Evaluation of incoming calls to intensive care unit for emergency assistance

Yoğun bakım ünitesine acil yardım için gelen çağrıların değerlendirilmesi

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Abstract

Aim. The aim of this retrospective study was to determine mean admission time after calls, resuscitation success rate, and determine the rate of medical emergency team (MET) calls of clinics in hospital by assessing the incoming calls to MET at intensive care unit. **Methods.** This study was conducted by collecting emergency call forms of 147 patients. The data including age, gender, medical diagnosis, the name of the caller department, cause of call, occurrence time, call time, attending time, medical care termination time and the outcomes were extracted from the forms or patient files. Event declaration time was accepted as minute time difference between occurrence time and call time. Duration of admission was accepted as minute time difference between call times and attending time. Duration of resuscitation was accepted as minute time difference between attending time and medical care termination time. **Results.** Mean event declaration time was 3.3 ± 3.0 minutes. Mean duration of admission was 3.7 ± 1.6 minutes. Mean duration of resuscitation was 20.5 ± 12.7 minutes. The resuscitation of 84 patients (63.6%) was successful while 48 patients (36.4%) died at the end of resuscitation. It was found that the patients with a result of successful resuscitation were significantly younger and their duration of resuscitation was significantly shorter. **Conclusion.** We indicate that MET system is an essential part of in-hospital emergency medical care system. We suggest that a blue code call system should be established by intensive care unit members and announced to all hospital staff.

Keywords: Emergency medical care, medical emergency team, cardiac arrest, blue code, call

Özet

Amaç. Bu retrospektif çalışmanın amacı hastane içinde yoğun bakım ünitemizdeki acil yardım ekibine yapılan çağrıları değerlendirerek, ortalama varış süresi, resüsitasyon başarı oranları ve arayan kliniklerin belirlenmesidir. **Yöntem.** Bu çalışma 147 hastanın formları incelenerek yapıldı. Yaş, cinsiyet, tanı, klinik adı, çağrı nedeni, olay zamanı, arama zamanı, varış zamanı, tıbbi bakım sonlandırma zamanı ve sonuç bilgileri kaydedildi. Olay bildirim süresi, varış süresi, resüsitasyon süresi bilgileri hesaplanarak kaydedildi. Olay bildirim süresi olay zamanı ile arama zamanı arası, varış süresi arama zamanı ila varış zamanı arası, resüsitasyon süresi varış zamanı ile tedaviyi sonlandırma zamanı arası süreler olarak alındı. **Bulgular.** Ortalama olay bildirim süresi 3,3 ± 3,0 dakika idi. Ortalama varış süresi 3,7 ± 1,6 dakika idi. Ortalama resüsitasyon süresi 20,5 ± 12,7 dakika idi. 84 (%63,6) hastanın resüsitasyonu başarılı iken 48 (%36,4) i resüsitasyon sonunda mortaliteyle sonuçlandı. Sonuçları başarılı olan hastaların yaşları belirgin olarak daha genç olarak bulundu ve resüsitasyon süreleri de belirgin olarak düşüktü. **Sonuç.** Acil yardım ekibinin hastane içi acil durumlar için önemli olduğunu belirtmekteyiz. Bir mavi kod çağrı sisteminin yoğun bakım üyeleri tarafından oluşturularak tüm hastaneye bildirilmesi gerektiği kanaatindeyiz.

Anahtar sözcükler: Acil tıbbi bakım, acil yardım ekibi, kardiak arrest, mavi kod, çağrı

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Introduction

Establishing a medical emergency team (MET) is very crucial especially for a university hospital, as mortality rate of in-hospital cardiac arrest is very high [1]. In general, METs are comprised from intensive care practitioners and anesthesiologists, as they have been largely practiced. Outcome following intensive care is determined by the level of care delivered before and after admission to the intensive care unit (ICU) [1-3]. The quality of medical care given by MET is not only associated with the quality of MET members but it is also associated with the establishment of a hospital-wide system which rapidly detects and responds to the seriously ill patients in the early stages and which monitors and audits quality, resulting in improved patient care. The timeliness of the emergency response is critical to outcomes in patients with in-hospital cardiac arrest [3].

MET was first implemented in 2009 in our institute and consisted of 2 different teams from department of emergency and department of anesthesiology. The present retrospective evaluation focused on the MET of anesthesiology which involves one instructor doctor, one assistant doctor, one technician from intensive care unit of anesthesiology department. System is based on a phone call system with a static number that is known by all clinics.

The aim of this study was to evaluate the medical emergency care given by MET of our department to in-hospital emergency calls and to determine mean response time to calls, resuscitation success rate, and the rate of MET calls of clinics in hospital.

Materials and methods

This retrospective study was conducted after the approval of ethical committee by collecting emergency call forms of 147 patients from end of year 2009. If the data on the forms were missing then the patient files analyzed and data were recorded. The data of the patients were excluded if needed data couldn't be found in the forms and patient files in archive, or if the emergency medical care were given any other clinic other than MET of anesthesiology department. Also, patients who were not in-patients (i.e. they were visitors and out-patients) and those in the Emergency Department were excluded from the study.

Our MET service was implemented in 2000 but it was first introduced as blue code call with one stable phone number in 2009. It consists of an intensive care instructor, an intensive care assistant doctor and the receiving medical unit fellow. The MET service can be activated by any member of hospital staff calling number 2222. This service is nominated as blue code call in our hospital.

The attending fellow completes a form and one copy with the relevant data summarizing the call after each MET call. These data include the patient's demographic information, the reason for the call, the initial diagnosis, occurrence time, calling time, attending time, the interventions and the outcome. Completed form is always attached to patients' file. To ascertain data form completion, a detailed log of all MET calls is maintained by the switchboard operators and any missing entries are requested from the responsible doctor.

The data including age, gender, medical diagnosis of the patient, the name of the caller department, cause of medical care need, occurrence time, call time, MET attending time, medical care termination time, result of medical care were extracted from the forms or patient files. Event declaration time was accepted as minute time difference between occurrence time and call time. Duration of admission was accepted as minute time difference between call times and MET attending time. Duration of resuscitation was accepted as minute time difference between MET attending time and medical care termination time.

Data were analyzed by using SPSS (ver 15.0) software, and presented as mean, number and percentages. Mann Whitney U and t tests were used to analyze our data.

Results

The MET call forms and files of 132 patients were evaluated in this retrospective study. Nine patients were excluded due to inadequate or missing data. Fifty eight (43.9%) female and 74 (56.1%) male patients were included and their data were evaluated. Mean age of the patients was 68.1 ± 13.7 (minimum 25 and maximum 90) years. Mean event declaration time was 3.3 ± 3.0 (minimum 0 and maximum 17) minutes. Mean duration of admission was 3.7 ± 1.6 (minimum 1 and maximum 10) minutes. Mean duration of resuscitation was 20.5 ± 12.7 (minimum 2 and maximum 60) minutes. The resuscitation of 84 patients (63.6%) was successful while 48 patients (36.4%) died at the end of resuscitation (Table 1).

Table 1. Patient and call data.

	Patients (n=132)
Age (year)	68.1 ± 13.7 (min 25 - max 90)
Gender (Male/Female)	58 / 74 (43.9% / 56.1%)
Event declaration time (min)	3.3 ± 3.0 (min 0 - max 17)
Duration of admission (min)	3.7 ± 1.6 (min 1 - max 10)
Duration of resuscitation (min)	20.5 ± 12.7 (min 2 - max 60)
Result (Survive/Death)	84 / 48 (63.6% / 36.4%)
Data are mean ± SD	

When calls were stratified according to clinics, it was observed that the most of the calls were from department of chest diseases; followed by other clinics. Data are presented in Table 2.

Table 2. Clinics requesting emergency medical care.

Clinic	Number of patients (n/%)
Chest Diseases	27 / 20.4%
Hemodialysis	25 / 18.9%
General Surgery	14 / 10.6%
Internal Medicine	12 / 9.0%
Neurology	10 / 7.5%
Neurosurgery	8 / 6.0%
Infectious Diseases	6 / 4.5%
Hematology	5 / 3.7%
Nephrology	5 / 3.7%
Gastroenterology	3 / 2.2%
Orthopedics	3 /2.2%
Cardiology	3 / 2.2%
Urology	2 / 1.5%
Thoracic Surgery	2 / 1.5%
Obstetrics and Gynecology	2 / 1.5%
Psychiatry	2 / 1.5%
Otorhinolaryngology	1 / 0.7%
Pediatrics	1 / 0.7%
Plastic and Reconstructive Surgery	1 / 0.7%
Total	132 / 100%

It was evaluated that whether there is a difference regarding data recorded between the patients with successful resuscitation and those with mortality. It was found that the patients with successful resuscitation were significantly younger (p<0.05) and their duration of resuscitation was significantly shorter (p<0.05) (Table 3). When the difference about recorded data were evaluated between the patients resuscitated in working hours (08:00 - 17:00) and those resuscited out of working hours (17:00 - 08:00), no difference was found (Table 4). There was no difference between male and female gender regarding any of the informations recorded.

Table 3. Comparison of patients according to CPR results.

	Survive (n=84)	Death (n=48)	p
Age (year)	65.5±14.6[*]	72.7±10.8	0.003
Event declaration time (min)	3.1±2.6	3.7±3.6	0.244
Duration of admission (min)	3.6±1.7	3.8±1.5	0.457
Duration of resuscitation (min)	15.1±10.4[*]	29.8±11.1	0.000

Data are mean ± SD
*:p < 0.05

Table 4. Comparison of patients according to event time (working hour vs. out of working hour).

	Working hour (n=84)	Out of working hour (n=48)	p
Age (year)	67.5±13.3	69.2±14.6	0.487
Event declaration time (min)	3.1±2.7	3.6±3.4	0.454
Duration of admission (min)	3.6±1.6	3.8±1.5	0.394
Duration of resuscitation (min)	19.5±12.9	22.1±12.3	0.254

Data are mean ± SD

Discussion

Our retrospective study evaluates in-hospital emergency calls and effectiveness of MET system in our hospital. In our retrospective study the all analyzed patients needed CPR due to different reasons. Generally, the mortality rates from in-hospital cardiac arrests are rather high, thus any system that reduces preventable cardiac arrests should have a significant impact on hospital mortality. It should be taken into consideration that both CPR and complications of resuscitation can lead to death [4].

Advanced life support should be given by experienced medical staff. Despite all improvements in medical sciences, no satisfactory outcomes are achieved in in-hospital cardiac arrests [5-7]. Early cardiopulmonary resuscitation (CPR) is essential to overcome a cardiac arrest and gain success. Although first resuscitation attempts are usually started by clinical staff at the site of the cardiac arrest, resuscitation in most hospital settings is continued by an emergency team such as our MET. There is a concerning issue mentioned by our MET members that some clinical staff who call for emergency medical care hadn't started resuscitation attempts or some emergency cases hadn't declared at early stage to us. Although, MET is a necessary and essential part for emergency medical care especially for CPR, earliest CPR can be given best by the clinical staff requesting medical care. Another important issue is inadequacy of medical devices that can be used by unexperienced staff such as automated external defibrillators. While uncertainty remains over the effectiveness of automated external defibrillators in hospitals the prompt recognition of cardiac arrest and effective systems to dispatch the resuscitation team remains a central step in the resuscitation process [6].

The ratio of female patients was 43.9% in our study so it correlates with literature as it was 39% [5, 8]. In a study of Oguzturk et al. [5], the ratio of female patients was 41.4% and so it was another correlation of our study with literature. There were no differences between male and female patients about recorded data in our study.

In our study mean duration of resuscitation was 20.5 ± 12.7 minutes. It was also correlates with the study of Oguzturk et al. [5] as their mean CPR time was 17.64±14.30. CPR time was the principal factor that affects success rates. If a CPR attempt is initiated over 10 minutes the success rate is further decreased [9-11]. Goldberger et al. [12] analyzed data of 64 339 patients with cardiac arrests at 435 different US hospitals between 2000 and 2008 years. In their study, they found the median resuscitation duration was 17 minutes.

The admission time also represents time to advanced life support (ALS) and it was a major factor affecting the prognosis of patients. In our study there were no difference between survivors and non-survivots in admission time. In study of Sandroni et al. [13] in 2004, it was found that admission time was significantly shorter in survivors. In the literature admission time of 3 min is accepted as a threshold to succeed [14].

In a prospective study of Jones et al. [13] it was concluded that MET system in a hospital reduced the cardiac arrests over a period of 4 years. They suggested that, for every 17 MET calls, one cardiac arrest might be prevented. MET system helps to provide lower attending time as giving chance to the caller clinics to call a stable phone number. There were several studies demonstrating the effectiveness of MET emergency calls on outcomes of in-hospital patients have involved a physician-led MET. A recent study indicated a reduction in mean hospital-wide code rates following the introduction of nurse-led MET system. The interventions that can be provided by a physician-led MET differ substantially to those of a nurse-led system, and may expedite transfer to the critical care unit [14]. This is the case if the physician team leader has intensive care expertise. Therefore, the therapy may differ between institutions according to team expertise and composition.

In this study, it should be indicated that mean age of patients with successful CPR was significantly lower than in patients with mortality. It shows the fact that age of a patient is an important factor for the CPR success [15]. Furthermore, results of our study showed another important thing about the time of event and it was founded no difference between in working time calls and out of working time calls. It indicates operationality of our MET system in all day long.

There is usually another serious problem for our MET system that false or unnecessary call in our hospital. It is really an important issue which occupies MET members unnecessarily and it may be a serious problem for a huge hospital like ours [16].

In conclusion, it is indicated that MET system is an essential part of in-hospital emergency medical care system. We suggest a blue code call system should be established by intensive care unit members and announced to all hospital staff properly.

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