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Effectiveness of Simulated Demonstration on Knowledge and Skill Regarding Cardiac Defibrillation among Nursing Professionals

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Abstract

Background: Cardiac emergencies including cardiac arrest proceed with warning signs which should be identified early to enable timely treatment for improvement and survival. The cardiac arrest is a common medical emergency where the nurse play significant role in reducing the magnitude of problems and longevity of life. The aim of present study was to determine effectiveness of simulated demonstration on knowledge and skill regarding cardiac defibrillation among nursing personnel's. *Material and Methods:* A quasi experimental study, pre and post test design was undertaken among nurses of Pravara Rural Hospital, Loni (Bk). A total of 30 nurses were selected by simple random sampling technique who fulfills the inclusion criteria's. Pre tested structured questionnaire [for knowledge] and observation check list [for skill] was used to collect data. Study was approved by IEC/IRC and informed consent was obtained from all the participants. After pre testing simulated demonstration was implemented in group and post test was conducted after fifteen days of intervention. The descriptive and inferential statistics were applied wherever was required. *Results:* The result highlights that simulated demonstration was effective in improving the knowledge as well as enhancing skill on cardiac defibrillation and the difference was found statistically significant. It was noted that knowledge and skill had positive correlation; wherein knowledge had significant association with demographic variable like age ($x2 = 4.02$), and skill had associated with previous source of information ($x2 = 4.65$) at $p<0.05$ level. *Conclusion:* Study outcome revealed that simulated demonstration was found effective, and played significant role in improving knowledge and skill on cardiac defibrillation among nursing professionals. Regular the interactive session with simulation better the updates, confidence and aptitude on cardiac defibrillation procedure.

Keywords: Effectiveness; Simulated Demonstration; Knowledge; Skill; Nursing Professionals.

Introduction

The cardiac disorders including the cardiac emergencies accounted for significant proportion of burden on individual and family. The common cardiac disorders are coronary artery disease, ischemic heart disease, heart rhythm disorder, rheumatic heart disease, pulmonary heart disease, valvular heart disease, congenital heart disease, and conductive system disorders [1].

The cardiac emergencies like pulseless ventricular tachycardia, ventricular fibrillation, and cardiac arrest requires cardiac defibrillation of as per advance life support [2]. Defibrillation (delivery of therapeutic dose of electrical energy to heart) is a regular treatment for life threatening cardiac dysrhythmias, and needs to be performed immediately after identifying the cardiac emergencies [3].

American Heart Association envisages that the chance of survival decreases from 7% to 10% for every minute that passes without defibrillation when a shockable rhythm is present. When shock is delivered within 3–5 minutes, the survival rate of sudden cardiac arrest secondary to ventricular fibrillation can range from 48–74%. The facts depicts that the initial survival rates of nearly 100% when a shock for ventricular fibrillation was delivered within 1–2 minutes after cardiac arrest in an inpatient setting [4,5].

The nurses play key role in managing cardiac emergencies, and studies have shown that nursing professionals have inadequate knowledge, and

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competence in handling emergencies including the cardiac defibrillation [6]. Similarly numerous scientific studies have exhibited that the planned educational program does have significant impact in enhancing the awareness and skill in capability of handling the defibrillators [7].

Nurses are becoming witnesses of cardiac emergencies commonly in the health care settings. Their demanding role expects from them to be well trained, qualified, competent and confident in order to overcome such emergencies. The trainee nurses practicing in the emergency care environment should possess adequate knowledge and skill regarding mechanism and handling of defibrillators and other supportive cardiac devices [8]. Further it was evident that the simulated training led to a change in awareness and skill in handling the emergency situations with devices/equipments etc among nurses. Thus the present communication was undertaken to examine the effectiveness of simulated demonstration on knowledge and skill regarding cardiac defibrillation among nursing professionals.

Material and Methods

A quantitative research, quasi experimental study where pre and post test design was undertaken among nursing professionals working at Pravara Rural Hospital, Loni (Bk), Maharashtra. The variables explored under study were knowledge and skill on defibrillation among study participants. A total of 30 nurses above 21 years of age of both gender; and willing to participate were selected by using simple random sampling (table method) technique. The nurses who were absent due to sickness or otherwise were excluded from study. Pre tested and reliable structured questionnaire (25 items) and observation check list (21 items) was used to gather data. The responses for all items of tool was categorized as correct response (score 1) and wrong response (score 0) respectively. The scoring procedure for knowledge was 'average, good and very good'; and for skill it was separated as 'not adoptive, partially adoptive and completely adoptive'.

The study was approved by Institutional Ethics Committee/Institutional Research Committee (IEC/IRC) and written informed consent was obtained from all the participants. The simulated demonstration consist a total of three sessions including theory (1 hour) and demonstration (2 hour sessions). It was implemented by researchers with help of lecture and computed simulation along with educative materials such as leaflet and pamphlets were supplemented for reinforcement of knowledge, after the pre testing of knowledge, simulated demonstration was administered followed by post test was conducted after fifteen days of post intervention. The collected data was coded, tabulated and analyzed as per objectives by using descriptive (mean, SD) and inferential statistics (t test, chi square test and coefficient of correlation) wherever required, and $p<0.05$ was considered as statistically significant.

Results

Results related to socio demographic data: Maximum (87%) of nurses was in the age group of 21–30 years, majority (80%) were female, higher percent (70%) of them educated up to General Nursing and Midwifery (GNM) and more than half (60%) have work experience between 2–4 years. Significant percent (43%) of nurses working at medical and surgical units and (17%) were placed at critical care areas, only one fourth (24%) have attended CNE's and other training programs wherein most (90%) of them under study were Hindu's.

Results related to knowledge and skill on defibrillation: Study outcome revealed that during pre test staff nurses had mean score (10.1±3.48) followed by during post test the mean knowledge score was (19.3±3.51) indicates that staff nurses have enhanced level of knowledge from 'average' to 'good level of knowledge' on various aspects of cardiac defibrillation and found statistically significant at $p<0.05$ level (Table 1). Correlation of post test knowledge with demographic variables depicts that nurses of 21–30 years of age, those worked at critical care areas had more knowledge than other categories. Similarly in relation to skill it was evident that nurses had mean skill score of (15.93±1.98) indicates 'completely adaptive skills' on various steps of cardiac defibrillation procedure (Table 2 and 3).

The knowledge had statistically significant association with socio demographic variable such as age ($x^2 = 4.02$); whereas skill had association with previous source of information ($x^2 = 4.65$) at $p<0.05$ level. The coefficient of correlation test showed a moderately positive correlation found ($r=0.56$) between knowledge and skill on cardiac defibrillation.

Table 1: Mean score of pre and post test knowledge on cardiac defibrillation among nurses

SN	Areas	Max. score	Pre test		Post test		't' value
			Mean	SD	Mean	SD	
1	Structure of heart	6	2.62	1.35	4.13	1.19	6.2*
2	Cardiac arrest	6	2.41	1.25	4.53	1.39	9.1*
3	Cardiac defibrillation	9	3.16	1.41	7.26	1.25	9.7*
4	Legal Aspects	4	1.85	1.17	3.06	0.78	5.8*
	Overall	25	10.1	3.48	19.3	3.65	9.5*

* Significant df – 29 $p<0.05$

Table 2: Mean score of post test skill on cardiac defibrillation among nurses

SN	Aspects	Max. score	Mean	SD	Mean%
1	Preparation of patient	4	2.26	0.69	56.5
2	Placement of paddles	4	3.14	0.87	74.5
3	Cardiac defibrillation procedure	13	10.1	1.69	76.9
	Overall	21	15.9	1.98	75.8

Table 3: Item wise comparison of post test correct skill response (%) of nurses on steps of cardiac defibrillation procedure

SN	Steps	Correct practice	
		(f)	(%)
1	Presses 'ON'	30	100
2	Bares patient's chest	29	96
3	Prepares paddle sites with brisk dry rub	06	20
4	Prepares additionally for patient with excessive hair, oily or damp skin	11	36
5	Disconnects equipment which may pose a hazard or become damaged	22	73
6	Applies conductive gel over the entire paddle electrode surface	29	96
7	Sternum (anterior) paddle below right clavicle, lateral to sternum	28	93
8	Apex (lateral) paddle lateral to left nipple on maxillary line	29	96
9	Avoids areas with dressings, ECG electrodes and wounds	11	36
10	Describes anterior/posterior paddle placement	22	73
11	Verifies cardiac arrest rhythm of VF or pulseless VT	15	50
12	Presses energy select	30	100
13	Presses CHARGE on Apex paddle or on front panel of device	30	100
14	States – All Clear and observes all personnel are clear of patient/ bed	24	80
15	Confirms ECG rhythm and available energy, reads screen/overlay	20	66
16	Presses both shock buttons on paddles simultaneously after the charge completion, Removes charge by pressing SPEED DIAL or ENERGY SELECT for performance practice	14	46
17	Observes patient and ECG rhythm to determine results	21	70
18	Prepares for additional shocks if needed by repeating steps 6 – 12	24	80
19	Presses CODE SUMMARY for documentation	25	83
20	Presses ON to turn power off	30	100
21	Cleans and places paddles safely	28	93

Discussion

The results highlight that majority of nurses were in the age group of 21–30 years and have work experience between 2–4 years, it envisage the fact that nurses were at young adults category. This fact was mutually consistent with the study carried out by Naeem MM, Mohamed NT, Mohammed MA, Anwar MA that maximum 62% of nursing participants were in the age group of less than 25 years [9]. Our study shows maximum number of nurses were female, have GNM has highest educational qualification i.e. an entry level requirement for nursing profession. This finding was congruent with the study result of Ali SN that majority of the participants in his study were female (92.5%) [10]. Similarly Gupta RV also observed that higher proportion of nurses had RGNM has educational qualification [11]. It was noticed that simulated demonstration was effective in improving the knowledge and skills on cardiac defibrillation among nursing professionals, and

the same was evident from statistically significant pre and post test mean scores. These findings were well supported by Naik N, Yadav R, Juneja R [12] and Salunkhe PA and Dias RA [13] that cardiac defibrillation training had enhanced the general concepts, Advance Cardiac Life Support (ACLS) and superiority performance of defibrillation procedure. The findings revealed that there was a statistically significant association found between knowledge, skill on cardiac defibrillation with demographic variables such as age and previous source of information respectively. It was coincident with results disseminated by Gupta RV that who also noticed a significant association between knowledge and age factor of participants at 0.05 level of significance [11]. Alongside the result exhibited a moderately positive relation between knowledge and skill on cardiac defibrillation. This information was in congruence with scientific communication by Jones TL, Lapkin S [14] that an upbeat correlation was noticed between awareness and practice on advance cardiac life support including method of cardiac defibrillation.

Conclusion

The sudden cardiac death cause adverse mortality, where timely emergency cardiac care enables to overcome the enormous impact on health and improves survival. The result highlights that simulated demonstration was found to be effective in improving various areas of knowledge and enhancing skill on cardiac defibrillation procedure among nursing professionals. It should be emphasized that having interactive session with simulated practical education along with educative materials to nurses regarding cardiac defibrillation would improve knowledge and develop competencies on cardiac defibrillation procedure. Thus it significantly contributes in reducing morbidity and mortality rate, minimizes the impact of cardiac arrest and treatment cost of critically ill patients due to cardiac emergencies. In conclusion, Regular the simulated education – Better the updates, sense of confidence and aptitude to carry out cardiac defibrillation procedure.

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Conflict of Interest: Nil

Ethical Clearence: The study was approved by Institutional Research Committee and Institutional Ethics Committee (IRC/IEC) of Pravara Institute of Medical Sciences – Deemed to be University, Loni (Bk), Maharashtra. The ethical guidelines for biomedical research on human participants were strictly followed.

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