control group were females. In addition, as for total study sample gender were female 38 (63.3%). Concerning to the educational level, majority of nurses in study group were nursing institute graduate 13(43.3%), while 12 (40.0%) in the control group were nursing college graduate, in addition for total study sample 23 (38.3%) were female. In relation to the years of service in nursing, the most of nurses have 1-5 years in study groups 21 (70.0%), while 16 (53.3%) in the control group within the same years of services. In addition total study sample 37 (61.6%) have 1-5 years of services in nursing. Regarding to the years of service in critical units, the most of nurses have 1-5 years in study groups 24 (80.0%), while 18 (60.0%) in the control group. In addition total study sample 42 (70.0%) have 1-5 years of service in critical units. Regarding to have you ever used a defibrillator**,** the most of nurses answer (Yes) years in study group 23 (76.7%), while 18 (60.0%) in the control group answer (No) for this question. In addition, total study sample answers (Yes) for this question were 35 (58.3%).

Table (2): Effectiveness of Educational Program Among the Two Period (Pre and Post-test) for Nurse`s Knowledge toward Uses of Defibrillation Cardioversion shock for Patients with cardiac arrhythmias at critical care unit for Study Sample.

Period	Mean ±S.D.	*N*	T	P. value	Sig
Pre-test	1.2121 ± 0.07787	30	28.982	0.001	S
Post –test	1.8021 ± 0.05813	30			

$\bar{x} \mp$ S.D.=Arithmetic Mean ($\bar{x}$) and Std. Dev. (S.D.), F = Fisher test, d.f. = degree of freedom, P = probability value. , NS : Non Significant at P ≥ 0.05 , S : Significant at P < 0.05 t=t test , N=Number of sample.

Table (2) shows there is statistically significance differences between pre and post- test for study group at P < 0.05 , which mean effectiveness of educational program among the two Period (Pre and Post- test) for nurse`s knowledge toward uses of defibrillation cardioversion shock for patients with cardiac arrhythmias at critical care unit for Study group.

Table (3): Comparison of Pre and Post- test Practices between Study Sample (Control and Study Groups) Nurse`s toward Uses of Defibrillation Cardioversion shock for Patients with cardiac arrhythmias at critical care unit.

Period	Groups	*N*	Total Mean	*SD*	P=0.001	Sig.
Pre-test Practice	Control	30	1.2451	0.13910	0.552	N.S
Post-test Practice	Control	30	1.2451	0.13910		
Pre-test Practice	Study	30	1.2706	0.16681	0.003	S
Post-test Practice	Study	30	2.4863	0.18339		

N=number, SD=standard deviation, , P = probability value. , NS : Non Significant at P ≥ 0.05 , S : Significant at P < 0.05 t=t test , N=Number of sample.

Table(3) shows that the pre-test practice scores were approximately equal for the for control groups (M = 1.2) at pre and post-test period, while for pre and post-test practice, study group scores are higher (M = 2.48 versus M = 1.27).

Also this table show statistically significant differences between pre and post-test for study group at P < 0.05, which mean effectiveness of educational program among the two Period (Pre and Post-test) for nurse`s practice toward uses of defibrillation cardioversion shock for patients with cardiac arrhythmias at critical care unit for Study group.

Table (4): Statistical Associations of the Study Group between the Demographic Variables of Nurses and Effectiveness of Educational Program Among for Nurse`s Knowledge toward Uses of Defibrillation Cardioversion shock for Patients with cardiac arrhythmias at critical care unit by (ANOVA) :

No	Demographic Variables / Nurse`s Knowledge	Statistics				
		Mean±S.D.	F	d.f	P. value	Sig
1	Age	26.0∓1.102	2.634	29	.423	N.S
2	Gender	1.70 ±0.466	.894	29	.590	N.S
3	Educational Level	2.17 ± 0.747	1.472	29	.038	S
4	Years of service in Nursing	1.50 ± 0.974	4.445	29	.098	N.S
5	Years of service in critical care units	1.23 ± 0.504	.784	29	.005	S

$\bar{x}$ ∓ S.D.=Arithmetic Mean ($\bar{x}$) and Std. Dev. (S.D.), F = Fisher test, d.f. = degree of freedom, P = probability value, , NS : Non Significant at P ≥ 0.05 , S : Significant at P < 0.05.

This table(4) show their no statistically significances differences between demographics variables (age, gender, years of service in nursing) ,while there is statistically significances differences between demographics variables (educational level and years of service in critical care units) and effectiveness of educational program for nurse`s practices toward uses of defibrillation cardioversion shock for patients with cardiac arrhythmias at critical care unit ,when analyzed by ANOVA.

Table (5): Statistical Associations of the Study Group between the Demographic Variables of Nurses and Effectiveness of Educational Program for Nurse`s Practices toward Uses of Defibrillation Cardioversion shock for Patients with cardiac arrhythmias at critical care unit:

No	Demographic Variables / Nurse`s Knowledge	Statistics				
		Mean±S.D.	F	d.f	P. value	Sig
1	Age	26.0∓1.102	0.748	29	0.674	N.S
2	Gender	1.70 ±0.466	0.522	29	0.854	N.S
3	Educational Level	2.17 ± 0.747	0.779	29	0.648	N.S
4	Years of service in Nursing	1.50 ± 0.974	0.707	29	0.708	N.S
5	Years of service in critical care units	1.23 ± 0.504	0.971	29	0.035	S

$\bar{x}$ ∓ S.D.=Arithmetic Mean ($\bar{x}$) and Std. Dev. (S.D.), F = Fisher test, d.f. = degree of freedom, P = probability value, , NS : Non Significant at P ≥ 0.05 , S : Significant at P < 0.05.

This table(5) show their no statistically significances differences between demographics variables (age, gender, educational level and years of service in nursing) ,while there is statistically significances differences between demographics variables only (years of service in critical care units) and effectiveness of educational program for

nurse`s practices toward uses of defibrillation cardioversion shock for patients with cardiac arrhythmias at critical care unit, when analyzed by ANOVA.

VII. DISCUSSION

The findings of data analysis that are shown in **table (1)** result of the study sample reported that the age group less than 25 years old makes the majority of Nurses and more than other groups .These findings are agreed with study done by (Hzainel & Hassan, 2014) The results of the current study showed that the majority of nurses aged 25 and less are the most involved in the(control and study) group. Our findings are slightly differed from the results of the study (Hussein & Hassan, 2019) who stated that the age group more than (25yeare) formed the majority of Nurses because it was more than the others.

Related to gender, the result of the study for females was more participation than males in both group(control and study). these findings are agreed with study of (Al-Hakkak, 2014) he data analysis reveals that (66.7%) of the staff nurses for both groups (study and control) were female and the remaining were males. contradicting to the study done by (Rokeia, et al., (2017) who reported that the males were more than females.

Concerning the educational level, the majority of nurses are in The study and control subjects who were graduates of the Nursing Institute were the most participating compared to the other levels. These findings were agreed with the study of (Amirabadi ,et al ,.2012) He stated that the level of graduate from the Nursing Institute achieved the highest participation in a study and control group. But these findings disagree with the study of (Hui et al., 2011)) who documented that the nursing college graduate made the majority of nurses more than other educational levels.

In relation to the years of service in nursing, that employment 5 years and less construct the majority of nurses more than other levels of occupation year in both study and control groups. These results agree with study done by (Mohammed et al., 2019) with regard to years of experience The majority of nurses under study (73.3%) have 5 or less Years of experience, most participating group compared to the rest of the groups. but these findings disagree with the study of (Nasser & Hassan, 2014)who documented that the more 5 years construct the majority of nurses more than other levels of occupation years.

Regarding to the years of service in critical units, the most of nurses have 5 years or less in both study and control groups of service in critical units was the most involved group compared to the other groups. These results agree with study done by((Saiboon et al., 2016) who mentioned in that employment 5 years and less construct the majority of nurses more than other levels of the years of service in critical units.

Regarding to item related to ever used a defibrillator,most of the nurses who answered (yes) in the study and the control group more than the group answer (No) to this question .these results agree with study done by (Thomas, 2013) The majority were 64% of male and female nurses uses defibrillator more than the anther group. But these findings disagree with the study of (Stewart, 2012) The result of the study was their answer no more than answering yes in both groups.

Table (2) shows there is statistically significance differences between pre and post-test for study group at $P < 0.05$, which mean effectiveness of educational program among the two Period (Pre and Post- test) for nurse`s knowledge toward uses of defibrillation cardioversion shock for patients with cardiac arrhythmias at critical care unit for Study group. these results have come along with the findings of the (A. Mohammed & El-Aziz, 2016) the total score of nurses' knowledge categories before and after teaching program. It was observed that there were statistical significant differences between nurses' knowledge categories indicating good knowledge after teaching program, compared with poor knowledge before teaching program. There will be significant difference between post- test skill scores to the pre-test skill scores following implementation of teaching program**.** It was observed that there were statistical significant differences between nurses' skills indicating good skills after teaching program, compared with poor skills before teaching program.

Table (3) It shows that the pre-test practice scores were approximately equal for the pre- and post-test control groups, while for the pre- and post-test practice, the study group scores are higher and this table shows statistically significant differences between the pre- and post-test of the study group at $P < 0.05$, Which means the effectiveness of the educational program between the two periods (before and after the test) of the nurse's practice towards the uses of shock defibrillator cardiologists patients with arrhythmias in the critical care unit of the study group.

These results have come along with the findings of the study of (Saiboon et al., 2016)There was a significant improvement in performance between the pre-test and the immediate post-test practice. The incremental mean score in post-test practice was better in the study group compared with the control group.

Table (4) show their no statistically significances differences between demographics variables (age, gender, years of service in nursing) while there is statistically significances differences between demographics variables (educational level and years of service in critical care units and effectiveness of educational program for nurse knowledge toward uses of defibrillation cardioversion shock for patients with cardiac arrhythmias at critical care unit) ,when analyzed by

ANOVA. These results came in conjunction with the results of a study conducted by (Thomas, 2013) that conducted a study (assessing the effectiveness of a video-supported teaching program on knowledge and practice regarding cardiac heart and defibrillation among nurses working in the cardiac unit in selected hospitals of the bagalkot) that showed that the variables Demographics such as age, gender, religion, and work experience in years, were not significant in knowledge.

Table (5) show their no statistically significances differences between demographics variables (age, gender, educational level and years of service in nursing),while there is statistically significances differences between demographics variables only (years of service in critical care units) and effectiveness of educational program for nurse`s practices toward uses of defibrillation cardioversion shock for patients with cardiac arrhythmias at critical care unit, when analyzed by ANOVA. In support of our results by (Gupta & Dias, 2014) the study shows that there was no significant association between pre-test practice scores and selected demographic variables except only in relation to critical care unit work experience. Here calculated p value is (0.011), which is less than 0.05 level of significance thus it showed significant association with practice score.

VIII. CONCLUSTION:

Nurses' knowledge and practices regarding Uses of Defibrillation Cardioversion Shock at Critical Care Unit, has been improved after implementation of the educational program in the study group, which reveal that the effectiveness of the provided program was highly beneficial.

Recommendations: Orientation program should be utilized for newly graduated nurses in critical care units to improve their knowledge and practice.**,** Nurses in critical care units should updating their knowledge and practice through frequent attending seminars, and conferences based on their needed assessment. **,** Continuous educational program for theses nurses concerning any emergency situation in the critical care units.

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