Statistics of rapid response team's work in the Training and Research Hospital of Ordu between 2010–2013: A retrospective study

Ordu Eğitim ve Araştırma Hastanesi mavi kod ekibi çalışma istatistikleri, 2010-2013 yılları arası: Bir retrospektif çalışma

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Abstract
The rapid response system is an emergency intervention that is organized in order to guarantee basic life support in hospitals. In this study, we aimed to evaluate the patient profile and the results of intervention by retrospectively scanning the rapid response calls in Ordu University Training and Research Hospital between 01/10/2010 - 31/12/2013. Female patients comprised 44.9%, with 55.1% male patients, and mean age was 74.3 ± 12.6 years. The reasons for calls were as follows: 75.5% cardiac arrest, 16.9% respiratory arrest, 6% loss of consciousness or unidentified deterioration in clinical status, 1.4% respiratory distress due to epileptic convulsion and 0.2% allergic reactions. Inpatient services placed 68.8% of the calls. Day shift calls comprised 42.5%, with 57.5% made during the night time shift and mean arrival time was 1.51 ± 0.97 minutes. Cardiopulmonary resuscitation was applied to 81.6% of the patients, mechanical ventilator support without chest compressions was provided to 10% and medical support was provided to 8.4% of the patients. Mean intervention duration was 30.6 ± 16.2 minutes. The majority, 58.1%, of the interventions ended with exitus at the first intervention stage, 10.6% of all cases were transferred to the intensive care unit after the first intervention. Since cardiovascular events constitute the majority of the rapid response calls, it is important that, as well as the rapid response team, other hospital staff should be educated in basic life support and intervention should be applied as quickly as possible.
Keywords: Basic life support; rapid response system, patient safety

Özet
Mavi Kod ya da Hızlı Yanıt sistemi, hastanelerde temel yaşam desteği sürecinin güvence altına alınması için uygulamaya konulmuş bir acil müdahale organizasyonudur. Bu çalışmanın amacı hastanemiz Mavi Kod çağrısı verilerini geriye yönelik olarak tarayarak uygulamalarımızın etkinliğini tespit etmek ve kendi hastane profilimizi ortaya çıkarmaktı. Etik Kurul izni alındıktan sonra, hastanemizde 01/10/2010 - 31/12/2013 tarihleri arasında yapılmış olan "Mavi Kod" çağrıları geriye yönelik olarak taranarak; demografik özellikler, çağrı sebepleri, olayın gerçekleştiği yer, çağrı yerine ulaşma süresi, çağrı yapılan saatler, yapılan müdahale şekli, süresi ve sonuçları gibi verilere ulaşıldı. Çalışmaya dahil edilen 652 çağrının % 44,9'u kadın, % 55,1'i erkekti ve yaş ortalamaları 74,3 ± 12,6 idi. Tüm çağrıların % 75,5'i kardiyak arrest, % 16,9'u solunum arresti, % 6'sı bilinç kaybı veya tanımlanamayan klinik durumda bozulma, % 1,4'ü epileptik konvülziyon geçirilmesine bağlı solunum sıkıntısı ve % 0,3'ü de allerjik reaksiyon gelişmesi sebebiyle yapılan çağrılar idi. Çağrıların % 68,8'i yatan hasta servislerinden, % 22,6'sı yoğun bakım ünitelerinden, % 6,7'si acil servisten, % 1,9'u da diyaliz ünitesi ve poliklinikler gibi hastanenin diğer birimlerinden gelmişti. Gelen çağrıların % 42,5'i mesai saatleri içinde, % 57,5'i ise mesai saatleri dışında gerçekleşmişti ve çağrılara ortalama ulaşma süresi 1,51 ± 0,97 dk idi. Hastaların % 81,6'sına kardiyopulmoner resüsitasyon (CPR) uygulanırken % 10'una mekanik ventilasyon ile solunum desteği, % 8,4'üne de medikal destek tedavisi uygulanmıştı. Ortalama müdahale süresi; 30,2 ± 16,2 dk idi. Müdahale edilen hastaların % 58,1'i ilk müdahale sırasında eksitus olmuş, % 21,3'ü yapılan ilk müdahaleye cevap vermiş ve bulundukları servisteki tedavilerine devam edilmiş, % 10,6'sı ilk müdahalenin ardından genel yoğun bakım ünitesine transfer edilmiş, % 8,4'ü sıvı desteği ve oksijen verilmesi şeklindeki basit tıbbı müdahalelere cevap vererek düzelmiş ve % 1,5'i de üst merkezlere sevk edilmişti. Çağrıların çoğunluğunun kardiyak sebepli acil durumlar nedeniyle yapılmış olması, Mavi Kod ekibinin yanı sıra diğer hastane personellerinin de yeterli temel yaşam desteği eğitimi almış olmasının ve olay yerinde müdahaleye en kısa sürede başlanmasının önemini bir kez daha ortaya koymaktadır.
Anahtar kelimeler: Temel yaşam desteği; hızlı yanıt sistemi; hasta güvenliği.

Introduction

The rapid response system is activated when a hospitalized patient or anyone in the hospital develops a life-threatening condition, and is an important part of hospital quality standardization (1). Effective performance of the rapid response

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Received: 27. 06. 2014 **Accepted:** 01. 08. 2014
ISSN 2148-3132 (print) ISSN 2148-2926 (online)
www.gaziantepmedicaljournal.com
DOI: 10.5455/GMJ-30-163057.

system depends on continuous working of the system and adequate education of the team members and hospital staff. There are many different methods such as telephone, trans-receiver, pager etc. to call the rapid response team to the location of the current event. Data such as call time, location, arrival time, intervention method and results have to be recorded. These records are an important part of hospital quality systems, and it is possible to reach necessary data about the effectiveness of the rapid response working system through retrospective research.

In this study, we aimed to evaluate the patient profile and the results of intervention by scanning the rapid response calls, retrospectively. The data that obtained by our study provides brief information about the effectiveness and drawbacks of the rapid response system. Furthermore, our results enlighten other hospitals using the same systems about possible problems and their solutions.

Materials and Methods

After approval was obtained from the ethics committee (2013/477) and hospital administration (2013/3011-11149), rapid response calls made between 01/10/2010 and 31/12/2013 in Ordu University Training and Research Hospital were retrospectively scanned. Data consisting of demographic characteristics, reason for the call, location of the event, the time elapsed to reach to the scene, time of the call, type of intervention, length of the intervention and prognosis have been reached by scanning the archive files of rapid response intervention forms. Files with missing data were excluded. SPSS 16.0 software was used for descriptive and frequency statistical analysis. Descriptive statistical variables are presented as mean ± standard deviation and frequency analyses are presented as percentages.

Results

A total of 712 calls were made between 01/10/2010 - 31/12/2013, and 45 and 15 of calls were excluded because of missing data and improper call coding, respectively. File data from 652 patients were evaluated. Of patients, 44.9% and 55.1% were females and males, respectively, and the average age was 74.3 ± 12.6 years.

The reasons for rapid response calls were as follows: 75.5% cardiac arrest, 16.9% respiratory arrest, 6% loss of consciousness or unidentified deterioration in clinical status, 1.4% respiratory distress linked to epileptic convulsion and 0.2 % allergic reactions. Inpatient services placed 68.8% of the calls, 22.6% of them were from the intensive care unit (ICU), 6.7 % were from the emergency unit and 1.9% were from other departments in the hospital such as the hemodialysis unit or outpatient clinics (Fig I).

Mean arrival time to calls was 1.51 ± 0.97 minutes. Day shift calls comprised 42.5% of the calls (08:00 – 17:00) with 57.5 % made during the night time shift (17:00 – 08:00). We found that cardiopulmonary resuscitation (CPR) was applied to 81.6% of the patients, mechanical ventilator support without chest compressions was provided to 10% and medical support was provided to 8.4% of the patients. Mean intervention time was 30.6 ± 16.2 minutes. The majority, 58.1%, of the interventions ended with exitus at the first intervention stage and remaining cases responded to first intervention. The treatment plan of 21.3% of the patients continued in their inpatient clinics, 10.6 % were transferred to ICU after the first intervention, 8.4% of them responded to basic medical treatment, such as fluid support or oxygen and 1.6 % of them were sent to higher centers (Fig II).

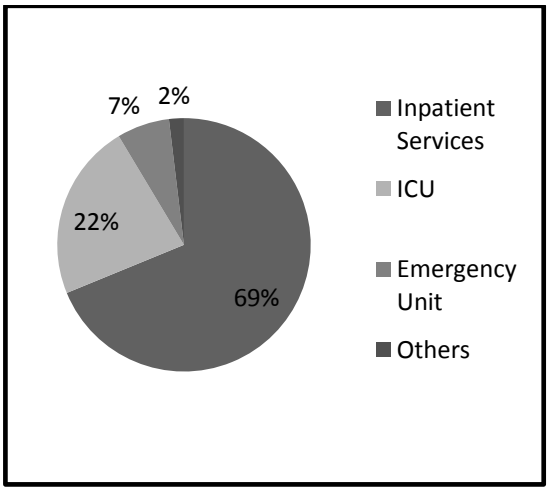

Figure 1. Distribution of all callings according to place

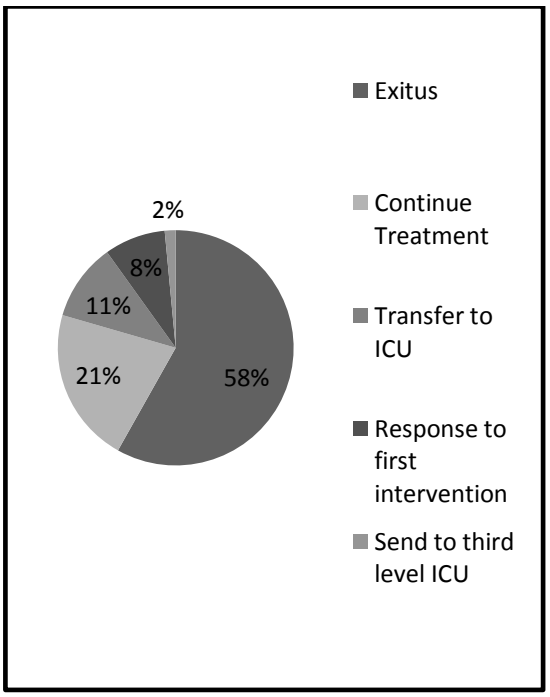

Figure 2. Distribution of all patients according to outcomes.

RAPID RESPONSE (CODE BLUE) INTERVENTION FORM

EVENT	**DATE**
Department	
Calling time	
Intervention time	
Intervention duration	
Improper call	
Name, Surname	
Age	
ID number	
Registration number	

INTERVENTION	
CPR	**YES** **NO**
CPR starting time	
Defibrillation (times / joule)	
Drugs	
CPR ending time	

OUTCOME	

LEADER	**OTHER STAFF**
Name-surname Signature	Name-surname Signature 1- 2- 3-

Figure 3. Rapid Response intervention form

Discussion

Effective intervention to life endangering situations within the limits of the hospital necessitates activation of the emergency call systems within the hospital. As is expressed in Health Service Quality Standards - Hospital Set, hospitals have to organize rapid response call management in order to perform necessary interventions to people whose basic life functions are at risk or stalled (1). Our rapid response team is called the "Code Blue" team as quality assurance regulations of the Ministry of Health mandate this organization. Our hospital is one of the five hospitals that serves Ordu city with a population of 731,000 including surrounding towns. The rapid response call system serves our hospital which has 17 ICU beds, 148 ordinary beds in the main block, 500 personnel and a daily outpatient clinic rate of 1450. The rapid response system can be reached from any internal telephone by dialling 2222 in our hospital and the call location can be seen on the pager which team members carry.

Certainly, the most important point in which the rapid response system differs from others is the duration to respond to the call, as it is known that the central nervous system can tolerate circulatory arrest in the short term and brain oxygen stores expire within 2-4 minutes (2). Delayed intervention in cardiac arrest cases causes ominous neurological results and hypoxic cerebral damage is the main

cause of mortality and morbidity (3, 4). The rapid response call may be needed for anybody within the limits of the hospital and the CPR team is supposed to arrive to the call location within 3 minutes to start CPR. This is also a necessity of the Ministry Of Health Quality Standards (1, 5). The rapid response team in our hospital consists of one consultant doctor (leader) and one anaesthesia technician educated in CPR, and for every work shift, a different team provides service. The leader of team signs the rapid response intervention form after the intervention finishes (Fig III). According to our evaluation our average arrival time to a call is 1.51 ± 0.97 minutes. Our hospital is constructed over 12,701 sq. meters area and 9,257 sq. meters is occupied by buildings. Inpatient clinics, ICUs, emergency unit and haemodialysis unit are in the main building of the hospital. It is thought that the most important reason for arrival to the rapid response call in less than 3 minutes is the short distances between departments.

In different studies performed in Turkey, a range of different arrival durations, such as 1.7 ± 0.6 min., 2.72 min. or 4.02 ± 2.51 minutes have been reported. These durations were affected by many factors such as size of the hospital and distance between departments (6, 7, 8). Distant areas of the hospital necessitate basic life support training for hospital staff other than the rapid response team (6). According to our evaluation, 68.8% of the calls were from inpatient services, 22.6% of them were from ICU, 6.7% of them were from emergency department and 1.9% of them were from other departments of the hospital such as haemodialysis unit and outpatient clinics.

According to the results of this investigation; 42.5% of the calls were during the daytime shift (08am – 05pm) with 57.5 % of them called during night time shift (05pm – 08am). The rapid response system is a service that works 24 hours continuously. According to "Instructions about Development and Evaluation of Health Service Quality", it is necessary that at least one medical doctor and medical staff educated for CPR must be assigned to the rapid response team, and different teams must be created for every shift. According to a retrospective study, it was shown that 56% of emergency calls were needed outside of working hours (6). Again in similar studies, this rate was identified as 41.8% and 69%, and all these rates emphasize the importance of a call service working 24 hours (9, 10).

In life-threatening cases, cardiac arrhythmias are the cases that respond most positively to resuscitation with early diagnosis and emergency intervention. Delay in defibrillation is related to decreased survival rates and every minute of delay decreases the survival rate by 10% (11). It is known that sufficient myocardial and cerebral perfusion is provided by early cardiac message and early defibrillation. Early defibrillation in VF/VT contributes to increased survival rate after cardiac arrest (5, 12). In our study we found that 44% of our patients were female and 55.1% of them were male and the average age was 74.3 ± 12.6 years. Since not every patient was monitored in all clinics in our hospital, the cause of calls were reported mostly as cardiac arrest on rapid response call forms and its rate was 75.5% and second was respiratory arrest. Koltka et al. reported in their study that clinical nurses can't evaluate cardiopulmonary arrest and even if they make the diagnosis, they perform delayed intervention, as a result their survival rate is low (8).

An improper call number was responsible for 15 calls in the total of 712 calls which were scanned at the beginning of our investigation and were excluded from the study. Of improper calls 86.6% were in the form of wrong calls made by unauthorized persons in the patient's rooms and 13.3% of them were wrong calls made by hospital staff. Murat et al. reported this rate as 21%, and Mehel et al. reported it as 4% (6, 10). Wrong calls were shared with hospital management for corrective procedures, necessary precautions were taken and the improper call rate has reduced. In our study we found that CPR was applied to 81.6% of the patients, mechanical ventilator support without chest compressions was provided to 10% and medical support was provided to 8.4% of the patients. Mean intervention time was 30.6 ± 16. 2 minutes. It is known that basic and advanced life supports are intermingled with each other.

In the case of a cardiac arrest in the hospital, the arrest has to be detected quickly, invoked immediately by using a standard phone number and CPR should be started as soon as possible (5). It is reported that patients resuscitated early and observed in ICU may have longer life expectancy and the critical point here is early diagnosis (13). In our study we found that 58.1% of the interventions ended with exitus and 10.6% of the cases were transferred to ICU after the first intervention. Our ICUs do not have their own rapid response team and the calls from these units are included in all calls. Therefore, patients who were transferred to ICU comprise the ones who needed CPR in other units of hospital. In view of the fact that 81.6% of our patients were given CPR, the importance of arrival of team to the event location for emergency intervention with compulsory drugs and portable equipment, and making necessary equipment always available for emergency intervention in clinical units becomes clear.

In our hospital, at all inpatient clinics, ICUs, emergency unit, and hemodialysis unit, there are biphasic defibrillators in easily accessible places. Besides, according to "Instructions about Development and Evaluation of Health Service Quality" the rapid response system must carry out practice drills within specific periods. In these

applications, in order to make a rapid response call, hospital personnel must be educated especially about early recognition of arrest and diagnosing other emergency situations. In our hospital, CPR and the rapid response (Code Blue) system training are provided to all health staff by the hospital training commission at appropriate time periods, according to these instructions. Between 01/10/2010 - 31/12/2013, 17 CPR trainings and 22 rapid response call simulation practices were performed by our hospital training commission with high attendance level. The arrival time to the rapid response call was recorded below 3 minutes in these simulation practices.

In conclusion, an effective rapid response call activation and better results for patients are possible with the adoption of this system. Since early diagnosis, arrival to the call location and urgent interventions are of paramount importance, the importance of active support of hospital staff becomes clear. The rapid response call system is an indicator of the importance of consideration of human life and patient safety; it is also a basic requirement for hospital quality standards.

References

1- Sağlık Hizmeti Kalitesinin Geliştirilmesi ve Değerlendirilmesine Dair Yönetmelik, 2013. Resmî Gazete, 6 Ağustos 2013, Sayı: 28730 (access date: June 2014).
2- Topçuoğlu M.A. Kardiyopulmoner arrestte serebral koruma. Yoğun Bakım Dergisi 2008; 8(1):22-43.
3- Eroglu SE, Onur O, Urgan O, Denizbasi A, Akoglu H. Blue code: Is it a real emergency? World J Emerg Med 2014; 5(1):20–23.
4- Madl C, Holzer M. Brain function after resuscitation from cardiac arrest. Curr Opin Crit Care 2004; 10:213–217.
5- Çertuğ A. Avrupa Resüsitasyon Konseyi 2010. Resüsitasyon kılavuzundaki temel değişiklikler. Anestezi Dergisi 2011; 19 (1): 1-14.
6- Murat E, Toprak S, Doğan BD. Mordoğan F. The code blue experiences: gains, problems and troubleshooting. Med-Science 2014; 3(1): 1002-12.
7- Çiçekci F, Atıcı SS. Mavi kod çağrısına bağlı kardiyo-pulmoner resüsitasyon uygulamaları sonuçlarının değerlendirilmesi. Genel Tıp Derg 2013; 23(3):70-6.
8- Koltka N, Çelik M, Yalman A, Süren M, Öztekin F. Kardiyopulmoner resusitasyonun başarısına etkisi olan faktörler. Türk Anest Rean Der Dergisi 2008; 36(6):366-372.
9- Bayramoglu A, Cakır GZ, Akoz A, Ozogul B, Aslan S. Saritemur M. Patient-staff safety applications: the evaluation of blue code reports. Eurasian J Med 2013; 45: 163-6.
10- Mehel D, Şen M, Sakarya Ö, Dinç S. Hasta ve çalışan güvenliğinde mavi kod uygulaması. ii. uluslararası sağlıkta performans ve kalite kongresi bildirileri kitabı. Sağlık Bakanlığı, Ankara. 2010; 772 (2): 614-6.
11- Nolan JP, Soar J, Zideman DA, Biarent D, Bossaert LL, Deakin C, et al. ERC guidelines writing group. European resuscitation council guidelines for resuscitation 2010 Section 1. Executive summary. Resuscitation 2010; 81(10):1219-76.
12- Bal A, Memiş R, Kılıç H, Çalış A, Yıldız A, Yılmaz H, et al. Mavi kod bildirimlerinin değerlendirilmesi. II. Uluslararası sağlıkta performans ve kalite kongresi bildirileri kitabı. Sağlık Bakanlığı, Ankara. 2010; 772 (2): 608-13.
13- Shin TG, Song HG, Sim MS, Song KJ. Improving survival rate of patients with in-hospital cardiac arrest: five years of experience in a single center in Korea. J Korean Med Sci 2012; 27: 146–152.

How to cite:

Taş N, Mutlu T, Yağan Ö. Statistics of rapid response team's work in the Training and Research Hospital of Ordu between 2010–2013: A retrospective study. Gaziantep Med J 2014; 20(4):318-322.