IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)
e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 16, Issue 11 Ver. V (Nov. 2017), PP 23-27
www.iosrjournals.org

Prehospital Factors Influencing Survival Time of Cardiac Arrest Patients Outside Hospital: Case Study of Malang General Hospital And Dr. Iskak General Hospital Tulungagung, Indonesia

*Ferry Limantara[1], Respati Suryanto Drajat[1],Ali Haedar[1],Nanik Setijowati
[1]*Department of Emergency Medicine, Faculty of Medicine, Universitas Brawijaya, Indonesia*
[2]*Department of Public Health, Faculty of Medicine, Universitas Brawijaya, Indonesia*
**Corresponding Author: Ferry Limantara[1*]*

Abstract: ***M****ortality due to sudden out-hospital cardiac arrest is common and has become health care problem worldwide.Emergency medical system is expected to implement five chains of survival effectively. The continuous PAROS (Pan Asian Resuscitation Outcome Study) has showed variation in pre-hospital service. Thus, there are room for improvement in pre-hospital service system. Eventually, mortality due to out-hospital cardiac arrest can be reduced. The objective of this study is to identify pre-hospital factors affecting survival time in cardiac arrest patients and to analyze the impact of survival time in hospital equipped with EMS (emergency medical services) and non-EMS hospital. This study was an observational analytic study with cross sectional approach. The data were taken from Malang General Hospital and dr. Iskak General Hospital Tulungagung retrospectively, to analyze the impact of pre-hospital factors toward survival time in sudden cardiac arrest and to observe the influence of survival time in EMS-equipped hospital and non-EMS hospital. The samples were 64 patients that met inclusion and exclusion criteria. The findings indicate that pre-hospital factors affecting survival time in cardiac arrest was initial rhythm. There was no impact of survival time in EMS-equipped hospital and non-EMS hospital.*

Keywords: *sudden cardiac arrest, Prehospital, initial heart rhytm, survival time*

Date of Submission: 06 -11-2017 Date of acceptance: 14-11-2017

I. Introduction

In general, sudden mortality is defined as natural unexpected death one hour after the emergence of mortality symptomps. One hour of time refers to time interval between the emergence of terminal occurance, which is acute change on cardiovascular status and heart attack. Based on the cause of prevailing disease, sudden mortality can be classified into two categories. The first is those caused by heart attack and the second is those which are not caused by other factors such as intrachranial bleeding, epilepsy, lung emboli or asthma. The classification is relevant clinically because for most population, the cause of heart attack is congenital and other causes are inherited to small number of population (Myerburg, 2010). The occurence of cardiac arrest is relatively high. Therefore, knowledge on initial management using Basic Life Support (BLS) to cardiac arrest patents is crucial. It includes introduction and immediate access to emergency service, the application of early lung and heart resucitation, defibrilation and advaced treatment to improve patients' life expectancy. Introduction of immediate cardiac arrest and activation of Emergency Medical Service (EMS) is preliminary step to save and treat cardiac arrest patient (AHA, 2010).

In Indonesia, average number of mortality in Emergency Instalation can be used as indicator of quality and efficiency of certain hospital. In Indonesian version of PAROS questionaire, there are questions on prehospital and hospital factors of cardiac arrest patient. Unfortunately, there is no adequate research data in Indonesia or Malang. Therefore, it is hard for medical personel to identify factors influencing survival time upon returning spontaneous circulation on cardiac arrest patient. Thus, the researcher intends to study prehospital factors influencing survival time of cardiac arrest patients at hospital and the effect of survival time on sudden prehospital cardiac arrest patients in hospital with EMS system and those without EMS system.

II. Research Method

The research design used in this study is analitical observational research using cross sectional approach and data are taken retrospectively to find out the influence of pre hospital factors (time span of cardiac arrest, early lung and heart resuscitation, initial heart rhytm and the use of resucitation drug) to survival time upon returning spontan circulation on patients of prehospital cardiac arrest and to find out the effect of survival time on sudden hospital cardiac arrest in hospital with EMS system and those withour EMS system.

Sample used is prehospital cardiac arrest patients taken to emergency facility in hospital at Malang and in dr. Iskak hospital in Tulungagung. They are 32 samples each using inclusion criteria. It covers all sudden cardiac arrest patients taken to emergency facility in hospitals at Malang and in dr Iskak hospital at Tulungagung. The data covers one whole year data starting from January 2016 to December 2016. This study uses OHCA PAROS questionaire. Primary data are taken from EMS officer, family of patients or those taking patients to hospital which are medical officers. Questionaires are filled out by researcher and nurse at primary triase functions as enumerator. Considering study ethics, data are taken after resuscitation proses are completed by doctor.

III. Findings

The followings are result of data analysis taken from prehospital cardiac arrest patients fulfilling predetermined inclusion and exclusion criteria and it aims at finding out the effect of prehospital factors to survival time of cardiac arrest patients at hospital and finding out survival time of sudden prehospital cardiac arrest patient at Hospital with EMS system compared to those without EMS system. Data are taken retrospectively during one year started from Januari 2016 to December 2016 at emergency facilities of hospitals in Malang and at dr. Iskak Hospital In Tulungagung.

Table 1. General Characteristics of prehospital cardiac arrest at hospitals in Malang and in dr. Iskak Hospital at Tulungagung

No	Variable	Occurance				P value
		Malang General Hospital		Dr. Iskak General Hospital, Tulungagung		
		n	%	n	%	
1	Sex	22	68.8	19	59.4	0.43
	- Male	10	31.3	13	40.6	
	- Female					
2	Transportation mode	30	93.8	16	71.9	0.00*
	- Without ambulance	2	6.3	16	28.1	
	- Ambulance non-EMS					

*meaningfull (P <0.05)

Based on Table 1, it is found out that more men suffer from prehospital cardiac arrest either at hospitals in Malang or in dr Iskak Hospital at Tulungagung (68.9% : 59.4). mostly used mode of transportations is not ambulance (93.8% : 71.9%) such as public transportation, private cars and motorcycle.

Table 2. Clinical characteristics of prehospital cardiac arrest patients at hospitals in Malang and in dr. Iskak Hospital at Tulungagung

No	Variables	Occurence				P value
		Hospitals at Malang		Dr. Iskak General Hospital, Tulungagung		
		n	%	n	%	
1	Early heart and lung resuscitaion					
	- Yes, occurence place	9	28.1	0	0	0.00*
	- Ya, Emergency facility	23	71.9	32	100	
2	Initial heart rhytm					
	- Asistol	28	87.5	30	93.8	
	- PEA	4	12.5	0	0	0.04*
	- VF	0	0	2	6.3	
3	Resusciation medicine					
	- Epinefrin	32	100	30	93.8	0.15
	- Amiodaron	0	0	2	6.3	
4	Survival Time					
	- < 8 Hours	26	81.3	30	93.8	
	- 8 – 24 Hours	4	12.5	0	0	0.11
	- > 24 Jam	2	6.3	2	6.3	
5	Patients status					
	- Passed away	30	93.8	32	100	0.15
	- Alive	2	6,3	0	0	

*meaningfull (P<0.05)

Data in Table 2 shows the meaningful difference between the two hospitals concerning the application of early heart resuscitation and initial heart rhytm. Meanwhile, there is no meaningfull relation between survival time and patients's status.

Table 3. Central tendency of Hospitals in Malang and dr. Iskak Hospitals in Tulungagung

No	Variables	Hospitals in Malang		dr. Iskak General Hospital, Tulungagung		P Value
		X̄±SD	Med (min-max)	X̄±SD	Med (min-max)	
1	Age	60±14	61(21-85)	54±14.9	53(20-92)	0.05
2	Time length of cardiac arrest (minutes)	12±6,8	10(5-30)	_*	_*	_*
3	Survival Time (minutes)	250±369	77(10-1441)	133±344	42(5-1441)	0.01*

* meaningfull (P<0.05)

-*time length of cardiac arrest (minutes) in dr Iskak hospital could not be evaluated because the data are not recorded.

Data in Table 3 shows that most number of cardiac arrest in hospitals are those who are 60 years old in Hospitals at Malang and 54 years old in dr Iskak Hospital. In average, time length of cardiac arrest is 12 minutes. Concerning survival time in Hospitals at Malang and dr Iskak Hospital in Tulungagung, the Standard Deviation (SD) is higher than average showing that variation of data are quite enermous. Due to enermous variation of survival time data, to facilitate data analysis, the researcher employs survival time data.

Table 4. summary of relation between independent variable to survival time in Hospitals at Malang and dr. Iskak Hospital at Tulungagung

No	Variables	P Value Hospitals in Malang	P Value dr. Iskak General Hospital, Tulungagung
1	Mode of transportation	0.78	0.48
2	Early RJP	0.05	-*
3	Initial heart rhytm	0.00*	0.00*
4	Resuscitation medicine	-	0.00*

*meaningfull (P<0.05)

* P value of early RJP in dr Iskak Hospital cannot be evaluated because not all RJP's are conducted at emergency facility.

* P value of resuscitation medicine in Hospital at Malang cannot be evaluated because all of them used epinefrin. Data in Table 4 shows that factor influensing survival time of outhospital cardiac arrest patients is initial heart rhytm in Hospital at Malang and dr. Iskak Hospital in Tulungagung (P <0.05).

IV. Discussion

Based on the results of the study, it is found out that prehospital cardiac arrest patients taken to emergency facilities in hospitals at Malang and dr Iskak Hospital at Tulungagung are mostly men with the following percentage; hospitals at Malang 68.8% and dr Iskak Hospital at Tulungagung 59.4% and their age is between 50 - 60 years old. The data is inline with cohort study condusted for 10 years by European Sudden Cardiac Death Risk Stratification entitled "Risk Factors Of Heat Attack And Cardiac Arrest", the study shows that the number of cardiac arrest is 4 times higher for men (Wallenset et all, 2014). Mostly, prehospital cardiac arrest patients are those who are 56 - 60 years old. Kim et al. (2010), states that incidence of cardiac arrest for men is 3 times higher than for women with the age of >55 years old.

Data also shows that cardiac arrest patients are taken to hospital using mode of transportation such as private cars, public transportation etc (not ambulance). It happens in hospitals in Malang and dr. Iskak Hospital at Tulungagung (93.8% : 71,9%). It is inline with study conducted by Silvalila et al. (2014), indicating that 63.4% patients taken to RSSA Malang did not use ambulance. Mostly, they are taken with public transportation, private or rented vehicle. Most respondents representing patients coming to hospital (not using ambulance) states that they have no idea of using ambulance to take patients to hospital. Other respondents states that the patients' condition is not severe so that there is no need for them to use ambulance. Cost factor also influence the decision not to use ambulance.

Based on data analysis, it is found out that there is meaningfull difference concerning initial heart rhytm from prehospital cardiac arrest taken to emergency facility in hospital at Malang or dr Iskak Hospital in Tulungagung. The data shows that the biggest number of initial heart rhytm is asistol for each hospital (87% ; 93%). The survival time is <8 hours for each hospital (81% : 93%). In other words, if initial heart rhytm in form of asistol is seen, then the possibility to survive is very small or survival time is low. It is inline with statement

that cardiac arrest patient with initial heart ryhtm in the form of shockable rhytm such as VT without pulse and VF might have chance to return to spontaneous circulation and its survival time is higher than those of nonshockable rhytm such as PEA and asistol (Steill et al., 2004). Confirming the result of previous study to find out the correlation between initial heart rhytm with the return to spontaneous circulation, it is found out that most patients of prehospital cardiac arrest taken to emergency facility has asistol initial heart rhytm (Pitt, 2005).

V. Conclusion And Recommendation

Based on data analysis and discussion of prehospital factors affecting survival time of sudden cardiac arrest patients, we are able to draw several conclusion in order to improve our knowledge on service process and first aid for cardiac arrest patient in Hospital at Malang and dr. Iskak Hospital in Tulungagung. The conclusion is that initial heart rhytm gives meaningfull effect to survival time of sudden prehospital cardiac arrest patients either at hospitals in Malang or dr. Iskak hospital in Tulungagung.

Therefore, the following is some recommendation given

1. Periodic and continuous training on handling patients of prehospital cardiac arrest is crucial and it should be delivered to medical officer and people in general.
2. On facing medical emergency such as prehospital cardiac arrest, there is a need of ambulance equipped with EMS to facilitate resuscitation effort to take patients to nearest hospitals. Therefore, there should be counselling and promotion on EMS ambulance as safe mode of transportation for patients.
3. There is a need of periodical training on basic life support especially high quality heart lung resusciation.
4. Improvement of communication system of EMS ambulance including setting up call center (integrated service center).
5. Improvement of service of EMS ambulance including personel and completing resuscitation equipment so that EMS ambulance not only functions as mode of transportation but also functions to give adequate and good resuscitation service.

References

[1]. Adrian, Puttgen 2011, ' Predicting neurological outcome following cardiac arrest', Journal of the Neurological Sciences, vol 26, no 4, pp. 108 - 117

[2]. Axelsson, C., Claesson, A., Engdahl, J., Herlitz, J.,Hollenberg, J., Lindqvist, J., Rosenqvist, M. and Svensson, L., 2012. Outcome after out-of-hospital cardiac arrest witnessed by EMS: changes over time and factors of importance for outcome in Sweden. J.Resuscitation, 83(10), pp.1253-1258.

[3]. Berdowski, J, Beekhuis, F, Zwinderman, AH, Tijssen, JG & Koster, RW 2009, 'Importance of the first link description and recognition of an out-of-hospital cardiac arrest in an emergency call': Sytematic review of 67 prorpective studies. J. Circulation, vol. 119, no. 15, pp. 2096-102.

[4]. Berg, RA, Hemphill, R, Abella, BS, Aufderheide, TP, Cave, DM, Hazinski, MF, Lerner, EB, Rea, TD, Sayre, MR & Swor, RA 2010, 'Part 5: Adult basic life support 2010 American Heart Association guidelines for cardiopulmonary resuscitation and emergency cardiovascular care', Circulation, vol. 122, no. 18 suppl 3, pp. S685-S705.

[5]. Bobrow, BJ, Zuercher, M, Ewy, GA, Clark, L, Chikani, V, Donahue, D, Sanders, AB, Hilwig, RW, Berg, RA & Kern, KB 2008, 'Gasping during cardiac arrest in humans is frequent and associated with improved survival', J. Circulation, vol. 118, no. 24, pp. 2550-4.

[6]. Boyce, L, Vlieland, TV, Bosch, J, Wolterbeek, R, Volker, G, van Exel, H, Heringhaus, C, Schalij, M & Goossens, P 2015, 'High survival rate of 43% in out-of-hospital cardiac arrest patients in an optimised chain of survival', Netherlands Heart Journal, vol.23, no.1, pp. 20-5.

[7]. Jacobs I. et al, 2004. Cardiac arrest and cardiopulmonary resuscitation outcome reports: update and simplification of the Utstein templates for resuscitation registries: a statement for healthcare professionals from a task force of the International Liaison Committee on Resuscitation. J. Circulation. 2004;110:3385–3397

[8]. Hideharu Tanaka, 2004. Pan Asian Resuscitation Outcomes Study. journal of Asian EMS Council, 22(4), p.335.

[9]. Hiltunen, P.V., Silfvast, T.O., Jäntti, T.H., Kuisma, M.J. and Kurola, J.O., 2015. Emergency dispatch process and patient outcome in bystander-witnessed out-of-hospital cardiac arrest with a shockable rhythm. European Journal of Emergency Medicine, 22(4), p.266.

[10]. Hollenberg, J 2008, 'Out-of-hospital cardiac arrest', J. Karolinska Institutet Clinical Science and Educations, 85(1), pp. 55-60.

[11]. Mongardon, N., Dumas, F., Ricome, S., Grimaldi, D., Hissem, T., Pène, F. and Cariou, A., 2011. Postcardiac arrest syndrome: from immediate resuscitation to long-term outcome. J.Annals of intensive care, 1(1), p.1.

[12]. Myerburg RJ, Castellanos A. Cardiac arrest and sudden cardiac death. In: Libby P, Bonow RO, Mann DL, Zipes DP, eds. Braunwald's Heart Disease: A Textbook on Cardiovascular Medicine. Philadelphia: Saunders Elsevier; 2010:933–973.

[13]. Nehme, Z., Andrew, E., Cameron, P., Bray, J.E., Meredith, I.T., Bernard, S. and Smith, K., 2014. Direction of first bystander call for help is associated with outcome from out-of-hospital cardiac arrest. J. Resuscitation, 85(1), pp.42-48.

[14]. Ong, M, Mackey, KE, Zhang, ZC, Tanaka, H, Ma, MH-M, Swor, R & Shin, SD 2012, 'Mechanical CPR devices compared to manual CPR during out-of-hospital cardiac arrest and ambulance transport: a systematic review', Scand J Trauma Resusc Emerg Med, vol. 20, no. 1, p. 39.

[15]. Pitt, E & Pusponegoro, A 2005, 'Pra rumah sakit care in Indonesia', Emergency medicine journal, vol. 22, no. 2, pp. 144-7.

[16]. Spaite, DW, Bobrow, BJ, Vadeboncoeur, TF, Chikani, V, Clark, L, Mullins, T & Sanders, AB 2008, 'The impact of pra rumah sakit transport interval on survival in out-of-hospital cardiac arrest: implications for regionalization of post-resuscitation care', J. Resuscitation, vol. 79, no. 1, pp. 61-6.

[17]. Stiell I.G.et all. 2004. Advanced cardiac life support in out-of-hospital cardiac arrest. Engl J Med 2004; 351:647-56

[18]. Stiell, IG, Brown, SP, Christenson, J, Cheskes, S, Nichol, G, Powell, J, Bigham, B, Morrison, LJ, Larsen, J & Hess, E 2012, 'What is the role of chest compression depth during out-of-hospital cardiac arrest resuscitation?', J. Critical care medicine, vol. 40, no. 4, p. 1192.
[19]. Talikowskaa, M, Tohiraa, H & Finna, J 2015, 'Cardiopulmonary resuscitation quality and patient survival outcome in cardiac arrest: A systematic review and meta-analysis', J. Resuscitation, vol. 96, pp. 66-77.
[20]. Travers, AH, Rea, TD, Bobrow, BJ, Edelson, DP, Berg, RA, Sayre, MR, Berg, MD, Chameides, L, O'Connor, RE & Swor, RA 2010, 'Part 4: CPR overview 2010 American Heart Association guidelines for cardiopulmonary resuscitation and emergency cardiovascular care', J. Circulation, vol. 122, no. 18 suppl 3, pp. S676-S84.

*Ferry Limantara. "Prehospital Factors Influencing Survival Time of Cardiac Arrest Patients Outside Hospital: Case Study of Malang General Hospital And Dr. Iskak General Hospital Tulungagung, Indonesia." IOSR Journal of Dental and Medical Sciences (IOSR-JDMS) 16.11 (2017): 23-27