

The Effect of Educational Program on Nurse's Performance Regarding Rapid Response Code to Prevent Cardiopulmonary Arrest

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Abstract

Post inter hospital cardiac arrest survival rate range from 17 - 32%. Early Warning Signs developed for the inpatient cases, Scoring system generated using the bedside assessment of physiologic parameters to detect of unwell patients and decreases in cardiac arrest rates. **The aim of this study** was to evaluate the Effect of Educational Program on Nurse's Performance Regarding Rapid Response Code to Prevent Cardiopulmonary Arrest. A quasi experimental **design** was used to conduct this study. The study was conducted in inpatient unit at Elaraby hospital, Egypt. **Convince sample** of all Inpatient nurses. **Method**; Study lasted from the beginning of February 2020 to beginning of December 2020. **Tools**: three tools for data collection. Self-administered questionnaire for nurses consisted of demographic characteristics and nurse's knowledge, observation checklist, and nurse's attitude. **Results**; the study finding revealed that, nurse's satisfactory knowledge pre educational program was Zero percentage, post educational program improved to 66%. Nurse's satisfactory practice pre educational program was 16%, post educational program improved to 60%. Also, the nurse's Positive attitude pre educational program was P 16%, post educational program improved to P 56%. Finally, the inpatient arrested cases in last month/critical cases number significant reduced; pre educational program P 7.6%, post educational program P 0%. **Conclusion**, Application of rapid response code for inpatient unit showed an improvement of inpatient cardiopulmonary arrest that clearly reduced. **The study recommended that**; increase awareness of Nurses regarding rapid response code to empower and motivate them to adhere to rapid response code guidance for prevent cardiopulmonary arrest.

Key words: Cardiopulmonary Arrest, Educational Program, Nurse's Performance, Rapid Response Code.

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I. Introduction:

Early Warning Signs (EWS) was developed for the inpatient cases in England since 1997. The scoring system generated a simple weighted score using the bedside assessment of five physiologic parameters, including (HR) heart rate, (SBP) systolic blood pressure, (RR) respiratory rate, temperature, and response to stimulus. A total score of three points or more triggered immediate escalation of care (Nagarajah et al., 2022).

Hospital has two different teams, Rapid Response Team (RRT) which acts when a patient presents with clinical deterioration, and the code blue which is called when the patient has cardiac arrest. An Intensive Care Unit (ICU) senior physician leads the RRT, plus unit Incharge and Assigned Nurse. Any code is alerted by dialing a particular number well known throughout the hospital. Almost code team is composed of a senior ICU physician, a medical resident and ICU nurse, and they bring with them an emergency cart, anyone can activate the code and all hospital wards can be reached within 3 minutes / code blue and 5 minutes / RRT (Viana et al., 2021).

Rapid Response System (RRS) is based on 4 essential components; the afferent limb includes EWS, physicians and nurses of general hospital wards, which called triggering limb., the efferent limb is the RRT that can be nurse or physician-led and can include a respiratory therapist, which called response limb., the administrative limb oversees all system components, allows the working of the team and provides necessary resources., and the quality improvement limb analyzes events data, provides feedback on the team function, monitors quality indicators like the staff satisfaction, and collects data on outcome measures (Difonzo, 2017).

II. Significance of the study:

Resuscitation teams are called to between one and five Inter Hospital Cardiac Arrest (IHCA) / 1000 hospital admissions amounting to around 20,000 arrests in NHS hospitals in England / year. Survival discharge is around 13-20%. 66% of IHCA patients show abnormal signs up to 6 hours prior to IHCA. Moreover, nursing staff

may be unaware of abnormal vital signs in almost 50% of patients in the general ward as they struggle to manage time pressures and work interruptions throughout their shift. This led to the development of RRS which focus on detect EWS (**Hogan et al., 2020**).

Historically, more recent literature is supportive of the positive effect of RRTs. Notably, decreases in mortality rates post implementation of an RRT within a hospital. Also, reported decreases in code blue calls and unplanned intubations as a result of the RRT model. Ultimately, the bedside nurse's role during these emergencies is to promote the best outcomes for the patient while promoting effective collaboration with RRT. Therefore the nurse play an important role in provide Educational Program regarding Rapid Response Code to prevent Cardiopulmonary Arrest (**Dobuzinsky, 2017**).

III. Aim of the study:

The aim of the study was to evaluate Effect of Educational Program on Nurse's Performance Regarding Rapid Response Code to Prevent Cardiopulmonary Arrest. This aim will be achieved through:

1. Assess nurse's Knowledge, Practice and Attitude regarding rapid response code to prevent cardiopulmonary arrest.
2. Design educational program regarding rapid response code based on nurse's basic assessment.
3. Implement the educational program regarding rapid response code to improve nurse's Knowledge, Practice and Attitude.
4. Evaluate the effect of educational program on nurse's Knowledge, Practice and Attitude regarding rapid response code to prevent cardiopulmonary arrest.

IV. Sample and Methods:

Design:

A quasi experimental research design was utilized to conduct the study.

Participants:

A convenience sample of all inpatient nurses. They were all included (50) in inpatient unit at Elaraby Hospital.

Research tools:

Three tools were utilized for data collection, designed in Arabic form, they were:

Tool I: Self Administered Questionnaire:

Consisted of two parts:

Part I: Socio-Demographic Characteristics: Concerned with assessment of socio-demographic characteristics of nurses.

Part II: Nurses' Knowledge: Concerned with assessment of Nurses' Knowledge related Rapid Response Code Parameter, Early Warning Signs and Rapid Response Team. It was assessed in the Pre, immediate post and follow up phases (**Rashid et al., 2014**) and (**Peter et al., 2015**).

Tool II: Observational Check List:

It was used by the investigator during observing nurses conducting the parameters of rapid response code. It consisted of eight observation as pre procedure, temperature, pulse, respiration, blood pressure, oxygen saturation, glasgow coma scale and post procedure. It was assessed in the Pre, immediate post and follow up phases the implementation of the educational program. (**Lynn, & LeBon, 2017**).

Tool III: Nurses' Attitude:

Was developed by the researcher based on literature review, under supervision and guided by **Rawia et al., (2017)**. It was used in pre, immediate post and follow up phases.

Content validity and reliability:

Content validity was used for the modified tools and the designed booklet to determine whether the tools covered the aim or not.

Pilot study:

A pilot study for tools of data collection was carried out on Five Nurses (10%) within selected criteria.

Field work:

Program lasted over a period of 10 months, from beginning of February 2020 to beginning of December 2020.

Ethical considerations:

All ethical issues were taken into consideration during all phases of the study. The ethical research considerations in this study included the following: The research approval was obtained before the educational program implementation, the objectives and the aims of the study were explained to the participants.

Statistical analysis:

Data collected throughout questionnaire and outcome measures coded, entered and analyzed using Microsoft Excel software. Data were then imported into Statistical Package for the Social Sciences (SPSS version 20.0) software for analysis.

V. Results:

Table (1): Frequency and Percentage Distribution of Socio-Demographic Characteristics for the Nurses (n=50).

Demographic Characteristics	Study Sample (n= 50)	
	No	%
Age in years:		
18 - 34	37	74.0
35 - 44	13	26.0
Gender:		
Male	24	48.0
Female	26	52.0
Marital Status:		
Single	9	18.0
Married	35	70.0
Widow	2	4.0
Divorced	4	8.0
Education Level:		
Institute	19	38.0
Bachelor	27	54.0
Master	4	8.0
Years of Experience:		
1-4	15	30.0
5-9	33	66.0
10-14	2	4.0
ICU Experience:		
Yes	8	16.0
No	42	84.0
Training Courses (First Aid or CPR):		
Yes	43	86.0
No	7	14.0

Table (1): showed that study sample consists of 50 inpatient nurses; age of nurses ranged from 18 to 44 years, as 18-34 and 35-44 years old of nurses (74% and 26% respectively). Additionally 52% of the nurses were female and 70% of the nurses were married. Also, 54% of nurses were bachelor degree. Concerning occupation, 66% of nurses were have 5-9 years experience. 84% of the nurses were not worked before in ICU. Finally 86% of the nurses were trained on first aid and CPR.

Table 2: Frequency and Percentage Distribution of Total satisfactory Knowledge of Nurses' about Rapid Response Code throughout the Study Phases (n= 50).

Total Satisfactory Knowledge	Pre		Post		Follow up		X2 (Sig)
	No	%	No	%	No	%	
Part I (Rapid Response Code Parameters)	7	14.0	35	70.0	35	70.0	41.843 (0.000**)
Part II (Early Warning Signs)	0	0.0	32	64.0	28	56.0	50.667 (0.000**)
Part III (Team dynamics of Rapid Response code)	0	0.0	33	66.0	29	58.0	53.501 (0.000**)
Total Knowledge	0	0.0	33	66.0	29	58.0	53.501 (0.000**)

X2 Chi Square test

** Highly statistically significant at $p \leq 0.01$

Table (2) shows that the nurses' satisfactory knowledge regarding Rapid Response Code Parameters through pre, post and follow-up phases were (14%, 70%, 70% respectively) and had statistically significant relation P value (0.000). While the nurses' knowledge regarding Early Warning Signs through pre, post and

follow-up phases were (0%, 64%, 56% respectively) and had statistically significant relation P value (0.000). Meanwhile the nurses' knowledge regarding Team dynamics of Rapid Response code through pre, post and follow-up phases were (0%, 66%, 58% respectively) and had statistically significant relation P value (0.000). Finally the total satisfactory nurses' knowledge regarding Rapid Response code through pre, post and follow-up phases were (0%, 66%, 58% respectively) and had statistically significant relation P value (0.000).

Table 3: Frequency and Percentage Distribution of Total Nurses' Practices about Rapid Response Code Parameters throughout the Study Phases (n= 50).

Satisfactory Practices	Pre		Post		Follow up		X2 (Sig)
	No	%	No	%	No	%	
Pre-Procedure	0	0.0	29	58.0	25	50.0	42.882 (0.000**)
Temperature	8	16.0	19	38.0	16	32.0	6.325 (0.042*)
Heart Rate	10	20.0	30	60.0	26	52.0	18.182 (0.000**)
Respiration	8	16.0	24	48.0	19	38.0	11.943 (0.003**)
Blood Pressure	8	16.0	20	40.0	17	34.0	7.429 (0.024*)
O2 Saturation	21	42.0	33	66.0	33	66.0	7.882 (0.019*)
Glasgow Coma Scale	4	8.0	31	62.0	26	52.0	34.205 (0.000**)
Post-Procedure	8	16.0	29	58.0	25	50.0	20.510 (0.000**)
Total Satisfactory Practices	8	16.0	30	60.0	25	50.0	21.839 (0.000**)

X² Chi Square test * Statistically significant at p≤0.05 ** Highly statistically significant at p≤0.01

Table (3) shows that the nurses satisfactory practices regarding rapid response code parameters regarding Heart Rate through pre, post and follow-up phases were (20%, 60%, 52% respectively) and had statistically significant relation P value (0.000). Additionally, Nurses satisfactory practices regarding rapid response code parameters regarding glasgow coma scale through pre, post and follow-up phases were (8%, 62%, 52% respectively) and had statistically significant relation P value (0.000). Finally, Satisfactory total Nurses practices regarding rapid response code parameters through pre, post and follow-up phases were (16%, 60%, 50% respectively) and had statistically significant relation P value (0.000).

Table 4: Frequency and Percentage Distribution of Total Nurses' Positive Attitude regarding Rapid Response Code throughout the Study Phases (n= 50). Hypothesis (n3)

Total Positive Attitude	Pre		Post		Follow up		X2 (Sig)
	No	%	No	%	No	%	
	8	16.0	28	56.0	23	46.0	18.160 (0.000**)

X² Chi Square test ** Highly statistically significant at p≤0.01
 Table (4) shows that the total positive attitude regarding rapid response code through pre, post and follow-up phases were (16%, 56%, 46% respectively) and had statistically significant relation P value (0.000).

Table 5: Frequency and Percentage Distribution of Inpatient Arrested / Critical Cases in the Last Month throughout the Study Phases. (n= 50).

Total Inpatient Arrested Cases / Critical Cases	Pre (no 65)		Post (no 42)		Follow up (no 51)	
	No	%	No	%	No	%
		5	7.6	0	0.0	1

X² Chi Square test

Table (5) reveals that the inpatient arrested cases in last month/critical cases number pre (March 2020), post (July 2020) and follow-up (Nov 2020) program implementation had (10%, 0% , 2% respectively), Which

was statistically significant difference relation regarding total arrested cases through post and follow up phases were noticed.

Table 6: Correlation between Total Knowledge, Practices and Attitudes throughout Study Phases (n= 50).

Items	Knowledge					
	Pre		Post		Follow up	
	r	Sig.	r	Sig.	r	Sig.
Practices	0.871	0.000**	0.829	0.000**	0.779	0.000**
Attitudes	0.249	0.081	0.773	0.000**	0.583	0.000**

r Pearson Correlation test

** Highly statistically significant at $p \leq 0.01$

Table (6) shows correlation between nurse' knowledge and practices regarding Rapid Response Code through pre, post and follow-up phases were (0.871, 0.829, 0.779 respectively), which statistically significant relation were noticed through pre, post and follow-up phase P value (0.000, 0.000, 0.000 respectively). In addition, correlation between nurse' knowledge and attitude about rapid response code through pre, post and follow-up phases were (0.249, 0.773, 0.583 respectively), which statistically significant relation were noticed through post and follow-up phase P value (0.000, 0.000 respectively).

VI. Discussion:

Concerning the study sample, it constitutes of 50 inpatient nurses included as study sample who received Educational Program on their Performance Regarding Rapid Response Code to Prevent Cardiopulmonary Arrest; More than two third of study sample aged 18-34 years old. More than half of study sample were female. Whereas more than two third of study sample were married. While more than half of study sample had Bachelor degree. Two third of study sample had 5-9 years experience. The majority of study sample hadn't previous ICU work and trained on CPR.

Concerning Nurses' Knowledge about Rapid Response Code, The present study clarified that all of nurses through pre program implantation hadn't knowledge regarding Rapid Response Code in study sample. This might be due to lack of Nurses' knowledge as result of lack of training/ education regarding Rapid Response Code. Agreed with **Warren et al., (2021)** who conduct study about Impact of a modified early warning score on nurses' recognition and response to clinical deterioration in US, who found the simulation based intervention significantly improved nurses' knowledge.

The present study clarified that more than two third of nurses through post program implantation had statistical significant increase in nurses' level of knowledge regarding Rapid Response Code in study sample. This might be due to nurses receiving motivation and knowledge regarding Rapid Response Code. Similarly **Pamela, & Jenkins, (2013)** in study titled Nursing Students' Clinical Judgment Regarding Rapid Response The Influence of a Clinical Simulation Education Intervention in UK, who found that nursing students who received the innovative education intervention had significantly higher posttest scores.

On the contrary **Azimirad et al., (2020)** in a study Nurses' ability to timely activate rapid response systems for deteriorating patients: A comparative case scenario study between Finnish and British nurses in Finland, who found that identified gaps in nurses' knowledge in management of deteriorating patients and case scenarios was suboptimal.

Concerning Nurses' Practices about Rapid Response Code Parameters, The present study clarified that more than half of nurses through post program implementation in study sample had significant increase in their level of practices regarding Rapid Response Code Parameters. This could be a result that nurses become more knowledgeable and trained about Rapid Response Code Parameters. Congruently **Jensen, & Skår, (2017)** who conducted study about the impact of Early Warning Score and Rapid Response Systems on nurses' competence in US, who found in his study the impact of the early warning score and rapid response systems on nurses' competence in identifying and managing deteriorating patients is beneficial.

Concerning the Nurses' Attitude about Rapid Response Code, present study clarified that more than half of nurses through post program implementation in study sample had positive attitude regarding Rapid Response Code. This might be a result that nurses become more aware with the importance of Rapid Response Code. This approach is also supported by **Loisa et al., (2021)** who conducted study about Rapid response team

nurses' attitudes and barriers to the rapid response system in Finland, found that RRT nurses consider their RRT work meaningful and think that RRT nurse duties have improved their critical care skills.

Concerning the cardiac arrest, the results of this study clarified that total arrested cases in last month / total inpatient critical cases had statistically significant reduced through post program implementation were noticed. This finding agreed with **Custo, and Trapani, (2020)** in his study the impact of rapid response systems on mortality and cardiac arrests in Malta, who found that rapid response systems significantly decrease mortality and cardiac arrests.

This disagree with **Zeb, (2021)** in study titled Effects Of Rapid Response Teams on Patient Outcomes After Nursing Education in UK, illustrated When analyzing the number of rapid response calls, showed significance in the number of rapid response calls after nursing education, but There were no significant results in the data regarding improvement in cardiac arrest rates after nursing education.

Concerning the correlation between the Nurses' knowledge and practices, between Nurses' knowledge and attitude, between Nurses' Practices and attitude regarding Rapid Response Code had strong significant relation through post program implementation in study sample. This might be a result that nurses become more knowledgeable, Caution and appreciate Rapid Response Code. Agreed with **Danis, (2019)** who conducted study about The Role of Rapid Response Nurses in Improving Patient Safety in US, that hospital RRT implementation is now a Joint Commission requirement, that enabled nurses achieve clinical and leadership competency when transitioning into the RRT role.

VII. Conclusion:

On the light of the current study results, it can be concluded that, the studied nurses had an improvement in their level of performance (knowledge, practice and attitude) post program implementation, as there was a distinguished satisfactory level of inpatient nurses' level of knowledge and competent level of practice regarding rapid response code after the educational program implementation. Furthermore, there was obvious reducing in cardiopulmonary arrest at inpatient unit.

VIII. Recommendation:

- Adequate education and training for increasing awareness of Nurses regarding Rapid Response Code on prevention cardiopulmonary arrest.
- Empower and motivate nurses to adhere to Rapid Response Code Guidance.
- Further studies are necessary to identify effects of Rapid Response Code application via electronic system.

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