

Cardiopulmonary Resuscitation at a Community Hospital With a Family Practice Residency

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The cardiopulmonary resuscitation (CPR) experience of a family practice residency program within a community hospital was reviewed for the period of July 1, 1979, to June 30, 1981. CPR was attempted 300 times on 242 patients experiencing cardiopulmonary arrest. The emergency department and operating room were excluded from the study. Successful resuscitation was accomplished in 145 instances (48.3 percent). Short-term survival (survival for greater than 24 hours) occurred in 111 instances (37 percent). Thirty-four (14 percent) of the 242 patients resuscitated survived to be discharged from the hospital. The most common primary diagnosis of the patients experiencing cardiac arrest was coronary heart disease. The length of time of each of the code conditions was determined, and its relationship to overall survival rates was found to be inversely proportional. Advanced age did not adversely affect the final outcome of successful attempts.

This study reaffirmed the expectation that consistently good results can be obtained if the physician, staff, and resuscitation team members are properly prepared and clear role delineation exists.

Cardiopulmonary resuscitation (CPR) is a vital and routine part of hospital care. Although considerable variation exists in the literature regarding quantitative results, its beneficial impact on hospital mortality has been generally accepted. A recent literature search shows only a few studies completed within the past decade, with most detailed studies conducted in university centers¹⁻⁷; there-

fore, this study was undertaken to evaluate the results of a team approach to CPR at a community hospital. This approach utilizes private physicians, family practice residents, nursing personnel, and respiratory therapy personnel, with the family practice resident having primary responsibility over resuscitation efforts in the absence of a patient's primary physician.

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Facilities and Code Procedures

Memorial Medical Center (MMC) in Corpus Christi, Texas, is a 500-bed city-county hospital with a 14-bed Coronary Care Unit, an 18-bed Med-

ical Surgical Intensive Care Unit, and a 9-bed Burn Center. There are as well 40 electrocardiographically monitored beds located in the progressive Coronary Care Units.

MMC serves as the regional trauma center for the south Texas area as well as the medical service center for the indigent county population—approximately 16 percent of MMC inpatients. In addition, 33 percent of MMC inpatient population are Medicare recipients.

A patient suffering from a cardiopulmonary arrest receives basic CPR initially from personnel on the unit where the arrest occurs. A "code" is then announced on the overhead paging system throughout the hospital with simultaneous notification of a CPR team by individual pocket pagers. The senior family practice resident has primary responsibility for all CPR codes unless or until the patient's primary physician arrives. The CPR code team consists of a second- or third-year family practice resident, two interns, designated respiratory therapy personnel, and two medical-surgical intensive care nurses. The intensive care nurses respond to the code with a large mobile resuscitation cart. There are small emergency carts containing essential equipment on each floor of the hospital. These carts are equipped with resuscitation bags, oxygen equipment, medications most commonly used in the first ten minutes of a resuscitation effort, and intubation equipment.

All new family practice residents (after 1980) are trained in basic CPR during their orientation and then are given an Advanced Cardiac Life Support (ACLS) course during their initial year of training according to the American Heart Association's guidelines.⁸ In addition, all respiratory therapy personnel are certified in basic CPR on a yearly basis, and a respiratory therapy supervisor who is trained in endotracheal intubation attends all code calls.

A documentation report is completed by a member of the nursing staff at each CPR code, and this report becomes a permanent part of the medical record. A copy of this report is sent to the administrative director of the respiratory therapy department, who serves as the chairman of the Code Yellow Evaluation Committee.

Methods

This study reviewed the CPR reports (supple-

mented by the medical record when necessary) for the period of July 1, 1979, to June 30, 1980, and again for the period of July 1, 1981, to June 30, 1982. The CPRs of "Code Yellow" reports and medical records were reviewed for mortality and survival data as well as for age of patient, sex, patient location at time of code, and other factors. Code calls originating in the emergency room or operating room were not included. Previous studies have demonstrated that emergency room results are somewhat better than those in the hospital at large.^{3,5,6}

Results

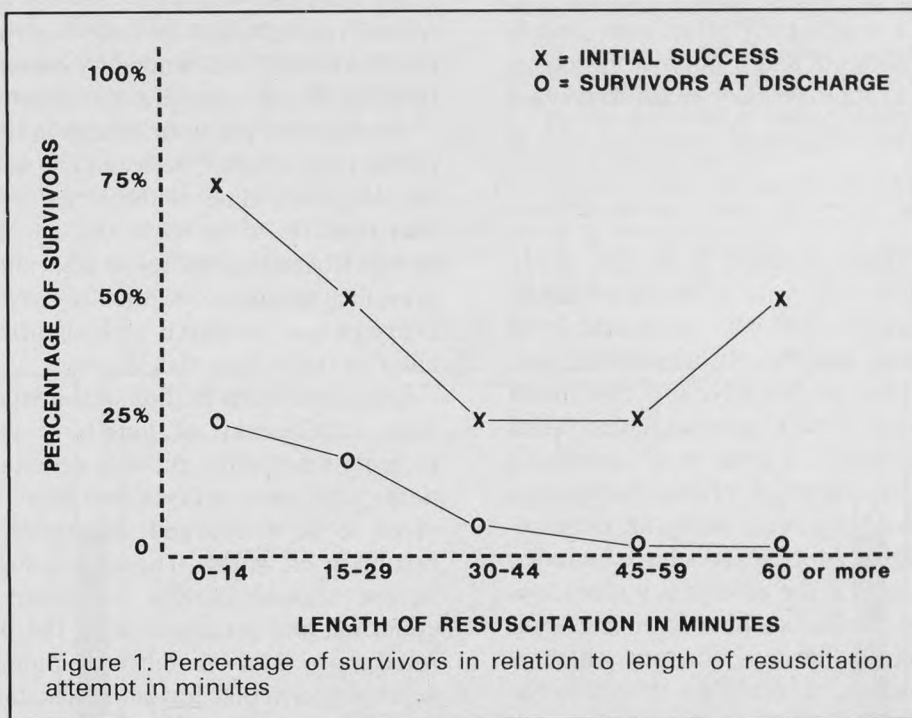
There were a total of 300 code calls involving 242 patients, and successful resuscitation was obtained in 145 instances for a success rate of 48.3 percent. The success rates for both study periods were the same. Code conditions occurring in the intensive care areas showed a better success rate (57 percent) than those on the general floor (40 percent). Interestingly, survival at the time of discharge was not affected by whether the patient suffered cardiopulmonary arrest on the general floors or in the intensive care areas.

Long-term survival based on discharge from the hospital was 14 percent of the 242 patients. There was a significant difference, however, in long-term survival between the two study years: 9 of 82 (10.9 percent) survived to be discharged in the first study year and 25 of 160 (15.6 percent) survived in the second study year. One contributing factor to these differences may have been the ACLS training given to all resident physicians beginning in 1980; however, there were too many other variables between the study groups to conclude that ACLS training was the most important factor.

Cardiovascular disease was the most common primary diagnosis (58 percent). The next most common diagnoses were cerebrovascular accident and overwhelming infection, each accounting for 7 percent of the total. No other single diagnosis accounted for more than 5 percent of the total. There was a slight preponderance of men in the group: 176 codes involved male patients and 124 involved female patients. There were no significant differences in success rates or discharge rates between male and female patients.

There were a number of patients who experienced cardiopulmonary arrest with attempted re-

Length of Time (min)	Number of Codes	Initial Success	Patient Survived to Discharge
0-14	48	35	13
15-29	51	27	9
30-44	49	13	3
44-59	15	4	0
60 or more	22	7	1



suscitation more than once during their hospitalization. Two of the 34 survivors were resuscitated twice, but all other long-term survivors had only one cardiopulmonary arrest during that hospitalization. There were 14 patients on whom resuscitation was attempted three or more times during their stay; however, none of these patients survived to be discharged.

Length of time for resuscitation efforts was evaluated, and as expected, the results showed an inverse relationship between time and successful outcome (Table 1, Figure 1). Even though there was a reasonable success rate of 30 percent for

CPRs lasting 45 minutes or longer, only one patient was eventually discharged alive. This patient suffered a respiratory arrest requiring intubation and treatment of multiple arrhythmias, but external chest compressions were not required during the actual procedure.

Patient age was significant in that more code calls occurred for older patients, but this age factor did not coincide with adverse outcome. The data for both study years showed the same general pattern. Forty-three percent of the patients in both study groups were aged 70 years or older, with a gradual decline in number of codes in the lower

Table 2. Age Distribution of Survivors (1981 to 1982)

Age (yr)	Number of Codes	Codes Successful No. (%)	Number Survived to Discharge
Under 30	11	3 (27.2)	1
30-49	15	5 (33.3)	1
50-59	38	15 (39.5)	7
60-69	45	17 (37.7)	6
70 and over	83	33 (39.7)	9

age groups (Table 2). These figures indicate that patient age does not adversely affect outcome. If anything, young patients had a poorer prognosis, probably related to their primary diagnosis, often trauma.

Discussion

The survival rates obtained from the study compare reasonably well with numbers obtained by other investigators. CPR was successful in 48 percent of the cases, and the overall survival rate was 14 percent. Other studies have reported initial resuscitation rates of 32 to 55 percent and survival rates of 9 to 21 percent.¹⁻⁷ Tweed et al³ reported a large series and demonstrated a resuscitation rate of 50 percent with 12.5 percent survival. Generally, studies with higher success rates have included resuscitation attempts in the emergency room, operating room, and cardiac catheterization laboratory.^{3,5,6} Even taking this into account, there is some variability in results, probably related to the patient population served by a particular hospital. Also, the ratio of beds with electrocardiographic monitoring to the total number of beds can vary significantly among hospitals. This relates to the problem of identifying the patient who experienced cardiac arrest on the general ward, where close monitoring does not exist.

In this study, patients who experienced cardiac arrest generating a code call between 11 PM and 7 AM were resuscitated only 38 percent of the time, and only 5 percent of these patients survived. This low survival percentage was not a function of the response time of the CPR team, as the team responded in less than 5 minutes for all codes and in less than 3 minutes in 95 percent of the cases. Nor was the low survival rate related to night codes

being generally attended only by house staff, for overall resuscitation and survival rates were equal for resuscitations attended by house staff only and those in which a private physician also attended.

Presumably the poor results at night are related to the time interval between the actual arrest and the discovery time of the arrest victim. The current trend is to increase the number of patients in electrocardiographic monitoring; however, at present it is not economically feasible to monitor every patient admitted with significant cardiovascular or other high-risk disease.

One significant finding of the study was the relative infrequency of long-term survival among patients who suffer multiple arrests. Only two patients who were resuscitated more than once survived to be discharged. Stemmler⁹ found similar results in his study. These data suggest that physicians should closely scrutinize the patient's condition and prognosis after the patient has suffered more than one cardiopulmonary arrest, and determine whether further resuscitation efforts are warranted. Another finding of this study is the poor outlook for the patient whose CPR attempt lasts longer than 45 minutes. The survival rate for this group was essentially zero, even though initial efforts were often successful. This points to the importance of continuous monitoring of the patient's overall condition and suggests that reassessment of therapeutic goals and expectations is warranted after 45 minutes of resuscitation.

Older age did not adversely affect resuscitation efforts, a finding that corroborates a previous finding by Peatfield et al.²

Conclusions

This study demonstrated that positive resusci-

tation results can be obtained in a community hospital utilizing an organized team approach. Essential to this is adequate training for the various team members, including residents, who often have inadequate experience at resuscitation at the time they finish medical school. The study conducted by Bernhard et al¹⁰ reports similar findings. The findings of this study disagree with the conclusions of Lowenstein et al¹¹ concerning the advisability of giving house officers responsibility for cardiac resuscitation because the data indicate that they do as well as, if not better than, private physicians when adequately trained. This study also points to the need for evaluating the severely ill patient in terms of long-term prognosis and recognizing that the usefulness of resuscitation in certain groups of patients may be limited. The results of this study support recent efforts by some to delineate roles and responsibilities of the physician in implementing "do not resuscitate" or "no code" orders.¹² Such an area is one of the major concerns that must be addressed in light of limited resources for health care.

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