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The Effect of Nursing Early Warning Score System (Newss) Based Application on Reducing Frequency of Emergency Cardiac Arrest: A Case Study of Pelamonia Hospital, Makassar

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Abstract. One of the efforts made by nurses to identify deterioration or emergency incidents in patients is through the Nursing Early Warning Score System (NEWSS). Therefore, this study aims to determine the effectiveness of this system in reducing the frequency of cardiac arrest in patients. A quasi-experiment with a post-test only control group design was adopted, and 80 respondents were obtained. Furthermore, the research instrument consists of 7 physiological parameters in the NEWSS assessment, under standard operating procedures. The Mann-Whitney test results with a P-value <0.05. It was indicated that the system is effective in reducing the frequency of emergency cardiac arrests. Nurses need to be considered this strategy to reduce the frequency of emergency cardiac arrest.

Keyword: NEWSS, Cardiac Arrest Emergency

INTRODUCTION

In order to improve and maintain the quality of nursing services, nurses need to be trained to recognize and respond to changes in the patient's condition. They (nurses) need to conduct focused assessments and observe vital signs to determine the risk of deterioration. Since nurses are the first to notice the deteriorating situation, it is necessary to develop and apply a systematic approach through the Nursing Early Warning Score System (NEWSS) to detect emergencies in the treatment room (1).

Furthermore, acute heart failure in cardiac arrest is the most identified emergency found in hospitalized patients. It has increased globally as WHO states that the annual incidence of cardiac arrest in the United States and Canada reaches 350,000 people, with a mortality rate of approximately 50%. Furthermore, people with heart disease are at increased risk of cardiac arrest. It is believed that 5 out of 1000 patients hospitalized in a developed country like Australia have a cardiac arrest, and most do not survive (2).

The leading cause of death in Indonesia is cardiovascular disease, and the 2014 data of WHO states that it takes part in the country's mortality rate by 37%. Also, the incidence of Sudden Cardiac Arrest (SCA) will increase along with coronary heart disease (CHD) and stroke, which is estimated to reach 23.3 million deaths by 2030 (3).

Meanwhile, PERKI data in 2016 found that the annual incidence of SCA ranged from 300,000 - 350,000. With modernization, Indonesian society's lifestyle has also shifted towards unhealthy habits combined with a lack of physical activity, fast food consumption, obesity, and stress. This unhealthy lifestyle is a risk factor for cardiovascular disease (4). Furthermore, the medical record of Pelamonia Hospital Makassar registered 233, 283, and 434 cases of cardiac arrest in 2015, 2016, and 2017, respectively (Pelamonia Hospital Medical Record, 2018). Therefore, to reduce SCA incidence, anticipation in the form of early detection through NEWSS is required. Also, preventive treatment and better prognosis, especially in high-risk patients, are essential (5, 6).

The use of NEWSS in hospitals is highly recommended since it helps nurses to improve their ability to detect early emergencies in patients. Furthermore, the results from the examination performed by nurses show that the system can handle the patient's problems, making it easier to find a solution (7, 8).

Regarding emergency detection in hospitalized patients, an earlier study entitled "*The impact of introducing the early warning scoring system and protocol on clinical outcomes in a tertiary referral university hospital*" was conducted by Yuda Sutherasan (2018). Also, Una Kyriacos (2015) carried out a study titled "*Early warning scoring systems versus standard observations charts forwards in South Africa: a cluster-randomized controlled trial*" (9).

Meanwhile, Yuda Sutherasan (2018) only focused on comparisons before and after introducing treatment protocol on the assessment results using the Early Warning Score System of hospitalized patients. However, it does not explain that the system helps nurses identify patient deterioration for early detection of emergencies, leading to cardiac arrest when not treated immediately (1). Another study by Una Kyriacos (2015) focused on comparing the application of the Early Warning Score System with standard observational charts in the ward. However, this did not also explain the early detection of physiological changes to identify emergency events in patients (9). Both studies did not clarify that implementing the Early Warning Score System in hospitalized patients helps nurses recognize the deterioration symptoms, handle the results of the assessments, and reduce the incidence of emergency cardiac arrest. Therefore, this study focused on the effectiveness of the Nursing Early Warning Score System in reducing the incidence of emergency cardiac arrest in patients of Pelamonia Hospital Makassar."

OBJECTIVE

The study aims to determine the effectiveness of applying the Nursing Early Warning Score System (NEWSS) in reducing the frequency of emergency cardiac arrest.

METHOD

This study used a quasi-experimental design with a Post Test Only Control Group Design. It endeavors to test the Nursing Early Warning Score System's effectiveness in reducing the incidence of emergency Cardiac Arrest at Pelamonia Hospital Makassar.

This research was conducted at Pelamonia Hospital Makassar in September 2020. Eighty samples of hospitalized patients with the partial and total care category in the Pelamonia hospital ward were collected using a total-sampling technique.

The Nursing Early Warning Score System uses seven assessment parameters, as shown in the table below:

PHYSIOLOGICAL PARAMETERS	3	2	1	0	1	2	3
RESPIRATION	< 8		9-11	12-20		21-24	≥25
OXYGEN SATURATION	≤ 91	92-93	94-95	≥ 96			
ADDITIONAL OXYGEN		YES		NO			
TEMPERATURE	≤ 35.0		35.1-36.0	36.1-38.0	38.1-39.0	≥39.1	
SYSTEMIC BLOOD PRESSURE	≤ 90	91-100	101-110	111-219			≥220
PULSE	≤ 40		41-50	51-90	91-110	111-130	≥ 130
CONSCIOUSNESS LEVEL				Alert			V, P, U

ASSESSMENT RESULT

0	1-4 LOW SCORE	5-6 MEDIUM SCORE	≥ 7 HIGH SCORE

THE SOLUTION

Observation 6-8 hours Routine nursing	Observation every 3 hours Report to DPJP (Doctor in charge) Problem handling	Observation every 1 hour Monitoring preparation Report to DPJP (Doctor in charge) Problems Handling	Install the Monitor DPJP report 30 minutes of no improvement KIE (Communication, Information, and Education) to the ICU / HCU room

The instrument consists of 7 physiological parameters in the Nursing Early Warning Score System (NEWSS) assessment (10, 11). This is under standard operating procedures for measuring respiration, temperature, pulse, blood pressure, and oxygen administration in the vitals signs examining manual (12). Furthermore, the examination of oxygen saturation with

an oximeter and the assessment of the awareness level using the APVU technique were carried out based on standard operating procedures (13).

In this study, interventions in the form of monitoring respiration, temperature, pulse, blood pressure, oxygen saturation, and consciousness level and observing the use of additional oxygen in patients were carried out. Subsequently, the results were assessed and given a score according to the predetermined value on the NEWSS assessment. A score of 0 requires 6-8 hours of observation and routine nursing. A score ranging from 1-4 needs observation for every 3 hours, report to the doctor in charge, and treatment. Meanwhile, when the assessment results are ≥ 7, a monitor is installed and reported to the doctor in charge. However, when there is no improvement within 30 minutes, IEC (Communication, Information, and Education) to the ICU/HCU room is performed.

This research was conducted from October 16th to September 16th, 2020, and the form of intervention provided to patients in this study was the application of NEWSS. It was implemented in the patients' administration to the ward until discharged, transferred to another room, or passed away. Data were collected by the researchers and assisted by nurses. Before this, the objectives and procedures for applying the Nursing Early Warning Score System were explained to the nurses involved.

Shapiro-Wilk test was applied to check the normality of the distribution. Then, the Mann-Whitney-test was used to determine the intervention's effect between the experimental and control groups.

The Ethics Review Committee approved this study of Universitas Megarezky with No. 092.D01.07.091056/IX/2020. A written research permit was also obtained from the investment office and one-stop integrated service in licensing service provision with n\No.6166/S.01 /PTSP/2020.

RESULTS

Characteristic of respondents

Table 1 showed the demographic data of the respondents. In the experimental group, the highest number of respondents was 45-55 years, consisting of 12 people (30%). Meanwhile, the smallest, consisting of 2 respondents (5%), was in the age range of 26-35. Similarly, the highest number of respondents in the control group was 46-55 years, consisting of 19 people (47.5%), and the least degrees from 26-35 years with two people (5%). Furthermore, 24 respondents representing 60% in the experimental group were male, and 16 (40%) were female. The control group consists of 22 (55%) male and 18 females (45%) respondents.

The experimental group's education demographic data shows that 13 respondents (32.5%) have high school education and bachelor level, and the fewest consisting of 6 (15%) has elementary. Whereas in the control group, the largest number of respondents had a junior high education level by 13 respondents (32.5%), and the smallest had elementary with 3 (7.5%).

Furthermore, the demographic data on patient classification shows that 24 respondents (60%) in the experimental group are in the total care category while the least 33 (7%) are in the minimum care. Similarly, 22 respondents (55%) in the control group were in the total care category, while the least consisting of 12.5 (7%) are in the minimum care.

Table 1. Characteristic of respondents.

Respondents' Characteristic	Experiment Group		Control Group	
	f	%	f	%
Age				
26-35	2	5	2	5
36-45	8	20	4	10
46-55	12	30	19	47.5
56-65	11	27.5	13	32.5
> 66	7	17.5	2	5
Gender				
Male	24	60	22	55
Female	16	40	18	45
Education Level				
Elementary	6	15	3	7.5
Middle	8	20	13	32.5
High	13	32.5	12	30
Undergraduate	13	32.5	12	30
Patient Classification				
Minimal Care	3	7.5	5	12.5
Partial Care	13	32.5	13	32.5
Total Care	24	60	22	55
Total	40	100	40	100

The Median Difference of early detection for physiological changes after receiving the application of the NEWSS among experimental and control group

Based on the table above, the median of early detection ability for physiological changes in the patients' emergency identification in the experimental group is 6.00, with a minimum, maximum, and mean rank value of 6.00, 7.00, and 60.50, respectively. Meanwhile, the median, minimum, maximum, and mean rank value in the control group was 3.00, 3.00, 4.00, and 20.50, respectively.

Furthermore, the Mann-Whitney test results showed a P-value = 0.000 ($P<0.05$), which indicates that the Nursing Early Warning Score System is more effective in reducing the incidence of emergency Cardiac Arrest at Pelamonia Hospital Makassar.

Table 2. Ability to detect early physiological changes of patients among the experimental group and the control group

Variable	Median		Mean Rank	P
	n	Minimum-Maximum		
Ability to detect early physiological changes of patients in the experimental group	40	6.00 (6-7)	60.50	0.000
Ability to detect early physiological of patients in the control group	40	3.00 (3-4)	20.50	

DISCUSSION

Demographic Data

The age demographics of both the experimental and control groups showed that the highest percentage of respondents was at the range of 45-55 years, comprising 12 (30%) and 19 people (47.5%), respectively. Previous studies also stated that the largest percentage of the age demographic data of the respondents studied was 59 and below (14). These results are consistent with people's conditions viewed from a health aspect because those who fall in the elderly age category are more susceptible to various physical complaints due to natural factors and disease (15).

Besides, the demographic data on gender, both in the experimental and control groups, showed 24 (60%) and 22 people (55%), respectively, as the highest percentage of male respondents. This is in line with previous research conducted by Zaky Soewandi Ahmad (2017), reporting that most respondents (49) studied were male (65.3%) (16). Previous research also showed 215 male respondents' dominance, representing 64.4% of the entire population (17).

Furthermore, in the demographic data of patient classification, both the experimental and control groups obtained the highest percentage of respondents with total care, 24 (60%) and 22 (55%), respectively. This is due to the patients' condition regarding surgical treatment or had undergone surgery.

Ability to detect early physiological changes of patients among the experimental group and the control group.

Table 2 showed that the median value of early detection ability in the experimental and control group is 6.00 and 3.00, respectively. Also, the Mann-Whitney test results showed a P-value = 0.000 (P <0.05), which indicates that the NEWSS is effectively applied toward patients to reduce the incidence of emergency Cardiac Arrest at Pelamonia Hospital Makassar.

In this study, the Nursing Early Warning Score System was applied to all treated patients, especially in the surgical room of Pelamonia Hospital Makassar. It was involved since the administration of patients until discharged, transferred, or passed away. This system used seven assessment parameters, as shown in table 1. Furthermore, several examinations were carried out on all patients, including blood pressure, oxygen saturation, respiration,

pulse, consciousness level check using the AVPU technique, and additional oxygen observation. The results were assessed and given a score according to the predetermined value on the NEWSS assessment. When the score is 0, it is required to conduct 6-8 hours of observation and routine nursing. A score ranging from 1-4 needs observation for every 3 hours, report to the doctor in charge, and treatment.

Meanwhile, when the assessment results are ≥ 7, then a monitor is installed and should be reported to the doctor in charge. However, when there is no improvement within 30 minutes, IEC (Communication, Information, and Education) to the ICU/HCU room is performed. These seven parameters prove that the ability to detect deterioration or emergency events of the patient in the experimental group is higher than the control that does not use the Nursing Early Warning Score System (NEWSS). This is evident in the experimental and control group's median values, which is 6.00 and 3.00, respectively. Furthermore, previous studies have shown that the application of Vitalpac Early Warning Scoring (ViEWS) has a very high scoring for the early detection of patient deterioration in the ER (16).

The Nursing Early Warning Score System (NEWSS) application is straightforward and practical, and closely related to the nurses' duty in making daily observations of vital signs. Previous studies have shown that users of the Online-based NEWSS reported that the system creates a direct scoring with a fast process, and it is also monitored in real-time (18).

Furthermore, the application of NEWSS in hospitalized patients improves early detection of deterioration or emergency incidents and its treatment control. Consequently, it reduces cardiac arrest incidence, which is the primary cause of mortality (death). Previous studies have also shown that the application of the Early Warning Scoring System causes a reduction in the incidence of death and transfer of patients to the ICU (1). Another study also showed this system as an intermediary for nurses to communicate with doctors in reporting patient conditions. Besides, it also improved patients' treatment with deteriorating or emergency conditions and supported nurses to collaborate with other professions. (19). Furthermore, this study's results correspond to the previous investigation, which explains that early identification of high-risk patients allows appropriate intervention, improves care, and reduces mortality (20).

CONCLUSION

After examining the Nursing Early Warning Score System (NEWSS) effectiveness, the results indicate that the system is sufficient to be applied in inpatients to reduce the cardiac emergencies incidence. In other words, it is feasible to use this system in any hospital.

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