Brief Report

Survival after In-Hospital Cardiopulmonary Resuscitation in a Major Referral Center during 2001-2008

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Abstract

Despite efforts to save more people suffering from in-hospital cardiac arrest, rates of survival after in-hospital cardiopulmonary resuscitation (CPR) are no better today than they were more than a decade ago. This study was undertaken to assess the demographics, clinical parameters and outcomes of patients undergoing CPR by the code blue team at our center during 2001 to 2008. Data were collected retrospectively from adult patients (n=2262) who underwent CPR. Clinical outcomes of interest were survival at the end of CPR and survival at discharge from the hospital. Factors associated with survival were evaluated using binomial and Chi Square tests. Of the patients included (n=2262), 741 patients (32.8%) had successful CPR. The number of male patients requiring CPR was more than females in need of the procedure. The majority of patients requiring CPR were older than 60 years (56.4±17.9). The number of successful CPR cases in long-day shift (7:00 to 19:00) was more than that in the night shift (19:00 to 7:00). Furthermore, 413 (18.4%) cases were resuscitated on holidays and 1849 (81.7%) on the working days. The duration of CPR was 10 min or less in 710 (31.4%) cases. Cardiopulmonary resuscitations which lasted less than 10 minutes were associated with better outcomes. The findings of the present study indicate that some manageable factors including the duration of CPR, working shift, working day (holiday or non-holiday) could affect the CPR outcomes. The findings might also be taken as evidence to suggest that the allocation of more personnel in each shift especially in night shifts and holidays, planning to increase the personnel's CPR skills, and decreasing the waste time would result in the improvement of CPR outcome.
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Keywords ● Cardiopulmonary resuscitation ● Cardiopulmonary arrest ● survival

Introduction

Cardiopulmonary resuscitation (CPR) has been widely practiced since the clinical utilization of closed chest massage was first reported in 1960.[1] Studies from the 1990s have noted hospital CPR discharge rates ranging from 13 to 14%.[2,3] Using data from 14,720 in-hospital cardiac arrests in the National Registry of Cardiopulmonary Resuscitation (NRCPR), Peberdy et al.[4] reported overall survival to hospital discharge rate of 17%. Moreover, a survival to discharge rate of 17% was also reported by Tunstall-Pedoe et al. who included arrests with

onset outside the hospital.[5] Recently Nadkarni et al.[6] analyzed several years of NRCPR data to compare the survival outcomes in children and adults after cardiac arrest associated with different arrest mechanisms. Using survival to discharge ratio as the primary outcome measure, they,[6] found a survival rate of 18% for adults after pulseless cardiac arrests. Matot et al.[7] in a prospective study examined the effect of arrest time on hospital discharge as the primary outcome measure. They found that survival to discharge ratio was poorer during night shift CPRs than those of CPRs performed in combined morning and evening shifts.

Cardiac–respiratory arrest is the foremost problem in many medical centers worldwide, and CPR is a part of the responsibility of the code blue anesthesia teams and anesthesia departments.[2,3] This study was undertaken to assess the demography, clinical parameters and outcomes of patients undergoing CPR by the code blue team at our center during 2001 to 2008.

Materials and Methods

Data relevant to CPR outcome performed on 2262 patients hospitalized in Baghiatollah hospital, Tehran, Iran from 2001 to 2008 by code blue (code 99) team were obtained from the nursing office and analyzed. Cardiopulmonary resuscitation sheets had been completed and signed by the hospital supervisor. The sheet contained information in regards to the patients' demography including name, age, sex, time that CPR team was called in, duration of CPR, time of working shift (day or night) and the working status of the day (holiday or working day) in which CPR was performed and the outcome of CPR. The CPR sheets had been reviewed and verified by the nursing offices after CPR. The success ratios (successful CPR/unsuccessful CPR) were compared using Z (Binomial) and Chi Square-tests and Statistical Package for Social Sciences (SPSS 17). A P value of ≤0.05 was considered statistically significant.

Results

Data were obtained from CPR sheet of 2262 patients who were cardiopulmonary resuscitated from 2001-2008 at Baghiatollah hospital, Tehran, Iran. The number of female patients was 975 (43%), and that of male patients was 1287 (57%). The cardiopulmonary arrests in 281(12.4%) of patients were of cardiac origin, in 312 (13.8%) of cases were due to respiratory problems, and in 1669 (73.8%) patients were the result of both cardiac and pulmonary problems. Cardiopulmonary resuscitation was successful in 741 (32.8%) of patients.

The ages of the patients were 56.4±17.9 years. One hundred sixty four (7.25%) patients were under 15 years, 94 (4.15%) were between 15 to 29 years, 133 (5.87%) were between 30 to 44 years, 476 (21.04%) were between 45 to 60 years, and 1395 (61.67%) were above 60 years. The number of successfully cardiopulmonary resuscitated cases in patients with over 60 years of age (n=529) was significantly (P<0.001) higher than that in patients with ages of below 60 years (n=212) (table 1). The number of CPR cases performed during long-day shift (7:00 to 19:00) were 1825, and the number of those performed during night shift (19:00 to 7:00) were 437. The number of successful CPR cases in long-day shift was 523, which was more than twice that in the night shift (n=218) (table 1). Furthermore, 413 (18.4%) cases were resuscitated on holidays and 1849 (81.7%) on the working days. The number of successful CPRs in working days was 577, which was about 3.5 times the successful CPR cases (164) on holidays (table 1).

The duration of CPR was 10 min or less in 710 (31.4%) cases, (11–20) min in 382 (16.9%) cases, (21–30) min in 632 (27.9%) cases, and above 30 min in 538 (23.8%) cases. There was a significant (P=0.001) difference between the number of successful cases whose CPR durations were above and below 10 min (table 2). There were 741 successful cases, of which 212 cases (24.5%) were below 60 years and 529 cases (37.9%) were above 60 years (table 2).

Table 1: The number and percentage of successful, unsuccessful and total CPR cases based on the patients' ages, working shifts and working days

		Successful	Unsuccessful	Total
Patients' age	-60	212(24.5%)	655(75.5%)	867(100%)
	+60	529(37.9%)	866(62.1%)	1395(100%)
	Total	741(32.8%)	1521(67.2%)	2262(100%)
Working shift	7am-7pm	523(28.6%)	1302(71.4%)	1825(100%)
	7pm-7am	218(49.9%)	219(50.1%)	437(100%)
	Total	741(32.8%)	1521(67.2%)	2262(100%)
Working days	Non-holiday	577(31.2%)	1272(68.8%)	1849(100%)
	Holiday	164(39.7%)	249(60.3%)	413(100%)
	Total	741(32.8%)	1521(67.2%)	2262(100%)

Table 2: The duration of CPR (> 10 and < 10 minutes) stratified based on age (< 60 and > 60 years) and CPR outcome (successful and unsuccessful)

		Age<60	Age>60	Total
Duration	-10	172(38.7%)	273(61.3%)	445(100%)
	+10	117(39.5%)	179(60.5%)	296(100%)
	Total	212(28.6%)	529(71.4%)	741(100%)
		Successful	unsuccessful	Total
	-10	445(62.7%)	265(37.3%)	710(100%)
	+10	296(19.1%)	1256(80.9%)	1552(100%)
	Total	741(32.8%)	1521(67.2%)	2262(100%)

Discussion

This study was done in a major referral hospital with over 800 beds comprising all medical specialties and subspecialties, and diagnostic para clinical facilities. In a previous study we showed that over 100 daily operations are performed in the hospital, and 61.1% of patients were in the sixth decade of their lives.[8] The study showed that the number of CPR cases was higher in daytime shifts than in the nighttime shifts. This was possibly due to the interventions and procedures, which might have induced cardiac arrest in the day time shifts.[5,6,9]

The prevalence of ventricular fibrillation or ventricular tachycardia was 12.4% in the present study. These findings are not similar to those of Nadkarni et al.[6] who reported prevalence of 23%, 35% and 32% for ventricular fibrillation or ventricular tachycardia, asystole and pulseless electrical activity (PEA), respectively in adults.

Although the duration of CPR was a significant factor in predicting survival after cardiac arrest in the present study, dictating a prescribed maximum duration of CPR remains impossible, especially because of the ethical concerns surrounding the issue. The determination of absolute accuracy of time documentation (CPR start time and duration) has been difficult with standard m ethods in previous studies.[10,11]

A review of 115 published studies showed that the survival to discharge ratios for USA, Canada, UK and other EU countries were 15.2%, 15%, 16% and 17%, respectively.[12] Another study found that resuscitations longer than 15 minutes were associated with significantly decreased survival to discharge ratio.[11] In the present study, CPRs with durations of <10 minutes had a significant effect on survival to discharge as demonstrated by comparative analysis. The results were significantly better when the duration of CPR was less than 10 minutes (table 2) and (figure 1). The average age of patients in a previous study [13] by Bialecki was 69 years,but the average age of patients in the present study was 56.4 years with a SD of 17.9 years The overall survival to discharge ratio after CPR in the present study were 12%, which was lower than those reported by Zoch et al (32%) [14] or Peberdy et al (17%).[4] These investigators,[4,14] speculated that increased use of "do not resuscitate" or "No Code" orders during the study period might have resulted in higher survival to discharge ratios. We did not use the "do not resuscitate" orders in our hospital.
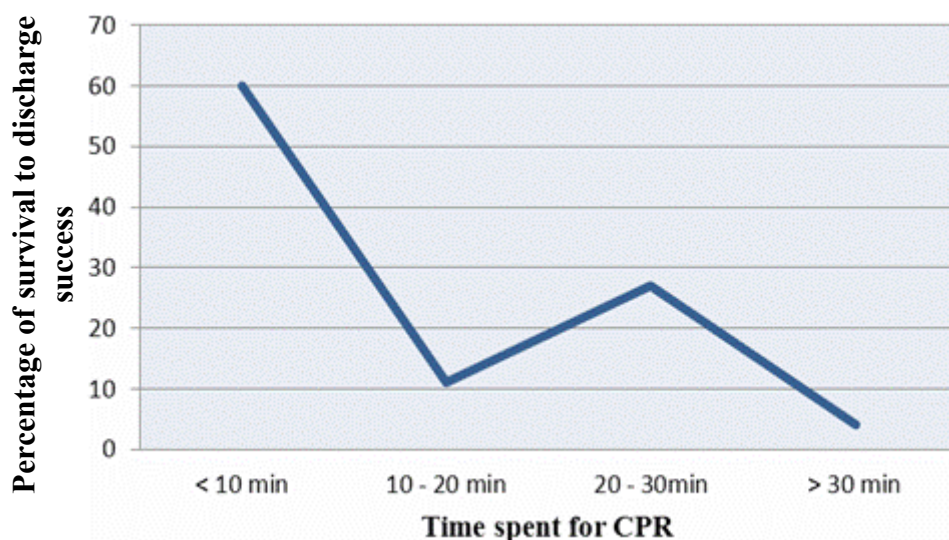

Figure 1: The relation between the percentage of survival to discharge success and the duration of CPR

Conclusion

The present study provides a retrospective analysis of survival after in-hospital pulseless cardiac arrest during 2001-2008. The findings were generally similar to the results of others studies in the current literature. Seven hundred and forty one (32.8%) cases had successful CPR. The findings of the study indicate that CPRs with durations of CPR>10 minutes significantly reduced the survival to discharge ratio as demonstrated by comparative analysis. The overall survival to discharge ratios after CPR was 12%. The study also suggest that it seems necessary to have a baseline data about success rate in CPR to compare efforts to improve results, and seek ways to improve the outcome of in-hospital CPR.

Conflict of Interest: None declared

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