Factor Analysis regarding Chain of Survival Affecting Survival Patient Pre Hospital Cardiac Arrest in the Emergency Room

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ABSTRACT

Background

External factors causing the death from cardiac arrest was namely speed and accuracy of handling "Chain of survival" with five series of immediate recognition of cardiac arrest and activation of the emergency response system, early CPR with an emphasis on chest compression, rapid defibrilation, effective advance life support, and integrated post cardiac arrest care.

Methods

A systematic review which collecting literature sources started from 27 November-27 December 2017 with inclusion criteria : publications are limited from 2010-2017, accredited national and international journals.

Results

This research from electronic database search 10 in Pub Med obtained, 10 in Pro Quest, and 1 accredited national journal. Results showed the survival of patients with cardiac arrest influenced by early acces of pre hospital pastients, which stating that timely chain of survival could increase survival rate of cardiac arrest patients, CPR could improve the endothelial tissue of the heart therefore it could repair the microvascular on the cardiovascular muscle tissue of cardiac arrest patients, the third factor affecting the survival pre hospital patient's cardiac arrest was early defibrillator, that the use of AED could soon improve their heart rhythm.

Conclusion

Factors had the most dominant relationship with survival patient pre-hospital cardiac arrest was a rhythm of the heart upon arrival, if the ventricular tachycardia or ventricular fibrillation was likely to reach the ROSC. It needed further research on to seek action of rescuing patient cardiac arrest.

Keywords

Chain of Survival; Survival Patient; Cardiac Arrest

BACKGROUND

The main cause of death in various countries now is cardiovascular disease. This type of disease includes angina pectoris, decompensation cordis, myocardial infarction, atrial fibrillation, cardiac arrest, and so on. Often patients with this case come to the hospital under critical conditions because they did not get proper treatment beforehand so that the patient entered the most serious and emergency condition, namely cardiac arrest. According to (1), The inevitable cause of internal body death is if the brain does not receive oxygen for 4-6

minutes duration can cause permanent brain damage. While the external actors that cause death of cardiac arrest are the speed and accuracy of handling "Chain of survival" with five series, namely immediate recognition of cardiac arrest and activation of the emergency response system, early CPR with emphasis on chest compression, rapid if defibrillation, effective advance life support, and integrated post cardiac arrest care (2). Data from the cardiovascular disease according to(3) in America, Europe and Asia ranged from 30%, while in Indonesia cardiovascular diseases and other infectious diseases were also the main causes of death as indicated by the survey results in East Java region precisely in Sidoarjo District Hospital from January to March 2014 there were 29 patients with cardiac emergency with acute myocardial infarction, STEMI, ischemia, ventricular tachycardia and atherosclerosis where the percentage 41.4% had cardiac arrest at the hospital.

Event Cardiac arrest now still to be topic main research from Indonesia or outside country. This proven on journal research studied international by (4) in Taiwan the country still high amount sufferers ventricular tacicardia and ventricular fibrillation with less response time from 6 minutes do Cardiopulmonary Resuscitation (CPR) then number hope his life only 41.08%. this show phase critical patient cardiac arrest average range <6-9 minutes. Data on existing research in Indonesia too show the same thing as it has been researched by (5) that nurse in handle stop heart work based on understanding they respectively, and there is various obstacles in the implementation including response emotional show helplessness for change condition in thing humanity for permanent do action rescue.

On decade this is absolute must for nurses come along and think critical in decrease number Dead and enhancement hope life patient interference cardiovascular including wrong the other cardiac arrest. Nurse prosecuted for could play an optimal role in situation emergency however often no could do its role with good corresponding standard. Nurses role among them on phase pre hospital could it he recognize sign symptoms cardiac arrest because increasingly fast patient identified then hope his life increasingly big however if late then permanent brain damage. When to be on stage in hospital nurse must fast do action help early with CPR and giving the right medicine, and phase last out of hospital can it nurse in involve the community for action introduction early and report to IGD 11 9 in order action rescue immediately. Thus efforts to improve patient safety can be improved.

The effort to save the patient with the chain of survival is a series of interdependencies, meaning that the success of each chain depends on the effectiveness and activation of the readiness of this system. Outside the hospital, lay people will experience a phase of confusion about what action to take when finding someone who has cardiac arrest. This confusion caused delays and failure to immediately activate emergency assistance or immediately perform cardiac pulmonary resuscitation. Time disappears along in the confusion phase and does not take action. If a lay person is able to contact the dispatcher, namely the person who receives emergency call at the hospital, the rescue action can be done through instructions guided by him to initiate help to the victim. The quality of emergency care performed is expected to be

able to increase the survival rate of victims of cardiac arrest. The above set of actions are steps to save patients in implementing chain of survival so that mortality can be reduced.

In the academic field, there are many studies on cardiac arrest that have been carried out by students, lecturers and researchers in the past two decades. After a preliminary survey, the results in the field show that research into cardiac arrest is divided into two, namely the research of the factors that affect cardiac arrest and the actions of rescuing patients with chain of survival. However there has been no comprehensive research on the analysis of chain of survival factors that affect patient safety cardiac arrest in Indonesia.

The incidence of cardiac arrest is quite a lot in Saiful Anwar Malang's hospital because as a referral hospital with fulfilled facilities encourages authors to conduct field studies and literature studies (systematic review). Systematic purpose of this review is to analyze the factors that affect the survival chain of pre hospital patient safety cardiac arrest in the ED room.

Formulation of Research Problems
1. Is there a relationship of early access to pre hospital patient safety cardiac arrest in the ED room ?
2. Is there a relationship between early CPR and pre hospital patient safety cardiac arrest in the ED room ?
3. Is there a defibrillator early relationship with patient safety in pre-hospital cardiac arrest the emergency room ?
4. What factors have the most dominant relationship with pre hospital patient safety cardiac arrest in the ED room ?

MATERIALS AND METHODS

Source of research data comes from literature obtained through the internet with PRISMA (Prefered Reposting Items for Systematic Review) in the form of results of research on cardiac arrest in Indonesia and abroad published on the internet including Indonesia, the United States, Taiwan and the Netherlands. After being traced through an on-line library from several studies above it was found that the literature on cardiac arrest was widely published in developed countries of the United States. Database online of literature collection starts on 27 November-27December 2017 with inclusion criteria : publications are limited from 2010-2017, published in accredited national and international journals, quantitative research types and handling of pre hospital cardiac arrest. Literature search was started from national journals with reductions and found 1 journal, then searching for Pro Quest found 10 literatures and 10 publications Pub Med, but there were duplications of 2 journals, 1 in one Pro Quest database and 1 duplicated in two Pub med database and Pro Quest. It turned out that after being studied there were 8 journals that discussed the handling of cardiac arrest in the in hospital phase so it had to be excluded because it did not meet the inclusion criteria. The final results are 6 journals because of the 10 previous journals there are still discrepancies with the inclusion criteria, namely the type of qualitative research. Furthermore flowchart and then search results are presented in Figure 1 below :
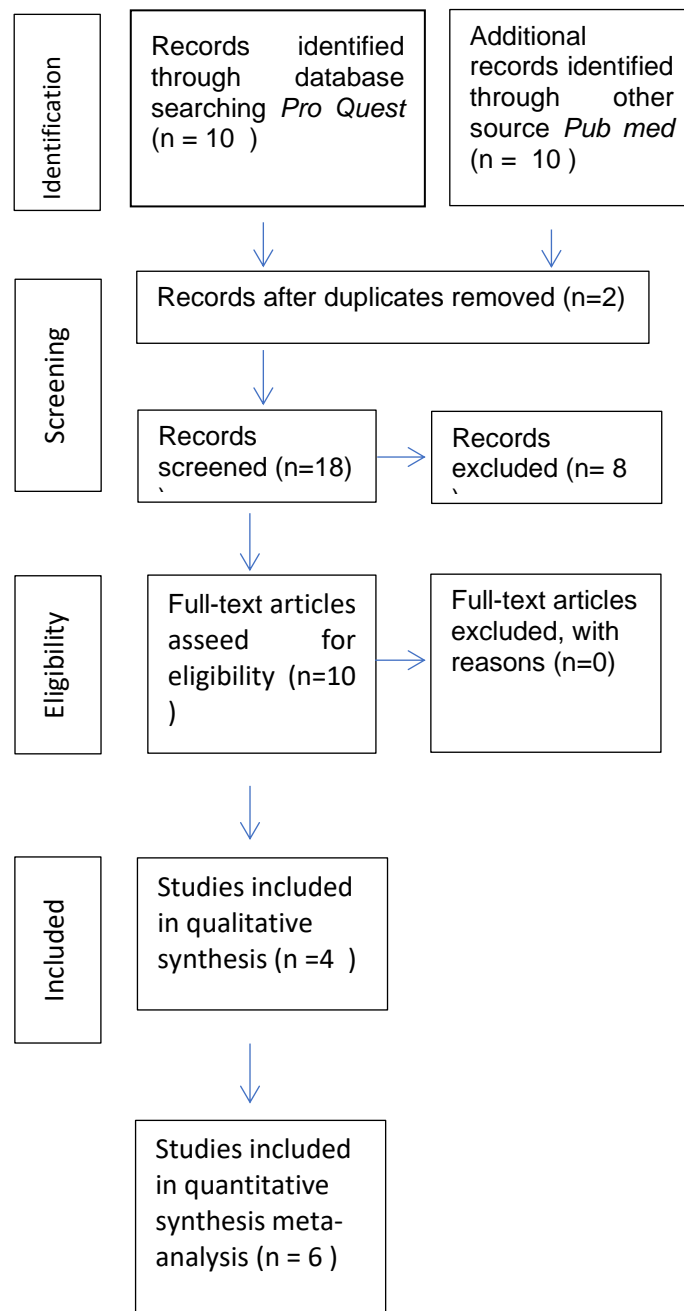
Identification	Records identified through database searching *Pro Quest* (n = 10)	Additional records identified through other source *Pub med* (n = 10)

Records after duplicates removed (n=2)

Screening	Records screened (n=18) `	Records excluded (n= 8 `

Eligibility	Full-text articles asseed for eligibility (n=10)	Full-text articles excluded, with reasons (n=0)

Included	Studies included in qualitative synthesis (n =4)

Studies included in quantitative synthesis meta-analysis (n = 6)

Figure 1. Diagram PRISMA groove

RESEARCH RESULT AND DISCUSSION
Journal analysis results that have been carried out by the researcher as lister in table 1 below.

Table 1.

No.	Researcher, Research Year and Research Title	Type of Study / Article	Research purposes	Research design	Research Sample	Measuring instrument	Procedure	Research result	Level
1.	Winanda Rizki Bagus Santosa, Titin Andri Wihastuti, Ali Haedar, 2015, Analysis of Factors Related to the Return of Spontaneus Circulation on Cardiac Stopping Patients at the Dr Iskak Hospital in Tulungagung.	National Journal	The purpose of this study was to determine the factors associated with the occurrence of ROSC in patients with cardiac arrest at the Dr Iskak Tulungagung Hospital.	This research is quantitative. The design used in this study is correlational with a cross sectional approach, namely a research model that aims to determine the relationship between variables that emphasize the measurement time only once by collecting data simultaneously at a time so that there is no follow-up. Not all research subjects had to be examined on	Gender of a total of 45 patients, 26 patients (57.8%) have male sex. Based on the characteristics of the patient's age from a total of 45 patients, 31 patients (68.9%) had a age of 45-75 years.	This study uses the PAROS registry of cardiac arrest events in the hospital which includes a history of disease that causes the risk of cardiac arrest, heart rhythm, mechanical devices used when performing CPR, use of advanced airway before ROSC occurs which is assisted by research enumerators namely nurses at the Hospital Dr. Iskak Tulungagung. for data retrieval	This study uses bivariate analysis test with phi coefficient test, and multivariate test analysis using logistic regression test	Based on the analysis of 45 patients, it was found that the heart rhythm associated with the occurrence of ROSC in cardiac arrest at Dr. Iskak Tulungagung Regional General Hospital p 0.000 <0.05 can be concluded that there is a significant relationship between heart rhythm and ROSC occurrence in cardiac arrest.	Level V

			the same day or time, but the assessment was only one time related to the occurrence of ROSC in cardiac arrest patients at the Dr Iskak Tulungagung Hospital.		of cardiac arrest patients.		
2.	E. Andrew, JE Bray, P. Cameron, S. Bernard, IT Meredith and K. Smith, 2015, Atlanta, USA, 2015, Cardiology; New Findings in Heart Attack Described from University of Western Australia (The significance of pre-arrest factors in out-of-hospital cardiac arrests witnessed by emergency medical services: A report from the Victorian	International Journal	The purpose of this study was to assess the relationship between prodromal symptoms and clinical observation pre cardiac arrest about heart rhythm and patient survival in EMS.	The design of this study uses a retrospective study of patient care medical records.	Respondents totaled 1056 EMS adults who were identified from medical records of cardiac patients Victoria Ambulance.	Not explained in the article.	Test data analysis using logistic regression identified factors related to survival rate and initial heart rhythm before cardiac arrest patients outside the hospital.	The results of this study are the average age of patients is 73 years of male 65.3%, symptoms that often appear before being taken to the hospital are chest pain (48.8%), dyspnoea (41.8%), consciousness changes (37.8%), respiratory rate <13x / min 43.1% and> 24x / min 45.5%, GCS <15 (45.5%).

								The conclusion is that there is an opportunity to improve the outcome of patient cardiac arrest by early recognition and management of patients at risk of developing OHCA.
	Ambulance Cardiac Arrest .							
3.	Chien-Chou Chen, Chao-Wen Chen, Chi-Kung Ho, I-Chuan Liu, Bo- Cheng Lin, Ta-Chien Chan, 2015, Spatial Variation and Resuscitation Process Affecting Survival after Out-of-Hospital Cardiac Arrests (OHCA)	International Journal	The purpose of this study was to determine how spatial and non-spatial factors simultaneously affect OHCA survival until hospital admission.	This research design was retrospective of OHCA register data in January 2011-December 2013 Kaohsiung City, Taiwan.	The number of 4957 respondents was taken from 4 levels of acute care in Taiwan (District Rs , Level 2 Hospital, tertiary medical services, and Central Hospital)	The data is based on Utstein International style criteria consisting of patient demographic information, witness status, EMS response time (interval between ambulance departure from fire station until ambulance arrives at the scene), EMS transport time, type of equipment used	Test data analysis with univariate and multivariate logistic regression to evaluate the association between risk factors and survival after OHCA.	The results of the study that factors that directly relate to the survival of patients with OHCA heart disorders are: use of the Laryngeal Mask Airway (AED or LMA), and the EMS time interval to bring the patient to the Emergency Department.

						to support the lives of patients with cardiovascular disorders , the name of the destination hospital, the name of the sending unit, and the location of heart failure, 4 levels of hospital data in Taiwan.		
4	DA Van Hoeijen, MT Blom, A. Bardai, PC Souverein, A. De Boer and HL Tan. 2016, Nutritional and Metabolic Diseases and Conditions; New Type 2 Diabetes Study Results from University of Amsterdam Described (Reduced pre-hospital and in-hospital survival	International Journal	The purpose of this study was to determine whether type 2 DM was associated with a decrease in pre hospital and in hospital survival rates after OHCA.	The design of this study was a cohort study, a prospective observational method in OHCA patients.	The number of respondents was 1549 OHCA Dm type 2 patients with the results of Ventricular Tacicardia ECG/ Ventricular Fibrillation and Non DM 1274 patients.	The measuring instrument is not explained in the research article.	Test the analysis with univariate.	The result is a lower survival rate in RS in type 2 DM patients than non diabetic patients with p = 0.032. Patients treated with insulin had decreased pre-hospital survival rates compared with patients with oral glucose-lowering drugs p = 0.034. Whereas good neurological

	rates after out-of-hospital cardiac arrest of patients with type-2 diabetes mellitus: an observational prospective ...)							status in type 2 DM patients with Non DM patients was associated with pre hospital and in hospital survival after OHCA as well as p = 0.954.
5.	Katrin Fink , Meike Schwarz, Linda Feldbrügge, Julia N Sunkomat, Tilmann Schwab, Natascha Bourgeois, Manfred Olschewski, Constantin von zur Mühlen, Christoph Bode and Hans-Jörg Busch, 2010, Severe endothelial injury and subsequent repair in patients after successful cardiopulmonary resuscitation	International Journal	The aim of this study was to analyze direct markers of endothelial injury, circulating endothelial cells and endothelial microparticles and endothelial progenitor cells as a marker of endothelial repair in patients after CPR.	Observatory research design.	The number of respondents was 40 patients after CPR, 30 control groups and 9 healthy subjects.	Flow cytometry measuring device.	Test the analysis with statistics.	After CPR circulating endothelial cell count increased p <0.005, in the initial phase of the patient after successful CPR there was very severe endothelial damage, endothelial microparticles appeared after the first 24 hours, after ROSC showed an inflammatory phase and the second day after ROSC increased endothelial repair.

| 6. | Gavin D Perkins, Ranjit Lall, Tom Quinn, Charles D Deakin, Matthew W Cooke, Jessica Horton, Sarah E Lamb, Anne-Marie Slowther, Malcolm Woollard, Andy Carson, Mike Smyth, Richard Whitfi eld, Amanda Williams, Helen Pocock, John JM Black, John Wright, Kyee Han, Simon Gates, 2015, Mechanical versus manual chest compression for out-of-hospital cardiac arrest (PARAMEDIC): a pragmatic, cluster randomized controlled trial | International Journal | The research objective was to determine the effectiveness of CPR with manual compression and compression mechanics. | The research design was controlled. | Number of respondents 2819 | The measuring instrument is not explained in the article. | Test analysis with logistic regression SAS version 9. | There was no evidence of an increase in 30-day survival with LUCAS 2 compared to manual suppression. | Level 1 |

Level I   : Meta-analysis of multiple RCTs ('gold standard')
Level II   : Individual RCTs

Level III   : Quasi-experimental
Level IV   : Non-experimental; qualitative
Level V   : Program evaluation; QI; RU; case reports
Level VI   : Opinion of respected authoritie

From the above table it can be seen that patients with cardiac arrest can pass through their critical period and reach the ROSC stage when marked with VT/VF heart rhythm. Of course, this begins with the implementation of the appropriate actions of the initial chain of survival stage, starting with early recognition of signs of heart disease symptoms, contacting help, and so on. This is in line with (6) that explains that the action to survive on cardiac arrest is to activate the chain of survival, namely the action when the first cardiac arrest is followed by BLS and ACLS (7). From the study it was also found that the factors associated with cardiac arrest were a history of the disease causing the risk of cardiac arrest, heart rhythm upon arrival at EM. To save cardiac arrest patients based on research data in general, the most related are affected by heart rhythm upon arrival at EM, which means that with heart rhythm, more actions can be taken to increase the occurrence of ROSC as an early sign of patient safety.

Study abroad, especially in developed countries also show the same thing with the fact companies that cardiac arrest patients rescue action must be supported by the chain of survival timely as research conducted by (8) on the conclusion that the management of the symptoms of premature stop sign the heart can increase the chances of rescue patients including the community must recognize the signs of chest pain, decreased awareness and shortness of breath. So that the community if they find such signs of symptoms must immediately take the patient to the nearest hospital to get immediate treatment. These three signs can be a guideline for the community that all three are signs of symptoms of cardiac arrest that must be known and they must immediately carry out chain of survival. The more widespread information is conveyed to the general public in accordance with the third research from (9) the patient's rescue actions for the use of AED and LMA will be quickly implemented. So that the heart rhythm can be maintained in the ventricular rhythm phase of tachycardia or ventricles fibrillation, where such a rhythm is potentially patient to survive cardiac arrest. The mechanism of the cause of ventricular tachycardia is usually due to a disorder of automation (impulse formation) or due to conduction disturbances. A rapid pulse frequency will cause the left ventricular filling phase to shorten, resulting in reduced filling of the blood to the ventricles so that cardiac output will decrease. VT with a stable hemodynamic state, the choice of therapy with medical treatment is preferred. Whereas in the case of VT with hemodynamic disturbances until cardiac arrest (VT without pulse), administration of defibrillation therapy using DC shock and CPR is the primary choice (6). Several other studies also proved that the determinants of patient safety were also determined by a history of comorbidities in patients with cardiac arrest including a history of diabetes mellitus, a study by (10) concluded that patients with type 2 diabetes have lower life expectancy than patients with cardiac arrest with non DM. This is supported by the 5th study from (11) which states that patients with cardiac arrest in the initial phase occur endothelial damage so it is very susceptible to the occurrence of ischemia in the tissue. This triggers macrovascular damage to the cardiovascular organs of the heart, we know that cardiac output in the heart is affected by stroke volume and frequency of the heart. If venous return has a disruption due to abnormal low pressure on the vein, it will affect cardiac output, so that with the presence of concomitant disease in the blood vessels due to blood viscosity, it will aggravate the backflow of the veins so that the potential for cardiac arrest will be even higher. Thus need to be aware of the accompanying disease history of patients with cardiac arrest to minimize patient mortality. The thickening of the heart muscle

caused by high blood pressure, Diabetes mellitus and heart valve abnormalities tend to make a person exposed to cardiac arrest (6). Another thing that is also important is the need to be aware of the use of assistive devices in performing cardiac massage (CPR). Cardiac arrest can be recovered if treated promptly with cardiopulmonary resusitation and defibrillation to restore heart rate normal. Patient's chance to survive is reduced to 7 to 10 percent per minute that goes without cardiopulmonary resusitation and defibrillation (6). Based on the results of research from The American Heart Association in June 1999 obtained data that 64% patients with cardiac arrest who get immediate treatment can survive live without brain damage. Research by (12) states that the use of LUCAS 2 mechanical aids in carrying out RJP is not absolutely able to increase the life expectancy of cardiac arrest patients, but doing CPR with manual emphasis is also still an effective choice in rescuing cardiac arrest patients with evidence that after 30 days the patient installed LUCAS 2 mechanical CPR did not show satisfactory results, the patient's life expectancy was still the same as if the patient was done with CPR with manual emphasis. Of the several factors that influence patient safety above, it can be concluded that the importance of treating cardiac arrest is the ability to be able to detect and react quickly and correctly to immediately restore the heart rate to normal conditions to prevent the occurrence of brain death and permanent death. The key to handling emergency conditions (cardiac arrest), is that there must be continuity from the upstream (those who first found it) must have knowledge about basic life support, ambulance services, emergency, emergency room, ICU, downstream (basic care services) must be one language in view of the emergency situation.

CONCLUSION

1). Patient safety cardiac arrest is influenced by early access to pre hospital patients as shown by (13) which states that timely chain of survival measures can increase the life expectancy of cardiac arrest patients.

2). Patient safety pre hospital cardiac arrest is also influenced by early CPR supported by (11) with the results that CPR can improve the endothelial layer of the heart tissue so that it can improve microvascular on cardiovascular tissue and cardiac arrest can be resolved.

3). The third factor that influences the patient's safety in pre hospital cardiac arrest is early defibrillator supported by research by (9) that the use of AED can immediately improve the heart rhythm of cardiac arrest patients.

4). Factors that have the most dominant relationship with pre hospital patient safety cardiac arrest the results of several literary studies are heart rhythm upon arrival at GIG.

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