

The Correlation between Response Time and The Code Blue Success Levels

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Article Information	ABSTRACT
<p>Received: 10 May 2024 Revised: 17 June 2024 Available online: 26 July 2024</p> <hr/> <p>Keywords</p> <p>cardiac arrest; code blue; response time; success level</p> <hr/> <p>Correspondence</p> <p>Phone: (+62)89667813115 E-mail: riris_risca@yahoo.com</p> <hr/> <p>Website</p> <p>https://journal.umtas.ac.id/index.php/healthcare/index</p> <hr/> <p>Doi</p> <p>10.35568/healthcare.v6i2.4721</p> <hr/> <p>©The Author(s) 2024 This is an Open Access article distributed under the terms of the Creative Commons Attribution-Non Commercial 4.0 International License</p>	<p>Cardiac arrest refers to the seized blood flow due to sudden dysfunction of the heart indicated by losing consciousness, cardiac respiration, and impalpable pulse on the large artery. The effort to prevent mortality from cardiac arrest requires some management, such as the activation of a code blue emergency system. The code blue team must work immediately to manage cardiac arrest. Immediate action for this patient could influence the success of the management. This research determined the correlation between the time response and the code blue team's success to manage the cardiac arrest case. This quantitative research applied correlation design with a cross-sectional study. The researchers took the respondents with accidental sampling. The results were 20 nurses of a code blue. The statistic test applied Chi-square and obtained a p-value of 9.615 with p value 0.008, ($\alpha < 0, 05$). The value indicated a significant correlation between the time response and the code blue team success level of cardiac arrest at the hospital. The result showed that the nurses of the code blue team should improve their skills and knowledge by joining seminars and trainings about emergencies. In Conclusion there was a significant relationship between response time and the Code Blue Team success rate in the case of cardiac arrest. Recommendations in this research for nursing students is expected to always update their skills by attending seminars and training to add and update their knowledge in the treatment of emergency patients.</p>

INTRODUCTION

Cardiac arrest is a condition where the circulatory system in the body is disrupted due to a sudden loss of heart function (Irawan et al., 2021). Cardiac arrest is characterized by loss of consciousness, cessation of breathing, and no palpable

pulse in the large arteries (Cristy et al., 2022). If cardiac arrest is treated with appropriate treatment, it can return to normal, and if not treated properly, it can result in death (Safitri et al., 2022).

WHO stated that in 2019, there were 17.9 million, representing 32% of all global deaths caused by heart disease, and this number increases every year, increasing the risk factors for cardiac arrest (Victoria et al., 2022). The incidence of cardiac arrest is around 10 out of 100,000 normal people aged under 35 years and annually reaches around 300,000–350,000 incidents (Indonesian Heart Association, 2022). There is no clear data regarding the incidence of cardiac arrest in Indonesia, but it is estimated that around 10,000 people per year or 30 people per day experience cardiac arrest, with the most incidents occurring in patients with coronary heart disease (Victoria et al., 2022). Meanwhile, Central Java is ranked 5th (1.6%) in the prevalence of heart disease according to the diagnosis of Indonesian doctors (Riskesdas 2018).

Based on a preliminary study conducted by researchers at Semarang Hospital, data on the number of cardiac arrest incidents from 2020 to 2022 reached 3,031. In 2020, there were 418; in 2021, there were 1,159; and in 2022, there were 1,454 cardiac arrest incidents, with the majority occurring in adults and the elderly. From this data, 2,871 people died, while 160 people survived. To prevent death from cardiac arrest, it is necessary to manage cardiac arrest, which can be done with cardiopulmonary resuscitation (CPR), which is the first step to saving a patient's life after cardiac arrest. The principles are rapid assessment of cardiac arrest, activation of the emergency system by calling the Code Blue Team, cardiopulmonary resuscitation, and defibrillation with AED (Automated External Defibrillation) (Amalia, 2022).

The Code Blue team must be able to work quickly in handling cardiac arrest cases because, if not treated immediately, they can have fatal consequences fatal (Weston & Aldalati, 2013). According to Lisnawati (2019), (Sinaga, 2022) states that response time is correlated with code blue

management. This response time is the time needed to respond to a Code Blue incident, starting from the Code Blue alarm warning sounding until the Code Blue Team arrives at the Code Blue incident location and handles the emergency (Nurcholis et al., 2021).

According to the American Heart Association (Mulya & Fahrizal, 2019), the response time or quick treatment for cardiac respiratory arrest or cardiopulmonary arrest is 3-5 minutes after the patient suffers cardiac arrest before immediate cardiopulmonary resuscitation (CPR) and defibrillation are carried out. Automatic External Defibrillator (AED) medical device. The quicker treatment of cardiac arrest patients affects the success rate (Sinaga, 2022). According to research by (Tezcan Keleş et al., 2021), the code blue team reaches the location within the first 3–4 minutes, or 92.7% of the time, which is defined as the "golden minute" during cardiopulmonary resuscitation (CPR).

According to Nurcholis et al (2021) several factors that influence the level of success are the competency of nurses in improving their abilities and skills in carrying out resuscitation and the facilities and infrastructure to support the action process in accordance with guidelines. Ida Jean Orlando has a very precise theory when applied to the success of the Code Blue Team. The Orlando concept divides five main concepts in the nursing discipline process: the responsibility of the nurse (a professional nurse), recognizing patient behavior, internal response or immediacy, discipline in the nursing process, and progress for the patient. This is in accordance with research by Nurcholis et al (2021), which states that recognizing patient behavior or changes in condition is very important in influencing the success of the Code Blue Team. Nurses as a Code Blue team must have the knowledge and skills to improve patient life safety. Nurses should be aware of the Code Blue disclosure process

that is consistent with hospital health policies. The Code Blue team must have the knowledge and skills to participate in CPR training for medical and nursing staff. CPR is useful for increasing nurses' knowledge of saving patients (Irawan et al., 2021).

Based on the prevalence and statements above, the researchers concluded that the incidence of cardiac arrest was quite high, with an average of most incidences in adulthood to old age. This requires the Code Blue Team to deal with patients with cardiac arrest with proper, prompt treatment and according to the standard of operational procedures. From these phenomena, the researchers will investigate the relationship between response time and the rate of success of Code Blue teams in heart arrest cases.

METHOD

In this study discussed the concept of the relationship of response time to the rate of success of the code blue team in the case of cardiac arrest. In this study, there are two variables: the independent variable, the code blue team's success rate, and the dependent, the response time. The type of research in this study is a quantitative descriptive with a cross sectional study design. The population in this study is the entire Code Blue nurse at the Semarang Hospital. In this study, the sampling technique used was accidental samplings of a total of 20 samples of respondents. This research is conducting research ethics to avoid unethical actions in research. The data collection included primary data such as age, gender, education, emergency training, and working time, observation sheets, validity tests, rehabilitation tests, and journal literature studies. Data processing includes editing, coding, data entry, and cleaning. Research uses univariate analysis and bivariate analysis. Data performed a statistical test with bivariate analysis to test the relationship between variables using the Pearson Chi-square test (X^2).

RESULTS

Table 1. Respondent Characteristics

Respondent Characteristics	f	%
Age		
Late teens (17-25)	2	10
Early teens (26-35)	16	80
Early adulthood (36-45)	2	10
Gender		
Man	16	80
Woman	4	20
Education		
Diploma Three	8	40
Bachelor degree	12	60
Emergency Training		
BLS training	2	10
No BLS training	18	90
BTCLS Training	20	100
No BTCLS training	0	0
ACLS-FN Training	3	15
No ACLS-FN training	17	85
Working Period		
< 5 years	11	55
> 5 years	9	45

Based on Table 1, Code Blue nurses are mostly of early adult age, or 26–35 years of age, of the 16 respondents (80%). The sex of the Code Blue nurse is mostly 16 men (80%) of the respondents. Code Blue Nurses education is mainly of layer 1 (S-1) of 12 respondents (60%). Code Blue Nurses who have already undergone emergency training are 20 respondents (100%). Basic Life Support (BLS) training mostly does not undergo BLS training for 18 respondents (90%). Base Trauma Cardiac Life Support Training (BTCLS) has entirely completed training for 20 respondents (100%), and Advance Cardiovascular Life Support for Nurses (ACAC-LS-FN) training has not been undergoing training for 17 respondents (85%).

Table 2. Code Blue Nurses Response Time

Respon Time	f	%
1 minute	13	65
2 minute	5	25
3 minute	2	10
4 minute	0	0
5 minute	0	0

Based on table 2 it is known that out of 20 respondents obtained response time of nurses Code Blue mostly with response time 1 minute as much as 13 respondents (65%).

Table 3. Code Blue Nurses Success Level

Respon Time	f	%
ROSC	12	60
Non-ROSC	8	40

Based on table 3, it is known that out of 20 respondents obtained the Code Blue Team success level results mostly succeeded as much as 12 respondents (60%).

Table 4. Relationship of Response Time to Code Blue Team Success Level in Cardiac Arrest Cases

	Value	degree of freedom	Asymptotic Significance (2-sided)
Pearson Chi-Square	9,615 ^a	2	0,008

The statistical test results using Chi-Square obtained p value = 9,615 and asymp. Sig. (2-sided) = 0,008 ($\alpha < 0,05$) so that H_0 was rejected or H_a received which means there is a significant relationship between response time and Code Blue Team success level in the case of cardiac arrest.

DISCUSSION

Univariate Analysis

This study showed that the majority of Code Blue nurses were of early adulthood, or 26–35 years of age, with as many as 16 respondents (80%). The results of this study are supported by a study conducted by (Chrisna, 2018) on the known age of the Code Blue nurse, mostly in the age group of 26–30 years. As a person ages, there are

physical and psychological changes. Ageing can affect a person's cognition and mental condition, including their responsiveness. (Wiliastuti et al., 2018). The age group between 25 and 45 years is a developmental stage in both knowledge sharing and increasing creativity, as well as critical thinking in nursing (Sutriyanti & Mulyadi, 2019). Age affects a person's endurance and performance in doing work. Age will affect the physical ability of labor; the older a person, the lower his muscle strength. (Kondi, 2019).

The majority of Code Blue nurses were 16 male (80%) respondents, which is in line with a study that says that the sex of the Code Blue nurse is mostly male (Pujiyanti Dwi, 2020). According to a study conducted by Vinet & Zhedanov (2016), there is no difference in the productivity of the work of male and female nurses. However, in determining nursing activities, it should be taken into account the degree of work that must be done. This is in line with a study conducted by Ardiansyah et al. (2020) in (Rahmawati et al., 2023) which states that the gender factor is a factor that affects the quality of breast compression skills of patients because men have larger muscle mass and body surface area compared to women, thus allowing men to do more chest compression than women.

The majority of Code Blue nurses have a bachelor's degree (S-1) of 12 respondents (60%). This is in line with the study that says that the highest level of education for Code Blue nurses is NERS (Nurcahyati et al., 2021). Nurses education is a stage of the profession adaptation process to be able to receive gradual delegation of authority in carrying out professional nursing, providing health education to perform advocacy functions on clients, making legal and ethical decisions, and using the latest research related to nurses (Putra et al., 2021). Education is a factor that can influence the knowledge and way of thinking of nurses when making quick

and accurate decisions (Nehme et al., 2016). From the statement, the researchers concluded that the higher the level of education, the higher the quality of the workforce produced, which will affect the decision-making process for the fast and accurate treatment of cardiac arrest patients, thus affecting the response time and the quality of nurses' services in the treatment of emergency patients, especially cardiac arrests.

Code Blue Nurses based on emergency training indicates that Code Blue Nurses have entirely completed emergency education with 20 respondents (100%). Code Blue nurses have completed basic life support (BLS), basic trauma cardiac life support (BTCLS), and advanced cardiovascular life support for nurses (ACLS-FN). Based on the emergency type of training, Code Blue Nurse has enrolled a total of 20 (100%) respondents. This research is supported by research that says that the BTCLS training certificate has become the standard or requirement that nurses should have when applying for employment in hospitals (Rahmawati et al., 2023). This training is also aimed at improving the value of the labor force, especially in relation to the expansion and development of the knowledge, attitudes, and skills of the labor force (Vinet & Zhedanov, 2016). Effective training for Code Blue nurses will ensure that quality cardiopulmonary resuscitation (CPR) is given to patients with cardiac arrest (Indah & Dirdjo, 2021).

Code Blue nurses mostly have a working time of less than 5 years for 11 respondents (55%). This is in line with the Rahmawati et al. study (2023), which says that some nurses who are skilled in dealing with cardiopulmonary resuscitation (CPR) are newly employed. Nurses with a working life of < 5 years are nurses with a productive age, so they have a higher motivation to work, which will result in a faster increase in knowledge and intellect, which will have an

impact on improving services in the implementation of emergency care, especially in patients with cardiac arrest. (Sutriyanti & Mulyadi, 2019).

In this study, the univariate analysis of the response time variable showed that Code Blue's response time mostly had a response time of 1 minute for 13 respondents (65%). This study was consistent with the study (Vinet & Zhedanov, 2016) that said that the frequency distribution of respondents was mostly in response time for the Code Blue team with quick response time. The response time is the response time to a Code Blue incident that starts with the Code Blue alarm ringing until Code Blue's team arrives at the scene and handles a cardiac arrest patient (Aziz, 2018). Rapid treatment for cardiac arrest is 3–5 minutes after the patient has had a heart attack for immediate cardiopulmonary resuscitation (CPR) (Mulya & Fahrizal, 2019). According to (Mitcel, 2022), the Code Blue Team's response time for effective results in patients is less than 5 minutes.

Code Blue Team response time mostly showed a fast response time, with an average overall response time of 20 respondents being 1 minute 45 seconds. Code Blue nurses, mostly 13 respondents (65%), had a response time of 1 minute to 1 minute and 45 seconds on average due to excellent response speed supported by factors such as age, gender, education, emergency training, and nursing time. In addition, the Code Blue system is spread or allocated to every room and is available at every shift in the hospital, so it will produce a faster response to get to the scene. In addition to the distribution of the area of location, the Code Blue team also affects the responsiveness of the treatment of cardiac arrest patients. The nurse with the closest location to the Code Blue incident will head first to the scene.

The degree of success of Code Blue's team in this study can be seen from how the patient's condition after receiving quick, careful, and efficient treatment from the Code Blue team determines whether a patient suffering from cardiac arrest can be saved or die. It is said to be successful when patients after receiving treatment from the Code Blue Team experience return of spontaneous circulation (ROSC), and it is said not to be effective when patients following receipt of treatment from the Code Blue Team experience non-return of spontaneous circulation (Non-ROSc), which is characterized by a return of heart activity and respiratory system functions such as cough, impaired pulse, or measurement of blood pressure. In this study, the univariate analysis of the Code Blue Team success rate variable found that out of 20 respondents, the result of the Code Blue Team success rate was mostly successful (ROSC) for as many as 12 respondents (60%). Code Blue's success is due to the rapid response time of the Code Blue team at an average speed of 1.45 seconds. Besides, there are other factors such as age, gender, education, emergency training, and the working time of a Code Blue Team nurse that influence the speed and success of treatment. This is in line with the research that says that the factors that influence the response time of emergency treatment are the characteristics of nurses (Mahrur et al., 2016).

In this study, 8 respondents (40%) were unsuccessful. (Non-ROSC). Based on the researchers' research, failure was due to factors such as longer response times, the condition of patients who did not attend, and breathing changes such as increased oxygen saturation, blood pressure, and breathing after being treated by the Code Blue Team until the Code Blue team felt fatigue, as well as the age and gender factors of patients. In this study, the results obtained showed that the majority of patients who failed (non-ROSC) were in the early-to-old age group to the elderly and

mostly in the female gender group. This study is in line with a study that says that the failure of the Code Blue team in dealing with cardiac arrest patients can be influenced by increasing response times because every minute of delay will reduce the percentage of patients' lives (Mulya & Fahrizal, 2019). In addition, it can be caused by the patient's condition, age, gender, and other factors that can't be controlled by the Code Blue Team. (Aziz, 2018).

Bivariate Analysis

The statistical test results using Chi-Square obtained a p value of 9,615 and an asymptotic sig. (2-sided) of 0,008 ($\alpha < 0.05$), so H_0 was rejected or H_a was received, which means there is a significant relationship between response time and the Code Blue Team success rate in the case of cardiac arrest. This is in line with a study by (Lisnawati et al., 2019), which says that the response time is related to the end result of Code Blue events and that there is a significant influence between response time and Code Blue success. This study is in keeping with the study that says that Code Blue Team response time obtained when Code Blue occurrences belongs to the category of events where response times are good with less than 5 minutes, that is, a quick and accurate response time affects the outcome of patient safety (Bennett et al., 2017).

It can also be seen from the percentage of response time with Code Blue Team success rate according to Basic Trauma Life Support and Basic Cardiac Life Support (2012) in Mulya & Fahrizal (2019) that response time < 1 minute has a chance of success of 98%, response time 1–2 minutes has a probability of success of 79%–88%, whereas response time 4–5 minutes has the likelihood of success of 41%–50%. With an average response time on the Code Blue team of 1 minute and 45 seconds, it therefore has a higher chance of life. This can make patients with ROSC more likely than non-ROSC

because, in patients with cardiac arrest, the timing of treatment determines the percentage of chances of success.

While in this study 8 respondents (40%) failed (non-ROSC), it was influenced by several factors, such as longer response time factors, the condition of patients who did not attend, experienced changes such as increased oxygen saturation, blood pressure, and breathing after being treated by the Code Blue Team until the Code Blue team felt tired, as well as the age and gender factors of patients. In this study, it was found that those who did not work (non-ROSC) were patients in the age group of early to old age.

This study is supported by a study that states that the factors that determine the success of the Code Blue Team are the condition of the patient and the age factor of the patient (Nurcholis et al., 2022). This is in line with the study that says that the success rate of cardiac arrest patients can be influenced by several factors, such as age and gender (Cristy et al., 2022).

CONCLUSIONS AND RECOMMENDATION

Based on the results of the study, it has been concluded that the response time of Code Blue nurses is mostly 1 minute, with a response time of as much as 13 respondents (65%) out of a total of 20 respondents. The statistical test results using Chi-Square obtained a p value of 9,615 and an asymptotic sig. (2-sided) of 0,008 ($\alpha < 0.05$), so H_0 was rejected or H_a was received, which means there is a significant relationship between response time and the Code Blue Team success rate in the case of cardiac arrest. Recommendations This research for nursing students is expected to always update their skills by attending seminars and training to add and update their knowledge in the treatment of emergency patients.

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