

In Hospital Cardiopulmonary Resuscitation (CPR) Analysis of 188 CPRs

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SUMMARY

Analysis of Cardiac Arrests over thirteen months indicated that out of 188 patients who received cardiopulmonary resuscitation, 34 (18%) survived to leave the hospital. Most arrests (36%) occurred at the age of 60-69 years. Majority of CPRs were performed in the Accident and Emergency (31%), coronary care unit (28%) and acute medical wards (21%). Most common cause was myocardial infarction (48%). Poorest outcome was associated with initial rhythm of asystole.

When compared to recent and past literature about CPRs, these figures suggest that the incidence of successful outcome for CPRs in hospital has not changed significantly over the past twenty five years.

INTRODUCTION

In the past twenty years or so there has been quite wide-spread teaching to the junior medical and paramedical staff about advanced basic life support. With the development of more modern resuscitative instruments, cardiopulmonary resuscitation (CPR) has been widely practiced. Besides all this advanced technology, the success rate has not changed dramatically in the recent years. There is however a tendency to resuscitate any candidate regardless of their age, underlying disease or ultimate prognosis. This attitude to save the human life has decreased the over all success rate and has raised the question that how much ethical it is to resuscitate terminally ill patients.

PATIENTS AND METHODS

This was a prospective study done at Stafford District General Hospital, Staffordshire, United Kingdom. The study was carried out during a thirteen months period. Most of the information was collected from a specially designed cardiac arrest form which was filled soon after the resuscitation by the senior most member of the team (leader) and kept safely. The specimen is shown in figure 1.

Other information was obtained from the patient's record.

Cardiac arrest was diagnosed clinically by absent major pulses, loss of consciousness, absent respiration and electrocardiographic evidence when the patient was on a monitor.

The cardiac arrest team consisted of medical registrar (leader), two senior house officers - one from coronary care unit (CCU) and other from intensive care unit (ICU), one anaesthetist and one medical house officer. Only in one occasion there was delay of five minutes due to malfunctioning of the cardiac arrest bleeps, though the bleeps were daily checked at 9.00 a.m. routinely.

RESULTS

A total of 188 CPRs were performed during a thirteen month period representing an average of 3.6 CPRs per week. Out of 188 patients, one hundred and fifteen were males (61%) and seventy three were females (39%). Initially 83 calls (44%) were successful but 45 of these subsequently died and only 34 patients (18%) out of 188 actually left the hospital. Majority of arrest were in the age group 60-69 years.

CARDIAC ARREST

Name
Age
Sex
Address
Hospital No.
Consultant
Place of arrest
Date/Time of arrest
Time of arrival (cardiac arrest team)
Was there any delay? Yes <input type="checkbox"/> No <input type="checkbox"/>
If yes specify
Duration of resuscitation
Mode of Cardiac Arrest
Respiratory Yes <input type="checkbox"/> No <input type="checkbox"/>
Cardiac
a) Asystole <input type="checkbox"/> <input type="checkbox"/>
b) V.F. <input type="checkbox"/> <input type="checkbox"/>
c) V.T. <input type="checkbox"/> <input type="checkbox"/>
False Alarm <input type="checkbox"/> <input type="checkbox"/>
Others (Specify) <input type="checkbox"/> <input type="checkbox"/>
Procedure
1. Ventilation
○ Mouth to mouth <input type="checkbox"/> <input type="checkbox"/>
○ Ambu Bag <input type="checkbox"/> <input type="checkbox"/>
○ Intubation <input type="checkbox"/> <input type="checkbox"/>
2. E.C.M. <input type="checkbox"/> <input type="checkbox"/>
3. D.C. Shock <input type="checkbox"/> <input type="checkbox"/>
4. Adrenalin
intravenous (I.V.) <input type="checkbox"/> <input type="checkbox"/>
Adrenalin
intracardiac (I.C.) <input type="checkbox"/> <input type="checkbox"/>
5. Lignocaine <input type="checkbox"/> <input type="checkbox"/>
6. Atropine <input type="checkbox"/> <input type="checkbox"/>
7. Sodium Bicarbonate <input type="checkbox"/> <input type="checkbox"/>
8. Calcium
chloride I.V. <input type="checkbox"/> <input type="checkbox"/>
Calcium
chloride I.C. <input type="checkbox"/> <input type="checkbox"/>
9. Pacing <input type="checkbox"/> <input type="checkbox"/>
10. Other (specify) <input type="checkbox"/> <input type="checkbox"/>
Outcome
Successful Yes <input type="checkbox"/> No <input type="checkbox"/>
Death certification (Time/Date)
Underlying Disease
R.M.O. Name

VF, ventricular fibrillation; VT, ventricular tachycardia; IV, intravenous; IC, intracardiac; ECM, external cardiac massage.

As already mentioned most of the calls were from Accident and Emergency Department, Coronary Care Unit and Medical Wards. Results of CPRs in relation to location are shown in Table 2.

Table 1: CPRs relating to the age.

Age	No. of CPRs		Successful CPRs		Discharge
	No.	%	No.	%	
20	1	0.5	1	100	1
20-29	6	3	2	33	2
30-39	6	3	3	50	1
40-49	16	9	11	68	5
50-59	39	20	18	46	4
60-69	68	36	30	44	10
70-79	30	16	11	36	8
80-89	20	11	7	35	3
90	2	1	0	0	0
Total	188		83	44	34 (18%)

Table 2: CPRs and the location of cardiac arrest.

Location	No. of CPRs	% of total calls	Successful CPRs		Discharge	
			No.	%	No.	%
A & E	59	31	23	38	10*	16
CCU	54	28	28	51	11	20
Acute Medical Wards	41	21	19	46	7	17
Surgical Wards	22	11	7	31	3	13
ICU	5	3	3	60	1	20
Others	7	4	3	42	2	28
Total	188		83		34	

*These patients were admitted to CCU after successful resuscitation but this was performed in the accident and emergency department.

Least successful CPRs were those where the patient had cardiac arrest outside the hospital and there was undue delay in transportation to the hospital. There were no calls from maternity or gynaecology wards during this period.

The survey also revealed that most of the cardiac arrests were on those patients who had coronary heart disease and its complications. Other causes including respiratory failure, massive gastro-intestinal haemorrhage, cerebro-vascular accidents and terminally ill patients due to malignant diseases. Table 3 shows the common causes of cardiac arrest in this survey.

Table 3: Causes of cardiac arrest.

Sr. No.	Causes of cardiac arrest	No. of Patients	
		No.	%
1.	Acute myocardial infraction	90	48
2.	Respiratory failure	35	19
3.	Non ischaemic cardiac causes	20	11
4.	Cerebrovascular accidents	15	8
5.	Unknown	12	6
6.	Pulmonary embolus	10	5
7.	Trauma	4	2
8.	Overdose	2	1
Total		188	

It was also revealed that ventricular fibrillation (67 patients) was the most frequent initial rhythm, followed by asystole (61 patients). There were ten patients with ventricular tachycardia and seven were resuscitated successfully (80%). If the initial rhythm was very slow i.e. severe brady-cardia or other brady-arrhythmias, the success rate was low. This is shown in Table 4.

Table 4: Initial rhythm and CPR.

Rhythm	Number of CPR	Successful	
		No.	%
Ventricular fibrillation	67	39	58
Ventricular tachycardia	10	7	70
Asystole	61	13	21
Bradycardia	27	8	29
Other rhythms	23	16	69
Total	188	83	

In this study other interesting points were noted. It was found that midnight arrest calls were actually a waste of time and effort. Patients were mostly found dead and the team was called by the nurses to seek cover particularly on the surgical floor in post operative patients regardless of their age and underlying pathology.

It was also found that defibrillation was the most effective and useful way of resuscitation. Therefore need of trained staff was recommended. The most commonly used drug was lignocaine for tachyarrhythmia.

It was also revealed that those places where

cardiac arrest was very uncommon cardiac arrest trays were sufficient, whereas acute cardiac unit, emergency, ICU and acute medical wards did need all the resuscitation equipment.

The duration of resuscitation ranged from 20-40 minutes. "When to stop resuscitation" was a problem facing most of the junior doctors. It was thought that intensive and continuous education of junior doctors was the solution to this problem.

DISCUSSION

Sudden and unexpected cessation of effective cardiopulmonary performance is a cardiac emergency which should be recognized immediately and effective measures should be instituted. The demonstration by Kouwenhoven and associates¹ in 1960 of closed cardiac massage revolutionized the methods of cardiopulmonary resuscitation. Even before the demonstration of the efficacy of closed-chest cardiac massage, Zoll and associates² reported the development of an external alternating current cardiac defibrillator.

Over the past twenty five years or so, there have been quit a few studies surveying in hospital cardiac arrests which have been shown in Table 5. These studies show that the percentage of patients who leave the hospital after resuscitation is much less for adults, than paediatric age group^{3,4}.

The higher success rate in this study was due to fact that medical personnel present at the spot in the coronary care and acute medical wards are trained and skilful in resuscitation. The patients who arrest in intensive care unit are resuscitated successfully initially but due to multiple problems the ultimate outcome is quite grim. In some places there has been a "no CPR" policy in intensive care units but it is generally not advocated but all the data in different studies written do suggest that cardiac arrest is such an event which sometimes delays the decision to stop aggressive management of patients who are terminally ill. However if the medical status of the patient is not known before cardiopulmonary collapse, it is best to proceed without hesitation.

In some other studies the outcome of CPR in cancer patients has proved disappointing and some writers suggest that CPR should not be tried in such patients as it is sheer waste of time and effort^{11,16}. Having said that, there may be several reasons for a "do-not-resuscitate" due to advanced disease or wish of the patient but this should be on individual basis

Table 5: Summary of resuscitation studies in hospital resuscitation.

Authors	Years	Ref. No.	Place	No. of CPRs	Initially successful CPRs	Left hospital
Sykes, Orr	1966	5	London	184	31.0%	13.0%
Stock	1966	6	Melbourne	59	42.0%	13.5%
Johnson, Tanser	1967	7	Montreal	552	31.7%	14.9%
Wildsmith et al.	1972	8	Edinburgh	536	33.0%	11.9%
Lemire, Johnson	1972	9	Montreal	1204	--	19.1%
Messert, Quagliari	1976	10	Wisconsin	183	22.0%	14.2%
Peatfield	1977	11	London	1063	32.5%	8.7%
Wernberg, Thomassen	1979	12	Denmark	1172	--	6.1%
Tweed et al.	1980	14	Winnipeg	2091	41.0%	12.5%
Hershey, Fisher	1982	14	Cleveland	88	60.0%	14.0%
Woog, Torzillo	1984	15	Sydney	174	44.0%	16.0%
Iqbal F.	1988		Stafford (UK)	188	44.0%	18.0%

and cancer patients as a whole should not be excluded for CPR simply on the grounds that they have malignant disease.

As regards CPR in the elderly a study¹⁷ showed that CPR is rarely effective for elderly patients with cardiac arrest which are either out of hospital unwitnessed or associated with aystole or electro-mechanical dissociation.

The results of this study confirm the findings of other authors^{8,12,18,19} that prognosis was better when the mode of arrest was ventricular fibrillation than aystole. This does not apply to those patients who develop cardiac arrest out of the hospital as a result of delay in the transport of the patient the rhythm changes from VF to aystole.

American Heart Association (AHA) recommends pre-cordial thump for those patients who are monitored by ECG²⁰. However, pre-cordial thump is almost always performed even on patients who are not monitored at the time of cardiac arrest and this has been shown to be successful in restoring circulation to sinus rhythm in a minority of patients. Resuscitation Council of the United Kingdom revised the guidelines for advanced support in 1989²¹. The chart and recommendation for 1989 are same for UK, Sweden, Denmark, Norway and Finland.

There has been a lot of discussion about the cost-effectiveness of CPR and the stability of the patient. On quite a few patients CPR has already begun and the severity of underlying disease or pathology was lateron evident. A 'no' CPR policy could avoid inappropriate short term prolongation of life.

Improvement in cardiopulmonary resuscitation outcome could be possible if there is continued education in resuscitation techniques at both nursing staff and medical staff. The former is more important as they are involved in initial management of the patient. An interesting study by Dracup et al²². showed that majority of family members of cardiac patients can learn CPR successfully. Specific training strategies may need to be developed and tested to enhance CPR training in those family members of cardiac patients predicted to have difficulty learning CPR.

Clearly the outcome of CPR will improve if there is better selection of patients to be resuscitated. It is important to make a decision whether to resuscitate or not to resuscitate before commencing CPR and in case of no CPR there must be clear instructions to the nursing staff and that should be written in the patient's notes. CPR should mainly be aimed at the patient in whom resuscitation of cardiopulmonary stability will result in a potential for continued life and not perpetuation of pre-terminal agony or vegetative existence.

There are no organized cardiac arrest teams in majority of hospitals in Pakistan because of less resources and very expensive equipment can not be installed. Moreover there is no proper bleep system even in quite modern hospitals. It is hoped that the importance of CPR would be realized and an organized way of resuscitation would be developed in which one individual the most senior and experienced member of the team (leader) supervises the entire procedure. The other members of the team should be assigned specific duties with which

they are well acquainted and with appropriate organization, the greatest efficiency may be attained in the resuscitation effort.

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