Outcome of out-of-hospital cardiac arrest in a regional hospital in Hong Kong

香港一所區域性醫院之院前心搏停止個案結果

CL Lau 劉柱良, JCH Lai 黎靖匡, CY Hung 熊忠勇, CW Kam 甘澤華

This study evaluated the resuscitation outcome of adult patients presenting with non-traumatic out-of-hospital cardiac arrest (OHCA) to a regional hospital in Hong Kong. Out of 876 patients of non-traumatic OHCA, 12.7% survived to hospital admission. Only 0.5% of the 876 patients survived to hospital discharge and at one year after discharge. The number needed to treat (NNT) for prehospital asystolic cardiac arrest to have one survival to discharge was 795. (*Hong Kong j.emerg.med.* 2005;12:224-227)

是次研究評估香港一所區域性醫院呈現非創傷性院前心搏停止的成年病者之復甦結果；在 876 名非創傷性院前心搏停止病者中，12.7% 病者可以生存至入院，但只有 0.5% 可生存出院並活至出院後一年。要成功救活一名院前心搏及心電靜止的病者生存出院的所需治療數目為 795 。

Keywords: Arrhythmia, cardiopulmonary resuscitation, emergency medical services, heart arrest, treatment outcome

關鍵詞：心律不齊、心肺復甦法、緊急醫療服務、心搏停止、治療結果

Introduction

Patients presenting with non-traumatic out-of-hospital cardiac arrest (OHCA) are frequently encountered in emergency departments (ED). Resuscitation is attempted in most cases but the outcome varies with reported survival rates in previous local studies ranging from 1.25% to 3.0%.[1-3] Is there a particular group of patients with a better outcome? This study was to evaluate the resuscitation outcome of adult patients presenting with non-traumatic OHCA to a regional hospital in Hong Kong.

Correspondence to:
Lau Chu Leung, MBBS, MRCSEd
Tuen Mun Hospital, Accident & Emergency Department, Tsing Chung Koon Road, Tuen Mun, N.T., Hong Kong
Email: terrycllau@yahoo.com

Lai Cing Hon, Jeffrey, MBBS, MRCSEd
Hung Chung Yung, MBBS, FRCSEd, FHKAM(Emergency Medicine)
Kam Chak Wah, MRCP(UK), FRCSEd, FHKAM(Emergency Medicine)

Methods

Setting

The study was performed in the emergency department of a regional hospital in the western cluster of the New Territories in Hong Kong, which had an annual attendance of 200,000 to 270,000 during the study period from 2001 to 2003 (Tuen Mun Hospital Annual Statistics).

Selection criteria

All patients aged 18 years or above presenting with non-traumatic OHCA during the period 1st January 2001 to 31st December 2003 were included. Resuscitation was performed in all patients presenting with non-traumatic OHCA, except those patients who had already developed post-mortem changes on presentation to the ED. Only patients of probable 'primary' cardiac arrest were included and those patients associated with toxicological causes were excluded.

Study design

This was a retrospective, observational study over a period of three years.

Data collection

Data of recruited subjects were collected, namely patient characteristics and the presenting cardiac arrest rhythm. Records of patients admitted to hospital were reviewed to determine the outcome on discharge and one year later.

Statistical analysis

Descriptive statistics with the number of patients, percentage of the total, mean, standard deviation (SD), and range for variables were used to summarise the data. Statistical analysis was done by the Statistical Package for the Social Sciences (Version 12.0, SPSS Inc., Chicago).

Results

A total of 1,279 patients presenting with cardiac arrest were brought to the Accident & Emergency Department of Tuen Mun Hospital during the study period. Only 876 adult patients presenting with non-traumatic OHCA with resuscitation performed were included in the study according to the above mentioned selection criteria. The mean age was 71.3 years and 502 of them were males (Table 1).

The most common presenting cardiac rhythm was asystole (90.8%). Ventricular fibrillation (VF) or pulseless ventricular tachycardia (VT) constituted 5.1% and pulseless electrical activity (PEA) 2.5% respectively (Table 2). Fourteen (1.6%) patients presented with OHCA at home or in old age home with cardio-pulmonary resuscitation (CPR) performed by the ambulance crew but the initial rhythm was unknown (not documented in the ED record and the ambulance records were not available). All patients with documented VF or pulseless VT received defibrillation by automated external defibrillator in the ambulance or manual defibrillator in the emergency department.

Among the 876 patients presenting with non-traumatic OHCA with resuscitation attempted during the study period, 726 (82.9%) patients were dead on arrival with no response to resuscitation and 39 (4.5%) patients had initial detectable vital signs and succumbed after resuscitation. Only 111 (12.7%) of the 876 patients survived to hospital admission (STA). Patients presenting with VF or pulseless VT had a higher rate of STA (42.2%) than those presenting with asystole (9.8%) and PEA (9.1%) (Table 3). The number needed

Table 1. Patient characteristics

Characteristics of patients (n=876)	
Age	Years
Mean (SD)	71.3 (16.9)
Median (range)	75 (18-104)
Sex	No. (%)
Male	502 (57.3%)
Female	374 (42.7%)

Table 2. Presenting cardiac arrest rhythm

Cardiac rhythm (n=876)	
Asystole	795 (90.8%)
Ventricular fibrillation/pulseless ventricular tachycardia	45 (5.1%)
Pulseless electrical activity	22 (2.5%)
Unknown	14 (1.6%)

Table 3. Outcome according to cardiac rhythm

Rhythm	STA	STD	Survived 1+ year
Asystole (n=795)	78 (9.8%)	1 (0.1%)	1 (0.1%)
VF / pulseless VT (n=45)	19 (42.2%)	2 (4.4%)	2 (4.4%)
Pulseless electrical activity (n=22)	2 (9.1%)	0	0
Unknown (n=14)	12 (85.7%)	1 (7.1%)	1 (7.1%)
Overall (n=876)	111 (12.7%)	4 (0.5%)	4 (0.5%)

STA=survival to hospital admission; STD=survival to hospital discharge

to treat (NNT) for patients of OHCA in VF/pulseless VT and asystole to have one live hospital admission was 2.4 and 10.2 respectively (Table 4).

Among all the 876 patients, the rate of survival to hospital discharge (STD) was only 0.5% and all of them survived more than one year after discharge (Table 3). No neurological deficits were reported in those patients who survived one year after the episode. Patients presenting with VF/pulseless VT had a better prognosis than those presenting with asystole and PEA. The rate of STD was 4.4% for patients of VF/pulseless VT compared to 0.1% in patients of asystolic cardiac arrest and zero in patients of PEA (Table 3). Therefore, the NNT for patients of non-traumatic OHCA to have one live hospital discharge was 219. The NNT for patients of OHCA in VF/pulseless VT and asystole to have one live hospital discharge was 22.5 and 795 respectively (Table 4).

Discussion

This study demonstrated the overall outcome of resuscitation performed in ED for non-traumatic OHCA patients. Restoration of spontaneous circulation (ROSC) and survival to hospital admission could be achieved in 12.7% patients which was similar to the 14.1% reported in another study in Hong Kong in 2001.[1] The overall survival to hospital discharge rate was 0.5% in our study. This was lower than the figures reported in previous local studies (1.25% to 3.0%)[1-3] and in other cities such as Singapore (2%),[4] Chicago (2%),[5] New York (1.4%).[6]

The most common presenting cardiac rhythm in our patients was asystole (90.8%), which was higher than the figures in Singapore (54.5%)[4] and in Hong Kong as reported in 2001 (80.6%).[1] Forty-five (5.1%) of our 876 patients presented with VF or pulseless VT which was similar to the figure reported in Singapore (5.6%).[4] For patients presenting with VF or pulseless VT, our rate of STD was 4.4%. The reported discharge rates for patients with VF or pulseless VT varied from 5.3% to 37.7%.[7] Only one patient presenting with asystolic cardiac arrest survived to hospital discharge.

The one-year survival rate was only 0.5% in our study. A higher figure (3.0%) was reported in Japan.[8] However, the one-year survival rate was 10.8% in a study reported in Germany.[9] The great difference could be related to patient factors (e.g. pre-morbid state, race), pre-hospital factors (e.g. time to receive CPR, including bystanders, and defibrillation) or hospital care factors (e.g. physician's decision/effort, intensive care). All the patients in our study were managed in general medical wards. Patient and pre-hospital factors should require further evaluation.

Resuscitation to provide a good quality of life is far more important than just to provide ROSC without the capability to be discharged alive. The identification of a particular patient group with better outcome can allow better allocation of resources during resuscitation.

Limitations

This study only analysed the general outcome and did not analyse factors occurring before patient arrival and in-hospital management. Risk factors of individual patients might also affect the outcome of resuscitation. As the survival rates to hospital admission and discharge of the 14 patients with unknown initial rhythm were high in comparison with the overall figures, the missing data put into doubt the validity and reliability of the outcome results of the individual cardiac rhythms.

Table 4. Outcome in NNT value according to cardiac rhythm

Rhythm	Survival to admission	Survival to discharge
Asystole	10.2	795
VF / pulseless VT	2.4	22.5
Pulseless electrical activity	11.0	Infinity
Overall	7.9	219

Conclusion

The overall prognosis of OHCA was poor with survival to hospital discharge rate of 0.5% and one year survival rate of 0.5%. The NNT for prehospital non-traumatic cardiac arrest to have one live hospital discharge was 219. Patients presenting with VF or pulseless VT had a better prognosis than those presenting with asystole. The NNT to have one hospital discharge for cardiac arrest patients in VF/pulseless VT and asystole were 22.5 and 795 respectively. Cardiopulmonary resuscitation can restore cardiopulmonary function, but also may induce iatrogenic injury to patients and take away the dignity of the dying patients. Resuscitation to achieve a good quality of life is far more important than the mere transient return of spontaneous circulation.

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