

Surveillance of in Hospital Cardiac Arrest

Arathy Darvin¹, Dr. Sreekrishnan .T .P²

Abstract: *Background and Methods:* Cardiac arrest is electrical malfunction of heart. It is referred to as termination of mechanical activity of heart. If proper interventions are not done, it can lead to sudden cardiac death. Prospective observational study was performed on 104 patients who suffered In Hospital Cardiac Arrest (IHCA) in Amrita Institute OF Medical Science, Kochi. **Objective:** The purpose of the study was to study the surveillance of In hospital cardiac arrest and to identify the population with prosperity to develop IHCA. **Results:** In all 104 patients, 73.08% were males and 26.92% were females. Majority of them were in the age group of 61 to 80 years old. Males were more prone to develop IHCA than females. Most of the patients comes under the illness category of cardio vascular system (42.3%) and hypoxia was most common reversible cause among these patients (52.9%). **Conclusion:** Rate of survival (59.6%) is more than rate of mortality (40.4%). The patients with myocardial ischemia (35%) were the population with prosperity to develop IHCA. The chance of survival is more in patients who had shockable initial rhythm.

Keywords: In hospital cardiac arrest (IHCA), Cardio Pulmonary Resuscitation (CPR)

1. Introduction

Cardiac arrest is referred to as termination of heart's activity. In this victim becomes unresponsive with no signs of circulation and breathing. It usually occurs in people with underlying structural heart disease. Usually there would not be any premonitory symptoms. If corrective measures are not taken, it will progress to sudden death. Then the event is called sudden cardiac death (SCD). Unconscious level during cardiac arrest is because of insufficient cerebral blood flow. Cardiac arrest is an event that is usually reversed by cardiopulmonary resuscitation and/or defibrillation.

Despite advanced treatment methods for cardiac disease, the outcome of patients experiencing sudden cardiac arrest remains poor and prognosis varies according to initial rhythm. Men are two to three times prone to develop cardiac arrest than females. Risk of cardiac arrest increases with presence heart disease, cigarette smoking, familial history, excess alcohol intake, elevated serum CRP, excessive caffeine intake and elevated plasma non esterified fatty acids. In 80% of sudden cardiac death patient's autopsy, coronary atherosclerosis is present¹. Coronary artery disease is also found in 70% to 80% of cardiac arrest victims who survive and undergo coronary angiography⁽²⁻⁵⁾. Approximately one third have evidence of acute plaque rupture in areas of long-segment coronary stenosis^(3,4).

Warning signs are often unrecognized by the victims. Acute triggering factors include ischemia, electrolyte abnormalities, autonomic nervous system activation and psychological factors. Prodromal symptoms in the days to weeks preceding cardiac arrest are common but are usually too nonspecific to be of important predictive value⁶.

Management of cardiac arrest is based on cardiopulmonary resuscitation and defibrillation. Injection adrenaline plays vital role in resuscitation. Management includes identification and treatment of acute reversible causes, evaluation of structural heart disease, neurologic and psychologic assessment. Important quality performance measures include compression rate (100–120 compressions/min), compression depth (5–6 cm), chest compression fraction (ie, CPR performed 80 out of every

100 seconds of the pulseless interval), fullchest recoil (no residual leaning between compressions), and ventilation rate (10 breaths ventilations/min)⁷. Furthermore, hyperventilation has been shown to be common, and more than 10 ventilations/min are unnecessary and reduce cardiac output during CPR⁷. A 30: 2 compression-to-ventilation ratio is currently recommended for health care professionals in all adult resuscitation scenarios until an advanced airway has been established⁷. Once an advanced airway is secured, CPR should be performed continuously, without pausing for ventilation, while providing one ventilation every 6 seconds (10 ventilations/min)⁸. Primary prevention varies according among categories, which includes general population, patients with myocardial infarction, patients with heart failure and cardiomyopathy and patients with congenital disorders.

2. Methodology

Inclusion criteria:

All IHCA patients due to any cause except trauma were included

Exclusion criteria:

Traumatic cardiac arrest and out of hospital cardiac arrest (OHCA) were excluded.

Structure, material, location

This is a prospective study done on 104 patients who suffered from IHCA in Amrita Institute of Medical Sciences, Kochi. It was done over a period of 6 months from July 2017 to December 2017. Parameters include age, sex, co morbidities, cause, use of adrenaline, total cycles of CPR and surveillance. In addition other intravenous drugs administered, illness category, number of shocks delivered, first rhythm appeared and location of the patient during cardiac arrest, ETCO₂, ventilation status and response time were recorded.

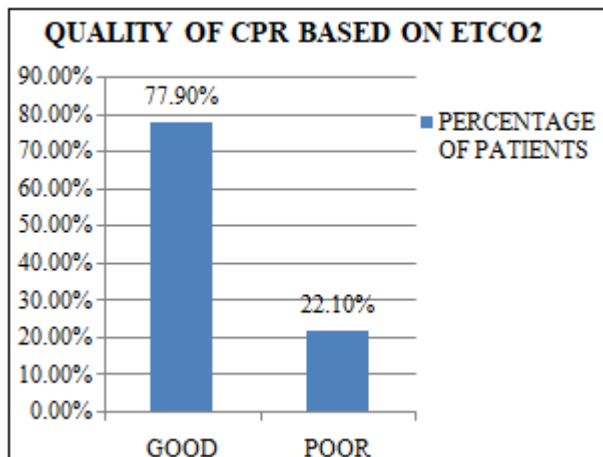
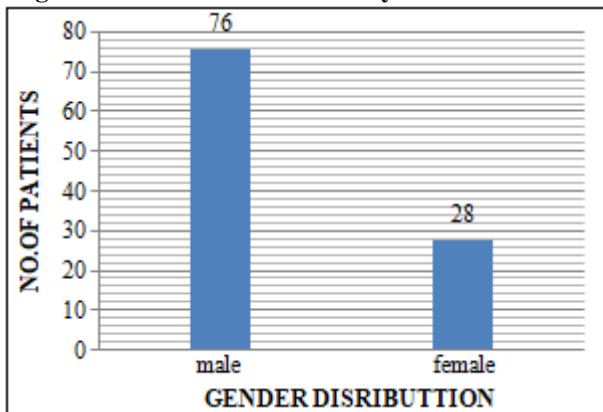
Analysis:

The data collected were compiled using Microsoft excel. Percentages were used to present category variable.

3. Result

This is a prospective observational study on 104 patients who had IHCA during July 2017 to December 2017 in Amrita Institute of Medical Sciences. 48% of patients were from the age group of 61 to 80 years old. Men (73.08%) were more prone to develop IHCA than females (26.92%). 76% patients were from ICUs. 39.4% patients had medical cardiology as category of past illness. Hypoxia was the most common cause of cardiac arrest. 66% patients only needed 1 to 5 mg of adrenaline IV dose. 55.8% patients had PEA as initial rhythm. Most of the patients only needed 5 to 20 cycles of CPR (45%). 34.6 % patients had intubated during CPR. 77.9% received good quality CPR as evident from the ETCO2 recording of more than 10 mmHg during the uninterrupted CPR in accordance to the ACLS 2015 guidelines. Chance of survival (77%) is more in patients with shockable initial rhythm than survival in patients with non shockable initial rhythm (57.14%).

The gender distribution of the study:

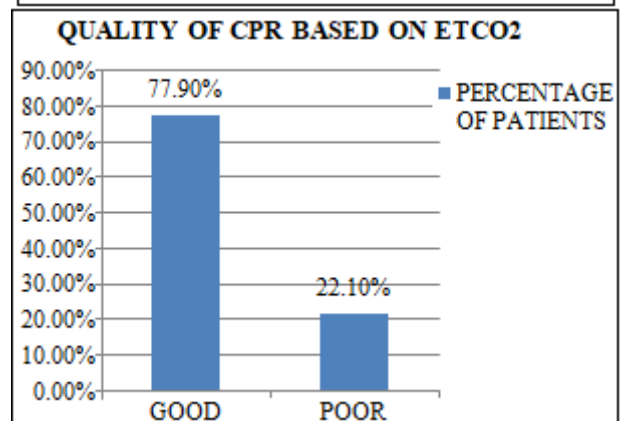
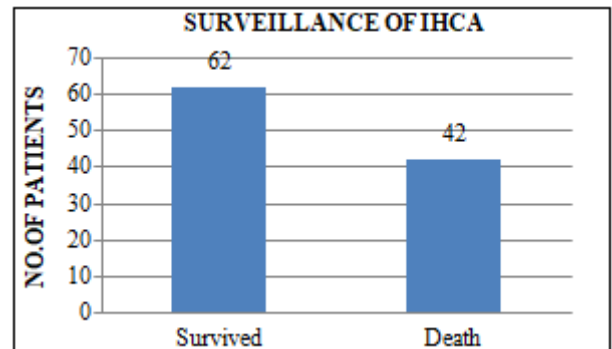


Past illness Distribution of the study

Past Illness Distribution	
Past Illness	No. of Patients
Myocardial ischemia	37
Sepsis	18
Gastroenterological disorders	14
Chronic kidney disease	9
Pulmonological disorders	7
Intra cranial pathology	6
Malignancy	5
Myocardial failure	4
Arrhythmias	3

Haematological disorders	3
Endocrinological disorders	3
Myocarditis	1
Congenital heart disease	1

The surveillance of cardiac arrest of the study:



4. Discussion

In this prospective observational study of 104 patients who had IHCA, the rate of survival is 59.6 % and rate of death is 40.4 %. Survival rate is higher in Amrita Institute of Medical Sciences when compared to studies conducted by “The New England Journal of Medicine (54.1%) and “JAMA” (51.1%). Out of 62 patients survived, 49 were males and 13 were females. Out of 42 patients died, 27 were males and 15 were females. Cardiac arrest cases were more common in the age group 61 to 80 years old (48%). The incidence of IHCA cases were more in males (73.08%) among the population. Myocardial ischemia (35.6%) was the most common co morbidity of the patients followed by sepsis (16.3%) and other conditions.

ABG was taken from all the patients with IHCA in order to diagnose reversible causes. The most common reversible cause was hypoxia (52.9%) followed by metabolic acidosis (21.1%), hyperkalemia (15.4%), hypovolemia (6.7%), thrombosis (2.9%) and pulmonary embolism (≈1%). Most of the patients in the study were received good quality CPR, adequate amount of adrenaline, defibrillation where ever necessary and other intravenous drugs like calcium gluconate, sodium bicarbonate etc to treat the reversible causes.

Most of the patients come under the illness category of cardiology (42.3%). 76% patients were from ICU. Only 23 (22.1 %) patients needed defibrillation. Most of the patients

(66%) needed 1 to 5 mg of injection adrenaline, 1:1000 dilution followed by 29% of 6 to 10 mg and 5% of 11 to 15 mg. PEA was the most common initial rhythm followed by 31.7 % of asystole and 12.5% of shockable rhythm. Among the total 104 patients in the study, 77.9% received good quality CPR as evident from the ETCO₂ recording of more than 10 mmHg during the uninterrupted CPR in accordance to the ACLS 2015 guidelines. In the remaining patients (22.1%) with an ETCO₂ recording lesser than 10 mmHg, the quality of CPR was improved accordingly.

No mortality was recorded in age group less than 20 years old. Mortality was high on age group of 61 to 80 years old. Chance of survival (77%) is more in patients with non shockable initial rhythm than survival in patients with shockable initial rhythm (57.14%).

5. Conclusion

In conclusion according to this study, rate of survival (59.6%) is higher than rate of death (40.4%) in In hospital cardiac arrest. Patients with myocardial ischemia (35.6%) are the population with prosperity to develop in hospital cardiac arrest. Study showed that males are prone to develop cardiac arrest than females and chance survival is more in patients with shockable initial rhythm than patients with non shockable initial rhythm. Response time of all patients was less than 3 minutes.

Among the total 104 patients in the study, 77.9% received good quality CPR as evident from the ETCO₂ recording of more than 10 mmHg during the uninterrupted CPR in accordance to the ACLS 2015 guidelines. In the remaining patients (22.1%) with an ETCO₂ recording lesser than 10 mmHg, the quality of CPR was improved accordingly.

6. Limitation

GRBS were not always documented. Monitoring like CPP, SCVO₂ were not well documented.

References

- [1] Adabag AS, Peterson G, Apple FS, Titus J, King R, Luepker RV: Etiology of sudden death in the community: results of anatomical, metabolic, and genetic evaluation. *Am Heart J* 159: 33, 2010.
- [2] Spaulding CM, Joly LM, Rosenberg A, et al: Immediate coronary angiography in survivors of out-of-hospital cardiac arrest. *N Engl J Med* 336: 1629, 1997.
- [3] Lo YS, Cutler JE, Wright A, Kron J, Blake K, Swerdlow CD: Long-segment coronary ulcerations in survivors of sudden cardiac death. *Am Heart J* 116(Pt 1): 1444, 1988.
- [4] Dumas F, Cariou A, Manzo-Silberman S, et al: Immediate percutaneous coronary intervention is associated with better survival after out-of-hospital cardiac arrest: insights from the PROCAT (Parisian Region Out of hospital Cardiac Arrest) registry. *Circ Cardiovasc Interv* 3: 200, 2010.
- [5] Peberdy MA, Ornato JP, Reynolds P, Thacker LR, Weil MH: The first documented cardiac arrest rhythm in

hospitalized patients with heart failure. *Resuscitation* 80: 1346, 2009.

- [6] Norris RM: Circumstances of out of hospital cardiac arrest in patients with ischaemic heart disease. *Heart* 91: 1537, 2005.
- [7] Kleinman ME, et al: Part 5: adult basic life support and cardiopulmonary resuscitation quality: 2015 American Heart Association Guidelines Update for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care. *Circulation* 132(Suppl 2):S414–S435, 2015.
- [8] Link MS, et al: Part 7: adult advanced cardiovascular life support: 2015 American Heart Association Guidelines Update for Cardiopulmonary Resuscitation and Emergency Cardiovascular Care. *Circulation* 132(Suppl 2):S444–S464, 2015.