

Article

The implementation of code blue by nurses as first responders in outpatient and inpatient rooms at Malang Indonesia Hospital

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Abstract

Introduction: In-Hospital Cardiac Arrest (IHCA) is a frequent occurrence that necessitates prompt and appropriate assistance to improve survival rates. Nurses in public care rooms and outpatients are expected to be first responders to IHCA until an activated hospital code blue team arrives. Therefore, this study aims to analyze the implementation of code blue response by nurses in outpatient and hospital inpatient rooms in Malang.

Design and Methods: This is a quantitative study that uses observational methods with a cross-sectional approach comprising of 109 inpatient and outpatient care room nurses from 9 hospitals in Malang. The implementation of code blue was measured by a simulated case of adult cardiac arrest in a hospital inpatient room.

Results: The nurses involved were 67.0% female, where the majority have a D3 education qualification (57.7%), with more than ten years working experience (45%). Furthermore, 83.5% of nurses work in regular care rooms and 16.5% come from outpatient rooms. The results showed that the implementation of code blue by nurses in regular care and inpatient rooms was 66.7% and 65.9%, respectively in the insufficient categories. In addition, the Mann-Whitney U test obtained a p-value of 0.929.

Conclusions: In conclusion, there was no significant difference in the implementation of code blue that occurred in the inpatient and outpatient rooms. Further studies were recommended to observe code blue events directly and take samples with balanced proportions.

Introduction

Cardiac arrest is a case that often occurs in the intensive care unit, the general ward, or the outpatient room.¹ It is a sudden cessation of heart function in a person characterized by the absence of pulse and other signs of circulation.² The survival rate following in-hospital cardiac arrests has been reported to be 7–26.7%. According to a study, CPR had survival rates of 14.7%, 16%, and 12% in the U.S., the U.K., and Turkey, respectively. Furthermore, reported that this rate after CPR varies in different countries and is generally low.^{3,4}

Cardiopulmonary resuscitation (CPR) is one of the most

stressful events for nurses that require immediate action with a survival rate as low as 20% and their speed and performance affect survival after CPR.^{5,6} The study reported that the survival rate data for outpatients is 4.3% while inpatients have a much better survival, which is 14.88%.⁷ Some of the factors that affect the survival of these patients include age, duration of CPR, delay in starting CPR, and speed of the team arriving at the scene.⁸ Due to its critical life-saving role, the current study on CPR and ED nurses focused on improving performance for patient outcomes.⁹ Lack of CPR skills of nurses and physicians contributes to the poor outcome of cardiac arrest victims,¹⁰⁻¹¹ therefore, it is their professional responsibility to remain competent through regular updates.^{12,13}

Cardiac arrest is a leading cause of death in hospitals, therefore, special attention is required in its handling. Some of the strategies developed by hospitals to prevent cardiac arrest deaths include implementing early warning systems, forming rapid response teams, and building a code blue system that provides a follow-up response.^{8,14} The code blue team aims to provide help quickly and appropriately to improve the survival rate of cardiac arrest victims in the hospital, through continued assistance and defibrillation.¹⁵ The nurses are responsible for initiating the CPR and performing basic life support until the team arrives; therefore, they need to be informed of and follow the CPR rules.¹⁶

Design and Methods

This quantitative study uses observational methods with a cross-sectional approach and was conducted between 17-21 December 2020 on nurses working at certain hospitals in the Malang region. The inclusion criteria of respondents in this study were nurses who worked in the general ward and nurses who worked in hospitals that had implemented the code blue system. The respondents comprises 109 inpatient and 91 outpatient nurses working in the general ward, outpatient care unit of 9 hospitals in Malang Region and were not part of a code blue team (Table 1).

The instrument used in this study was a questionnaire containing data on the characteristics of respondents and an overview of the implementation of code blue include the initial response of nurses in the treatment room and identification of the quality of CPR actions performed by nurses who responded early using the code blue implementation guide developed by American Heart

Significance for public health

In-Hospital Cardiac Arrest (IHCA) is a frequent occurrence that necessitates prompt and appropriate assistance to improve survival rates. Nurses in public care rooms and outpatients are expected to be first responders to IHCA until an activated hospital code blue team arrives. The application of the code blue response by nurses in outpatient and hospital inpatient rooms in Malang is documented in this study.

Association by measuring a simulated case of adult cardiac arrest in the hospital by asking when and how to call the code blue team, and what to do while waiting for their arrival. Data were collected using a google form requiring the respondents' ID card that shows where they work and also fill out a statement indicating that they are not a member of the code blue team. The completely and validly filled data were presented and univariate analysis was conducted. The bivariate test was conducted using the Mann-Whitney U test because the data obtained is not normally distributed. The level of confidence used is 5%. Furthermore, ethical clearance was obtained from the Faculty of Medicine, Universitas Brawijaya with No. 212/EC/KEPK/12/2020.

Result and Discussion

The majority of respondents in the study were female and were in their early adult age range. Also, nearly half of the patients are nurses with over 10s years of working experience and 98% of the respondents had participated in socialization and code blue simulations in their workplace hospital. About 93% of nurses did not consider advanced cardiac arrest and code blue system.

The results showed that there was no significant difference in the implementation of code blue in inpatient and outpatient rooms (Table 2 and 3). The majority of respondents had participated in socialization and code blue simulations organized by their workplace hospitals in the past year. This condition shows good understanding and acceptance by nurses when receiving materials and following simulations, ensuring that its implementation throughout the rooms in the hospital is relatively the same. The results are consistent with the reports of the study that code blue simulation can improve ability and confidence.¹⁷⁻²⁰ Furthermore, high-fidelity simulation has the potential to help HCPs retain the necessary knowledge to perform CPR successfully.²¹

The nurses involved in this study have also participated in basic life support training, which includes basic relief in cardiac arrest patients. They were taught periodically how to recognize cardiac arrest conditions, activate code blue, perform pulmonary resuscitation, and use AED while waiting for further helpers. Furthermore, there was a significant improvement in nurses' knowledge and abilities after a brief training in BLS, and some information and skills were retained after six months.²²⁻²⁴ They were also able to recognize cardiac arrest conditions and perform well-conscious examinations. Meanwhile, the method of calling the team code blue in this study is to reach a call a specific number using a telephone. Some hospitals use phones with special lines to activate code blue by calling the team through the emergency installation telephone number and then calling certain units to forward the information to all units. This is consistent with the reports of the study that some of the ways to activate the team include telephone calls and pressing the code blue button, however, no hospital has used GPS to detect the location of the incident.²⁵

The part of nurses' role as the first helper of cardiac arrest that requires improvement is the effort to locate and use the AED that has been placed by the hospital to minimize delays in defibrillation of cardiac arrest patients. Additionally, most nurses have performed well in their function of chest compression while waiting for the team's arrival. Based on the results, the factors that affect the outcome of CPR include delayed attendance of the team, inadequate skill, and deficient CPR equipment.²⁶ Three types of barriers were identified, namely procedural barrier, which is the time lost due to language and communication issues as well as telephone problems. The second and third barriers include CPR knowledge (skill deficits, perceived benefit), and personal factors.²⁷ The study's limitations include an imbalanced number of respondents and the lack of measurement of code blue application during the simulation procedure. Furthermore, the number of inpatient and outpatient nurse respondents should be equal to compare and measure the implementation of code blue using direct simulation rather than surveys.

Conclusions

The majority of code blue implementation by nurses as the first helper on cardiac arrest in the hospital is sufficient. Furthermore, there is no significant difference between the implementation in

Table 1. Respondent characteristics.

Variable	Category	N	(%)
Sex	Male	36	33
	Female	73	67
	Total	109	100
LoW*	<5 years	26	23.9
	5-10 years	34	31.2
	>10 years	49	45
	Total	109	100
Work place	Walking clinic	18	16.5
	General ward	91	83.5
	Total	109	100

*LoW: length of work .

Table 2. Implementation of code blue by nurses in outpatient and inpatient rooms.

Variable	Category	N	(%)
Implementation of code blue	Less	36	33
	Fair	72	66.1
	Good	1	0.9
	Total	109	100

Table 3. Difference in implementation of code blue by nurses in the inpatient and outpatient room.

Implementation of code blue Room	Less		Fair		Good		p
	n	%	n	%	n	%	
OPR*	6	33.3%	12	66.7%	0	0%	0.929
IPR*	30	33.0%	60	65.9%	1	1.1%	
	36	33.0%	72	66.1%	1	0.9%	

*OPR; outpatient room; IPR: inpatient room.

the outpatient and inpatient room. Hence, hospitals need to consistently socialize and simulate code blue to maintain nurses' ability to help cardiac arrest victims in the hospital.

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