

Study on the Activity of the Cardiac Arrest Teams from the Emergency Department of the Clinical Emergency County Hospital from Tîrgu Mureş, Romania, in 2009

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Objective: To evaluate the activity of the Cardiac Arrest Team (CAT) from the Emergency Department, called to perform resuscitation for patients admitted in different departments of the Clinical County Hospital.

Methods: We conducted a prospective study between 01/01–12/31/2009. We included all the patients we performed CPR on, regardless of indication.

Results: We had a total of 110 cases, representing 0.28% of the 39,074 patients assisted by the department in 2009. We noticed an increased incidence of calls in internal medicine and surgery departments, with 50% and 17% of the cases respectively. The most frequent diagnosis was cardiac arrest for respiratory failure and malignant tumors, each representing 17%, even though malignancy does not have an indication for resuscitation. There was no causal relationship between the outcome of resuscitation and age groups ($p = 0.552$), type of wards ($p = 0.36$), or the Basic Life Support (BLS) performed by the staff, before the CAT arrived ($p = 0.76$). Medical staff from wards started BLS in 40.1% of cases, in 32% of these cases only chest compressions were performed, without ventilation. The proportion of resuscitated versus deceased cases is 49.1% to 50.9%, so immediate results are good, unfortunately the late outcome is bad, 52 cases out of the 54 died later in ICU, 2 patients being discharged in good condition.

Conclusions: CAT should be called according to Do Not resuscitate criteria. Medical staff from the wards should be trained to start CPR and have basic equipment. The early outcome is comparable with the international data, the poor late results binds to resuscitation without indication.

Keywords: cardiac arrest, resuscitation, ethics, training, equipment

Introduction

The Cardiac Arrest Team (CAT) from the Emergency Department (ED) consists of one emergency physician and two nurses and is called to resuscitate patients admitted to different hospital wards, except Intensive Care Department and Cardiovascular Surgery, where the local staff is performing CPR. We wanted to evaluate the behaviour of the medical staff in the hospitals wards, concerning cardiac arrest cases. The request for the CAT team is made by telephone, directly to the ED, by the staff from wards. The necessary resuscitation equipment transported by the CAT is in a special stretcher, on wheels.

Method

We conducted a prospective study between 01/01–12/31/2009, in order to evaluate the activity of the CAT. We performed resuscitation in all cases, regardless of indication or age and we filled the data in a form, designed previously, specially for this purpose. All the patients with cardiac arrest were included in the study. For the statistical study we used SPSS program, version 17, χ^2 test and p values were determined to compare the data obtained.

Results

We had a total of 110 calls to cardiac arrest, on different departments of the Clinical Emergency County Hospital

from Tîrgu Mureş, representing 0.28% of the total 39,074 cases assisted by the ED in 2009.

The total number of cardiac arrests that involved the ED in this period was 296; out of this, 186 occurred in the department and 110 (36.16% of the total 296) on the wards.

Regarding gender distribution, there is a slightly higher incidence in males, 58 (52.7%) of the total 110, compared with women, 52 (48.3%).

There is a higher incidence of cases during the cold season, approximately 12–14% compared to summer months

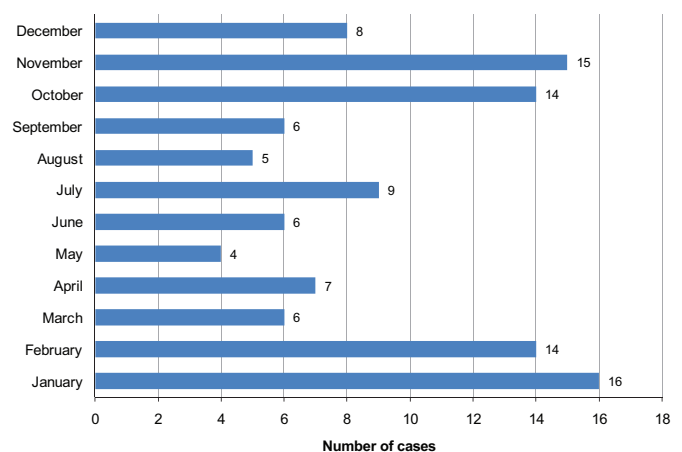


Fig. 1. Distribution of cardiac arrest cases in hospital wards, by months

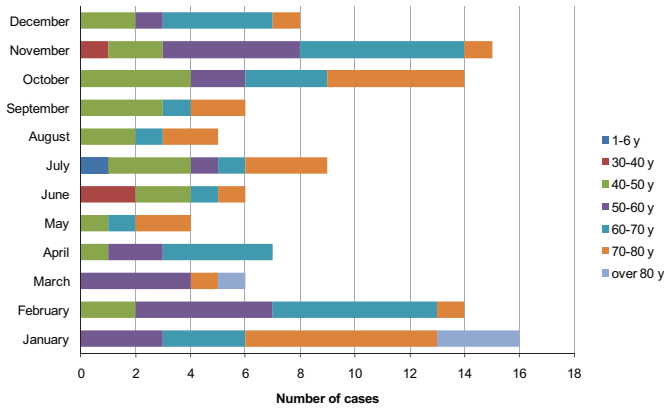


Fig. 2. The incidence of cardiac arrests in hospital wards, according to age group and season

(3–8%), which correlates with the higher number of severe respiratory failure in this time of year. The study shows that patients over 70 years are more vulnerable to cardiac arrest in January and October, patients between 60–70 years in December and March, while younger patients are not influenced so much by seasonal factors ($p = 0.08$, without statistical significance).

The number of calls is higher during daytime (between 08.00–20.00) compared to the night shift (20.00–08.00), 68 vs. 42 cases, both in male and female patients.

Regarding the age distribution of cases, the maximum incidence is between 60–70 years (27%), followed by 70–80 years (24%), younger groups are rarely encountered.

The clinics where the CAT team performed resuscitation were: Internal Medicine – 55 patients (representing 50% of the total cases), followed by Surgery – 19 (17%), Neurology – 15 (14%) and Cardiology II – 8 (7%).

The diagnosis of patients in cardiac arrest was varied: bronchopneumonia, malignant tumors in equal proportion 17%, followed by ischemic stroke 11%, renal failure 10%, liver cirrhosis 8%, postoperative 7%, acute coronary syndrome 6%, sepsis and heart failure each 5%, pulmonary embolism 3%, pulmonary edema 2%, etc. The increased incidence of malignant tumors is not normal, this diagnosis having no indication for resuscitation.

Although, the average time of arrival of CAT on the wards was 3 minutes, patients are found in 71% of cases

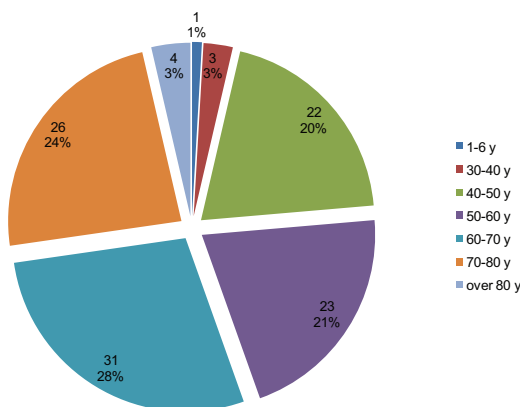


Fig. 4. Distribution of cases by age group

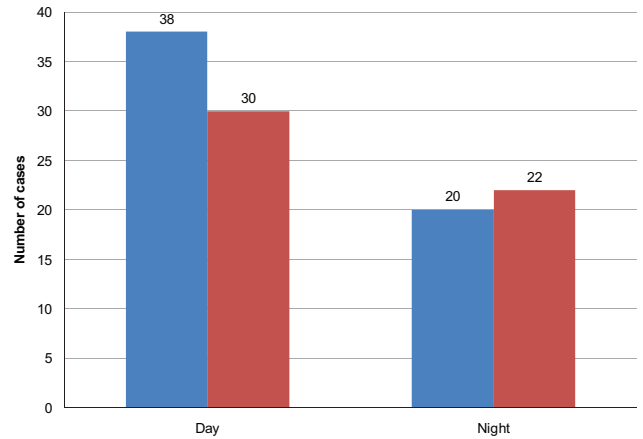


Fig. 3. Distribution of cardiac arrest cases on the hospital wards, depending on day or night shift

in asystole, 18% in pulseless electrical activity (PEA) and not in ventricular rates, as would be expected. Average time from collapse until the arrival of the team was eight minutes, but this is an uncertain parameter, because not all cases were witnessed. In eight cases the patient showed jaw stiffness, a sign that appears late, after about an hour from cardiac arrest.

The European Resuscitation Guidelines recommend a time of resuscitation of 20–30 minutes in case of asystole or pulseless electrical activity and not to stop CPR in ventricular rhythms, until they shift into non-shockable ones. In the study, a number of 38 patients, representing 34.55% of the total 110 cases, were resuscitated for a period of 20–30 minutes, 37 patients (33.64%) for 10–20 minutes, 17 (15.45%) for 30–40 minutes, 15 (13.64%) for 0–10 minutes and only 3 cases (2.72%) had more than 40 minutes of CPR efforts. We can conclude that the protocol was respected, 95 patients, representing 86.36% were resuscitated within the recommended interval. Shorter time of resuscitation was performed at 15 patients, where we agreed, together with the ward physician, that there is no indication to continue.

There was no statistically significant relationship between the time of CPR and patient age, $p = 0.404$. Most patients received 30 minutes of resuscitation, according to

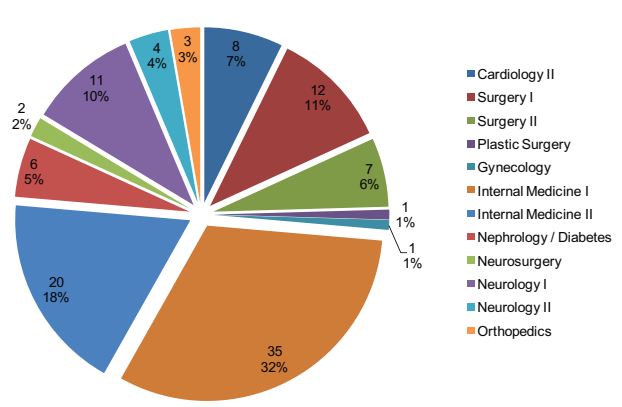


Fig. 5. Distribution of cases according to the department requesting CPR

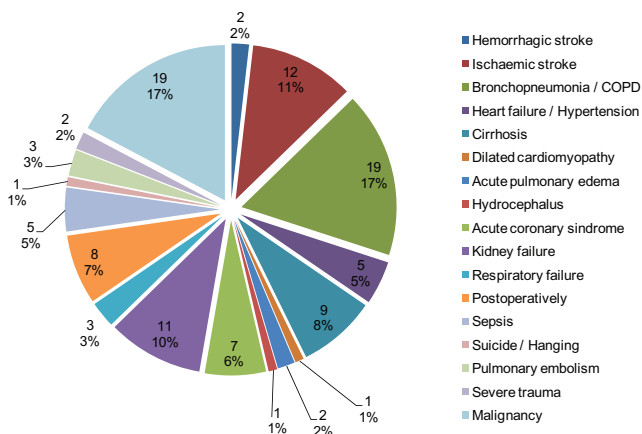


Fig. 6. Distribution of cardiac arrest cases on wards, depending on the diagnosis

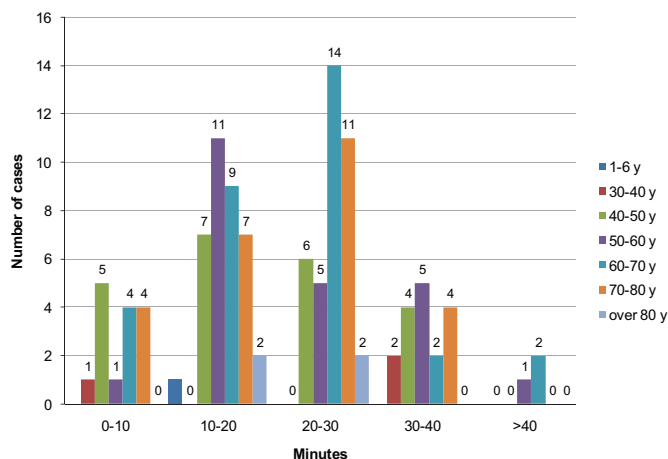


Fig. 7. Relationship between the age of patients and CPR time

the protocol. Also, there is no connection between the time of CPR and patient diagnosis, $p = 0.182$.

There was no causal relationship between the outcome of resuscitation and patient age, $p = 0.552$. In the age groups ranging between 30–40 and 60–70 years, there were more deceased patients than successfully resuscitated ones. In the other age groups there were more patients resuscitated successfully than deceased and over 80 years, the proportion was equal.

Also, there was no statistically significant relationship between resuscitation outcomes and the type of wards, $p = 0.36$. We noticed that in the Department of Cardiology II and Nephrology-Diabetes, the proportion of resuscitated and not resuscitated cases were equal. In Internal Medicine I, almost all the patients deceased, in Internal Medicine II, with the same diseases, almost all cases were successfully resolved. In Neurology I Clinic we had a lot of not resuscitated patients and in Neurological II Clinic, all patients had a good outcome.

Patients with successful resuscitation were transferred to the ICU I (56 cases – 51%) and ICU II (2 cases – 1.8%), the rest remained on the wards, to be transferred to Morphopatology. Fifty-two patients have died (47.2%).

The place where the patients were transferred is significantly correlated with gender, we noticed that more men than women were resuscitated and were transferred to the ICU, $p = 0.033$.

We did not find a statistically significant relationship between outcome and the initial cardiac arrest rhythm, $p = 0.096$. The cases found in asystole and VF/VT had higher successful resuscitation rates than DEM than those in pulseless electrical activity.

Between the resuscitation outcome and pupil size is a significant correlation, $p = 0.038$, patients with non-reactive mydriasis and marked signs of hypoxia had a lower rate of successful resuscitation than those with intermediate and reactive pupils.

The outcome was not significantly correlated with the BLS performed early by the wards staff, before the CAT arrived, $p = 0.76$, we noticed a better outcome when BLS was performed. Medical staff from wards started correct BLS only in 40.1% of cases, in 32% of these cases CPR was made only with chest compressions, without bag and mask ventilation.

There was no significant relationship between the diagnosis of the patients and the place of transfer. In all types

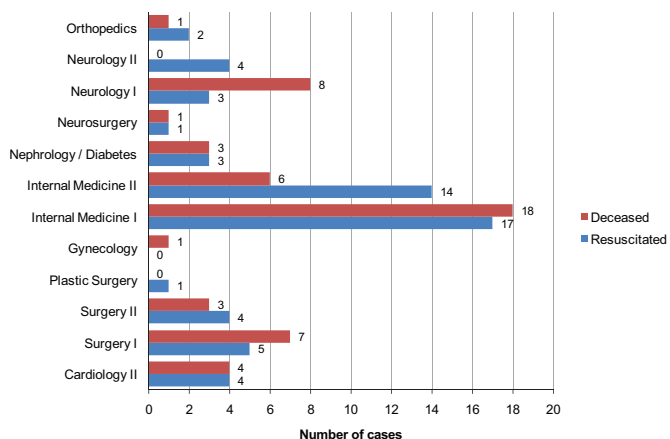


Fig. 8. The relationship between the department requesting resuscitation and outcome

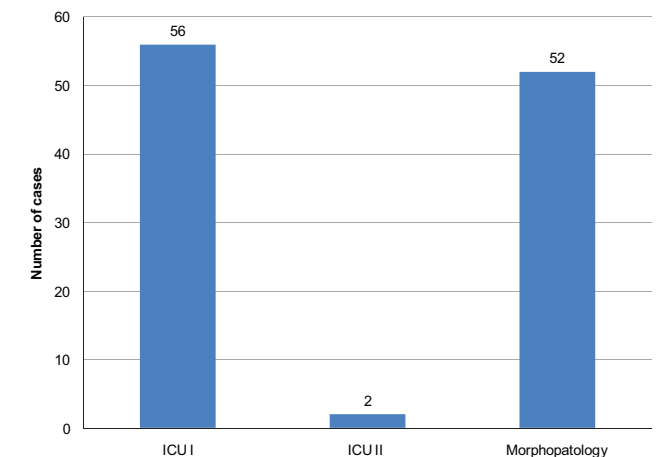


Fig. 9. Distribution of cardiac arrest cases depending on the place of transfer

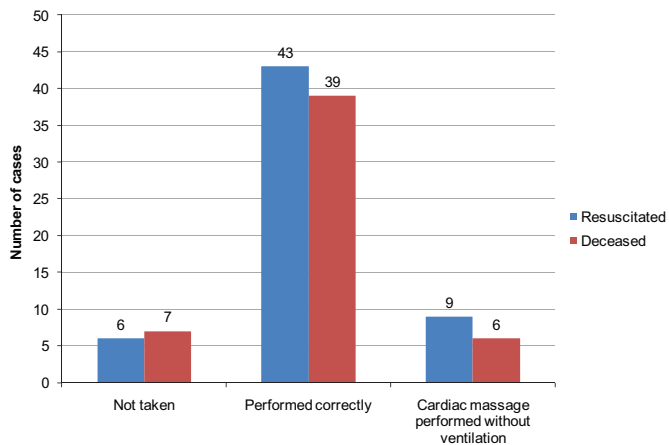


Fig. 10. Relationship between the outcome of resuscitation and BLS performed on requesting department, prior to arrival of CAT team

of diagnosis we had deceased and successfully resuscitated patients, even in the group with malignant tumors.

Discussion

The study showed that the proportion of cases with good outcome is very close to the unsuccessful cases, 49.1% vs 50.9%, so immediate results are very good, unfortunately we can not say the same thing about the late outcome, 52 cases out of the 54 died later in ICU. The 2 cases that were discharged (representing 3.7% of the total of 54 resuscitated cases) were a male patient with renal failure and dialysis, who after six days of hospitalization in ICU was transferred to Nephrology and the other was a female patient with respiratory failure, resuscitated in Internal Medicine II, she stayed only 2 days in ICU. We could explain this low late outcome rate by the fact that most of these cases did not have indication of resuscitation, that we were called late and BLS was not always performed. Early outcome is good because the time of arrival of the CAT team was short, so hypoxia was not so severe.

By comparison with recent data from the medical literature, we noticed that the rate of resuscitation is very good, however the late survival is low.

International data on hospital resuscitation of cardiac arrests reported by the European Resuscitation Council Guidelines for Resuscitation in 2010, shows that in Europe, the discharge rate of cardiac arrests is 10.7% at all rhythms and 21.2% for VF [1,2]. Similar data published by the American Heart Association shows a survival rate of 8.4% on all cardiac rhythms and 22% for ventricular rhythms [3]. A Canadian study, which evaluated cardiac arrests for a period of 10 years, reported a survival rate of 38% of resuscitations in hospital [4].

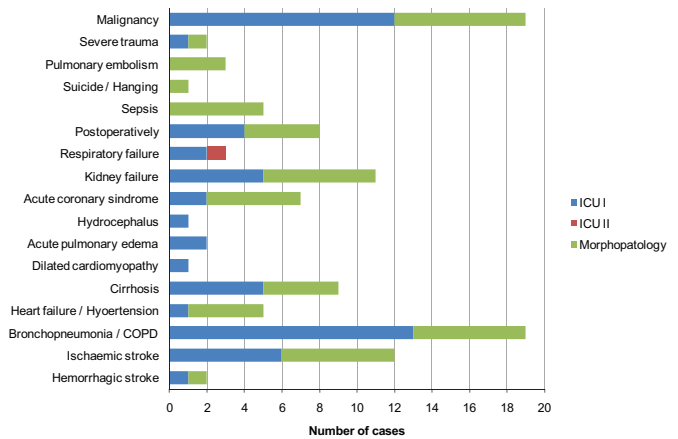


Fig. 11. Relationship between diagnosis and place of transfer

A study published in Taiwan, conducted on 330 cases, shows a resuscitation rate of 71% and hospital discharge rate of 18% [5].

Conclusions

- ▶ The call for CAT should be made according to ethical criteria – Do Not resuscitate.
- ▶ Medical staff from the departments should be better trained for CPR, BLS maneuvers performed before the arrival of the CAT team increases the rate of successful outcome.
- ▶ The departments should have basic equipment, bag and mask and defibrillator-monitor.
- ▶ The proportion of cases the team resuscitated is a good result, comparable to the literature, but the number of patients discharged is smaller and binds to resuscitation without indication.
- ▶ Resuscitation with no indication could have good immediate results, but the prognosis is bad. The post-resuscitation treatment in the ICU is expensive and involves much effort from the medical staff.

References

1. Nolan JP, Sips J, Zideman DA, Biarent D, Bossaerte LL, Deakin C, Kosterg RW, Wyllie J, Böttiger B – European Resuscitation Council Guidelines for Resuscitation 2010, Section 1. Executive summary, Resuscitation 2010, 81: 1219–1276.
2. Sandroni C, Nolan JP, Cavallaro F, Antonelli M – In-hospital cardiac arrest: Incidence, prognosis and Possible Measures to Improve survival. Intensive Care Med 2007, 33: 237–45.
3. Meaney PA, Nadkarni VM, Kern KB, Indik JH, Halperin HR, Berg RA – Rhythms and outcomes of in-hospital adult cardiac arrest. Crit Care Med 2010, 38: 101–8.
4. Redpath C, Sambell C, Stiell J, Johansen H, Williams K, Sami R, Green M, Gollob M, Lemery R, Birn D – 13,263 In-Hospital Mortality in Survivors of Out-of-hospital cardiac arrest in Canada, American Heart Journal 2010, 159(4): 577–583.
5. Shih CL, Lu TC, Jerng JS, Lin CC, Liu YP, Chen WJ, Lin FY – A web-based Utstein style registry system of in-hospital cardiopulmonary resuscitation in Taiwan, Resuscitation 2007, 72(3): 394–403.