



Effect of Rapid Response Nursing Team on Outcome of Patient Care

Leili YekeFallah,¹ Zahra Eskandari,^{2,*} Akram Shahrokhi,³ and Amir Javadi⁴

¹Assistant Professor, PhD of Nursing, Critical Care Nursing Department, Nursing and Midwifery School, Qazvin University of Medical Sciences, Qazvin, Iran

²PhD Student of Health in Disasters and Emergencies, Department of Health in Disasters and Emergencies, School of Health, Safety and Environment, Shahid Beheshti University of Medical Sciences, Tehran, Iran

³Critical Care Nursing Department, Nursing and Midwifery School, Qazvin University of Medical Sciences, Qazvin, Iran

⁴PhD student of medical bioinformatics, Tehran University of Medical Sciences, Faculty member of Qazvin University of Medical Sciences, Qazvin, Iran

*Corresponding author: Zahra Eskandari, Nursing and Midwifery School, Qazvin University of Medical Sciences, Shahid Bahonar Blvd, Qazvin, Iran. Postal Code: 3419759811, Tel: +98-9121676693, Fax: +98-002237268, Email: zeskandari44@yahoo.com

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Abstract

Background and Objectives: Rapid response nursing team evaluates the patients in the early stages of clinical exacerbation and prevents unexpected cardiopulmonary arrest. The present study aimed at determining the effect of rapid response nursing team on outcome of patient care in the emergency ward.

Methods: This clinical trial was conducted on 714 patients at the emergency ward in selected hospitals affiliated to Alborz University of Medical Sciences, during 2013. The patients were randomly allocated to a control and an intervention group. The rapid response nursing team comprised of an intensive care nurse and an anesthesia technician, who were in the emergency on a 24/7 basis. If the patient's clinical conditions deteriorated, they immediately attended to him, evaluated his clinical condition precisely, and took necessary nursing measures for the patients in the case group, yet those in the control group received the conventional treatment at the emergency ward. Patients' conditions and the measures taken for them were precisely recorded for both groups and the data were analyzed using the SPSS 16 software.

Results: The results of the study showed that there was a significant relationship between establishing rapid response nursing team and outcome of patient care ($P = 0.028$), reduced transfer to special care units ($P = 0.014$), and reduced level of care in the first 24 hours of admission ($P = 0.001$).

Conclusions: Given the results, the rapid response nursing team was effective in preventing unexpected cardiovascular arrests, increased successful cardiopulmonary resuscitation, and reduced transfer of patients to special care units and higher levels of care.

Keywords: Care Outcome, Cardiopulmonary Arrest, Emergency Ward

1. Background

Patients admitted to hospitals believe that they are entering a safe environment; patients, their families, and the hospital staff believe the patients will receive the best care. Patients should feel assured that if their conditions aggravate, they are in the best place to receive immediate and useful care. Meanwhile, it is possible that some patients, whose conditions exacerbate, do not receive proper care (1). This issue has challenged hospitals in the management of their staff and available resources to provide the best possible care. Furthermore, patients' increased awareness, quick admission and discharge periods, and the global shortage of nurses have caused high quality health care delivery to be difficult for admitted patients (2).

Joint Commission reported in 2007 that lack of communication and insufficient examination by the hospital staff causes unfavorable events in patients. Because

some 70% of these unfavorable events are preventable (3), hospitals should focus on recognizing strategies that can reduce such unfavorable events, especially failed Cardiopulmonary Resuscitation (CPR) through bringing experts (rapid response nursing team) to patients (4, 5). Rapid Response Nursing Team (RRNT) includes intensive care specialists with appropriate knowledge and skills (6), which usually comprises of an intensive care nurse, an anesthesia technician, and a physician, who are available on a 24/7 basis to care for ill patients at the non-intensive care unit (7). Different organizations choose the members of the team based on their needs and available resources (8). The RRNT is actually similar to the code 99 team, yet it is called according to ill - patient criteria and before cardiopulmonary arrest (9).

The ability to quickly evaluate patient's condition and take appropriate measures is the foundation of RRNT (10) because delayed therapeutic actions for high risk patients

significantly affect patients' clinical outcome (11). Furthermore, RRNT aims at reducing these delays. The American Heart Association considers RRNT an important strategy for prevention of preventable harms and elevation of patients' care outcome (12). Many experts believe that RRNT is a strategy for improving the quality of nursing services, determines treatment errors and their required measures, and effectively improves service quality (13). Therefore, the present study aimed at determining the effect of establishing RRNT on emergency patient care outcome at selected hospitals.

2. Methods

This clinical trial was conducted at selected hospitals affiliated to Alborz University of Medical Sciences, during year 2013. The study population included all patients over 18 years old, who were admitted to the emergency ward of the selected hospitals. The patients, who were admitted to the emergency ward with cardiopulmonary arrest, were excluded.

The Rapid Response Nursing Team (RRNT) comprised of three intensive care nurses and three anesthesia technicians, who were available at the hospital on a 24/7 basis at three different shifts. They visited patients at the beginning of their shift and every two hours.

The researcher briefed the nursing managers and supervisors on the objectives of the study and RRNT in a two-hour meeting. Then, the same was performed in a one-day seminar for the head nurses, shift authorities, and all nurses at the emergency ward. Posters and educational pamphlets were issued to the personnel regarding the criteria to call RRNT. Furthermore, these criteria were posted on the notice board of the wards and included: respiratory rate < 8 or > 26 per minute, reduced arterial oxygen saturation to $< 90\%$, systolic blood pressure of < 90 mmHg, chest pain, nurse's concern, reduced consciousness, etc. Then, RRNT members began collecting the samples. The total sample size was 714 qualified patients admitted to the emergency ward, who were randomly divided to control (who received standard treatment ordered by physicians by the care personnel) and intervention (who received the standard treatment ordered by physicians based on priority, time schedule, and with precision and without delay by the RRNT) groups, using the random block method (block size of 6). Therefore, 357 patients were assigned to each group. The RRNT visited all patients at the emergency ward at the beginning of their shift and every two hours during the 24 hours, as well as registered patients with special conditions, and asked the shift authorities to call them if the patients' clinical conditions changed. Upon

being called, the RRNT immediately attended to the patient and evaluated them with the help of the responsible nurse. If needed, they took measures, such as positioning the patient, oxygen therapy, suction, inserting IV line, taking routine blood samples, and taking Electrocardiogram (ECG) according to hospital protocols before the physician arrived. Then they followed the physician's orders as prescribed and prioritized by the physician with precision and without delay. They used the most skilled nursing assistant of the ward. It is noteworthy to mention that RRNT did not take any measures without physician's order unless it was allowed according to the hospital protocol and based on patient's conditions. The RRNT accompanied the patient if he was to be transferred to another ward and checked the transportation equipment including oxygen, stretcher, and portable monitoring. They also checked the patient every two hours, for 12 to 24 hours. If the physician decided to refer the patient to another hospital, RRNT did their best to stabilize patient's hemodynamic conditions and moderate life-threatening risks because the patient should have stable hemodynamic conditions before being transferred. They checked the patient as long as he/she was at the ward. After providing nursing care, the results were recorded in a check list, including age, gender, time of admission, manner of admission, duration of admission, duration of calling RRNT, the shift RRNT, who was called, the time RRNT was called, gap between being called and attending to the patient, duration of the RRNT attending to the patient, the level of care when RRNT attended to the patient, the level of care 24 hours after RRNT that was provided for the patient (if the patient was still there), the level of patient's triage in the first visit of RRNT, the reason for calling RRNT, the measures RRNT took, patient's outcome, and nursing report.

After the data were collected, they were analyzed using the t test, Chi-square test, and Fisher's exact test at a significance level of 0.05.

Informed consent was obtained from all patients or their legal guardians. This clinical trial was registered at the Iranian site for clinical trials (No 201302015077N1). The Ethics Committee of Research Deputy of Qazvin University of Medical Sciences granted permission (No 28/20/7628) for this study.

3. Results

Of 714 patients, 362 were males and 352 were females. The gender distribution in the control group was 181 (51.4%) females and 176 (48.6%) males. That of the intervention group was 171 (48.6%) females and 186 (51.4%) males. The chi-square test showed no significant difference between the two groups in terms of gender ($P = 0.5$). Participants'

age ranged from 18 to 92 years old with mean and standard deviation of 50.67 ± 18.62 . The mean age for the intervention and control groups was 51.97 ± 17.82 and 49.48 ± 18.65 years old, respectively. No difference was found between the two groups in terms of age, using the t test ($P = 0.081$). The chi-square test revealed that RRNT had a significant effect on patient outcome ($P = 0.028$) (Table 1). In the control group, 23.3% of the patients were transferred to the Intensive Care Unit (ICU), while that in the intervention group was 16%. The difference was found significant using the chi-square test ($P = 0.014$).

Furthermore, the chi-square test did not reveal a significant difference between the two groups in terms of care level on admission ($P = 0.55$), yet the groups were significantly different after 24 hours ($P = 0.001$) (Table 2). Code 99 was called for 3.1% of patients in the control group while that for the intervention group was 2.2%, that is, the control group received 1.5 times as many code 99 calls as the intervention group, yet the difference was not significant ($P = 0.643$). CPR was successful only in 63.6% of the control group that needed CPR, yet 100% success was recorded for the intervention group. However, the difference was not statistically significant ($P = 0.103$) (Table 3).

4. Discussion

One of the wards that needs RRNT is the emergency ward because it is the heart of the hospital and its regular circulation can save lives of many people (14). Most of the critical referrals are made to the emergency wards and the quality of service delivery in this ward indicates the general condition of service quality in a hospital (15). Emergency has a sensitive and unique position in hospitals and health care system because of rapid, high quality, effective and complex processes that it requires and its patients being the busiest, most varied, and most sensitive. The speed of service delivery in hospitals, especially in the emergency wards, is important to reduce mortality and morbidity (14). In the present study, establishing RRNT had a significant effect on patient outcome at the emergency ward ($P = 0.028$). The RRNT reduced code 99 calling and increased CPR success at the emergency room. The control group witnessed 3.1% of code 99 calling while that for the intervention group was 2.2%, that is, 1.5 times higher in the control group as compared with the intervention group. However, the difference was not significant ($P = 0.643$). The RRNT could recognize ill patients and reduce code calling in the intervention group in that it prevented 8 cardiopulmonary arrests. The control group witnessed 63.6% success rate for CPR while this was 100% in the intervention group. However, the difference was insignificant

($P = 0.103$). Despite this fact, the researcher believes that the insignificance can be due to low sample size.

Lighthall et al. (2010) reported the effectiveness of RRT on cardiopulmonary arrest and mortality, as cardiopulmonary arrest was reduced by 57% after activation of the RRT as compared to before RRNT activity. Furthermore, the rate of cardiac arrests was reduced to 5.6 per 1000 discharges ($P < 0.01$). It was estimated that 51 cardiac arrests were prevented during RRT presence (16). Sabahi et al. (2012) reported reduced cardiopulmonary arrest and mortality after starting RRT (17). Median - Rivera et al. (2010) reported lack of effectiveness of RRT on cardiopulmonary arrest and unexpected mortality, which confirms the findings of this study, where fewer code 99s were called after establishing RRT (18).

In the control group, 23.3% of the patients were transferred to special care units while this figure was only 16% in the intervention group. The difference between the two groups was significant ($P = 0.014$), that is, the rate of transfer to special care units was reduced in the intervention group. Given the limited number of beds in special care units and high demand for them, selecting patients for these wards should be based on appropriate reasons. Furthermore, RRNT and its help for stabilizing ill patients' clinical conditions under physician's supervision prevents unwanted admissions to special care units, which will reduce the number of patient transfer to these wards and the incurred costs. To the best of the author's knowledge, no studies have examined transfer to special care units in details, yet the current research studied the transfer to each ward separately and found that 6.7% of patients in the control and 6.2% in the intervention group were transferred to the ICU, and 16.5% and 9.8% were taken to the CCU, respectively. Simmes et al. (2012) reported the effectiveness of RRT on cardiac arrest and sudden death in surgery patients before and after implementing RRT. They showed that the number of unwanted admissions to ICU increased from 2.47% to 4.15% after implementing RRT because ill patients were immediately recognized and transferred to a higher level of care (unwanted ICU admission). This is why they witnessed higher transfer rate to ICU, yet the rate of cardiac arrests and sudden deaths was reduced by 50% (19).

The current study did not observe a significant difference between the two groups in terms of care level ($P = 0.507$), yet they were significantly different after 24 hours ($P = 0.001$). Therefore, RRNT recognized ill patients according to RRNT calling criteria, examined them, and quickly took required measures along with the health staff so fewer patients were transferred to higher care levels or if they were transferred, the critical care they received led to return to lower care levels in 24 hours. This caused significantly lower mortality among special care unit patients

Table 1. Distribution of Patient Outcome in the Two Groups^a

Patient outcome	Control	Intervention	Total	Statistic
Transfer to ICU				$\chi^2 = 0.087, P = 0.76$
Number	24	22	46	
Percentage	6.7%	6.2%	6.4%	
Transfer to CCU				$\chi^2 = 6.128, P = 0.013$
Number	59	35	94	
Percentage	16.5%	9.8%	13.2%	
Transfer to other wards				$\chi^2 = 0.75, P = 0.38$
Number	14	19	33	
Percentage	3.9%	5.3%	4.6%	
Discharge				$\chi^2 = 2.094, P = 0.148$
Number	214	245	459	
Percentage	59.9%	68.6%	64.3%	
Transfer to other hospitals				$\chi^2 = 1, P = 0.317$
Number	21	15	36	
Percentage	5.9%	4.2%	5%	
Discharged against medical advice				$\chi^2 = 0.001, P = 1$
Number	21	21	42	
Percentage	5.9%	5.9%	5.9%	
Cardiovascular arrest				$\chi^2 = 0.066, P = 0.13$
Number	4	0	4	
Percentage	1.1%	0%	0.6%	
Total				
Number	357	357	714	
Percentage	100%	100%	100%	

^aChi - square: P value = 0.028.

Table 2. Distribution of Care Level for each Group

Care Level	On Admission		24 Hours After Admission	
	Control	Intervention	Control	Intervention
I	0	0	0	0
II	1 (50%)	1 (50)	14 (34.1%)	27 (56.9%)
III	345 (50%)	345 (50%)	59 (62.8%)	35 (37.2%)
IV	7 (41.2%)	10 (58.8%)	9 (90%)	1 (10%)
V	4 (80%)	1 (20%)	6 (75%)	2 (25%)
Statistic	Chi - square, P - value, P = 0.55		Chi - square, P - value, P = 0.001	

and their discharge from emergency ward in that 59.9% of the control and 68.6% of the intervention group were discharged. This means more of the intervention group were discharged, which was an important factor in preventing overcrowding of emergency wards.

Reduced transfer of patients to other hospitals in the

intervention group (4.2%) as compared with that of the control group (5.9%) was another achievement of RRNT.

4.1. Limitations

The limitation of the present study was that it was conducted only at one hospital; therefore, the findings might

Table 3. Comparison of Frequency of Code 99 Calling and Its Outcome at the Emergency Unit for each Group

Group	Number of Code 99 Calling		Outcomes of Code 99 Calling	
	Code 99 Was Called	Code 99 Was Not Called	Successful CPR	Unsuccessful CPR
Control				
Number	11	346	7	4
Percent	3.1	96.9	63.6	36.4
Intervention				
Number	8	349	8	0
Percent	2.2	97.8	100	0
Total				
Number	19	695	15	4
Percentage	2.7	97.3	78.9	21.1
Statistic	Fisher P = 0.643		Fisher P = 0.103	

not be generalizable to other studies and settings. It is recommended for future studies to be conducted with other combinations of team members in RRNT and its effect be evaluated on patient care outcome.

4.2. Conclusion

Given that cardiopulmonary arrest is one of the unfavorable outcomes for hospitalized patients, RRNT can be used to reduce code 99 calling and increase success rate of CPR. Furthermore, special care units have limited capacity and there is high demand for them, thus patients should be selected based on appropriate criteria and unwanted and unreasonable admission should be prevented. This selection can be employed by implementing RRNT. That way, ill patients are recognized much earlier and their condition is stabilized with the help of other health care teams and under physician's supervision to reduce sudden cardiopulmonary arrest, unwanted transfer to special care units, and higher care levels, which themselves increase treatment costs. A skillful emergency nurse can prevent many critical situations that lead to death with early diagnosis. Thus, RRNT can improve the quality of nursing care at the emergency ward and prevent patient overcrowding.

4.3. Implications for Nursing and Health Policy

Establishing rapid response nursing team at the emergency ward or critical care units can be effective in management of critical patients and preventing unexpected cardiovascular arrests, increased successful cardiopulmonary resuscitation, and reduced transfer of patients to special care units and higher levels of care.

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Footnotes

Authors' Contribution: Leili YekeFallah: Design of proposal and acquisition of data and analysis of data; Zahra Eskandari: Interpretation of data and supervise the research team; AkramShahrokhi: Writhing and translation of manuscript; Amir Javadi: Revise and publication of manuscript.

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