

Retrospective Review of Blue Code Calls in Kayseri City Training and Research Hospital

Kayseri Şehir Eğitim ve Araştırma Hastanesi' nde Mavi Kod Çağrılarının
Retrospektif Olarak İncelenmesi

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ABSTRACT

Objective: Blue code is a colorful code application that effectively and quickly intervenes in hospital cardiac arrest cases. The aim of our study was to retrospectively examine blue code management and blue code registration forms in our hospital.

Material and Method: After receiving approval from the ethics committee of Kayseri City Hospital, the data of 160 patients who were called for blue code between October 2019 and December 2019 were retrospectively examined. Data of the intervention process was analyzed with the SPSS 22 package program.

Results: In 91 of them (56.9%), in-hours work time crews, transportation time to the scene was determined as 1 minute and 48 seconds on average. 69 (43.2%) of the blue code calls were found to be out of-hours work time and teams transportation time to the scene averaged 2 minutes and 6 seconds.

Conclusion: Respect for human life, rules that must be followed legally, once again emphasizes the importance of the blue code system. Blue code teams should use indoor navigation systems to ensure that there are no transportation problems with the scene in large hospitals.

ÖZET

Amaç: Mavi kod hastane içi arrest vakalarına etkili ve hızlı bir şekilde müdahale eden renkli bir kod uygulamasıdır. Çalışmamızın amacı hastanemizde mavi kod yönetimi ve mavi kod kayıt formlarının retrospektif incelenmesidir.

Gereç ve Yöntem: Kayseri Şehir Hastanesi etik kurulundan onay alındıktan sonra Ekim 2019 -Aralık 2019 tarihleri arasında mavi kod çağrısı verilen 160 hastanın verileri retrospektif olarak incelendi. Müdahale işlemlerinin verileri SPSS (Statistical Package for Social Science) 22 paket programı kullanılarak analiz edildi.

Bulgular: 160 bildirimden 91 'inde (%56,9) mesai içi zamanda ve ekiplerin olay yerine ulaşım süreleri ortalama 1 dakika 48 saniye olarak saptandı. Mavi kod çağrılarının 69'u (%43,2) ise mesai dışı zamanda ve ekiplerin olay yerine ulaşım süreleri ortalama 2 dakika 6 saniye olarak tespit edildi.

Sonuç: İnsan hayatına saygı, yasal olarak uyulması gereken kurallar mavi kod sisteminin önemini bir kez daha vurguladı. Büyük hastanelerde olay yerine ulaşım sorunu olmaması için mavi kod ekipleri kapalı mekân navigasyon sistemleri kullanmalıdırlar.

Keywords:

Blue code
Cardiopulmonary resuscitation
In-hospital cardiac arrest
In-hours work time
Off-hours work time

Anahtar Kelimeler:

Mavi Kod
Kardiyopulmoner Resüsitasyon
Hastane içi arrest
Mesai içi zaman
Mesai dışı zaman

INTRODUCTION

The blue code system is the rapid and effective application of basic life support by blue code teams to cases of cardiac and respiratory arrest in the hospital.

As clearly stated in article 16 of the Communiqué on "Ensuring and Protecting Patient and Employee Safety and Protection in Health Institutions and Organizations", blue code teams are established within the hospital as a team of doctors, nurses, anesthetic technicians, servants and security personnel who make effective interventions to individuals who are at risk in life functions.

This team is in service 24 hours a day, in and off-hours work. CPR training of the personnel in the team is provided by the training unit (1).

Working hours in hospitals are between 08:00 and 16:00,

and non-working hours are applied between 16:00 and 08:00.

Blue code teams benefit from various communication facilities such as pagers, handheld radios, radio telephones, announcement systems with the technological infrastructure of the hospital. With recent technological developments, announcement systems are not actively used because they make patients nervous, create loud noise during rest times, cause panic within the hospital. Blue code teams are ready with the necessary emergency response equipment in a central location of the hospital. The blue code process includes communication, transportation, team coordination, effective response, post-intervention status management and registration of the entire system.

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Blue code system is initiated with domestic communications number 2222 by the Ministry of Health in order to spread the application in all institutions and used in the national health system (2).

In any case when the call is started in our hospital, the time coming to the pager and the time to go to the scene and end the call are made by the blue code teams on the registration document.

The aim of our study is to retrospectively examine the blue code documents recorded in accordance with the "Performance and Quality in Health Directive" service quality standards, which came into force in 2008.

Blue code notifications, in-hours and off-hours work time false call notification rates to blue code system, methods for initiating a blue code call, the sexes of individuals, and cases after a blue code call were examined.

MATERIAL AND METHOD

After the approval decision dated 28.04.2020 and number 37 was taken from Health Sciences University Kayseri Provincial Training and Research Hospital Medical Specialization Training Board, the registration documents of 160 cases recorded in the blue code call between October and December 2019 were taken retrospectively. There are a total of 1738 control panels in the corridors and patient rooms of our hospital, which is a large center with 1607 beds.

Room control panel is a touch screen automation system that initiates colourful code applications with personnel ID cards. The information of the color code call addresses initiated is transmitted to the radiotelephones of the teams. In our hospital, blue code notifications are made by calling domestic line 2222 and direct landline using room control panels.

In the detail of the calls, in-hours work and out-of-hours work transportation times, incorrect blue code call rates, methods of initiating a blue code call, the genders of individuals, and their status after the blue code call were examined.

In the blue code registration forms, states of syncope, hypotension, bradycardia without cardiac arrest were recorded as incorrect calls it was based on forms that were complete and accurate from the record documents kept.

Statistical Package for Social Sciences (SPSS) version 22.0 program was used for statistical analysis. Descriptive statistics were calculated as mean ± standard deviation and percentages. Retrospective from patients included in our study informed consent due to screening work form not being taken.

RESULTS

In the statistical analysis, the data were obtained from 160 call notifications recorded in the blue code system between October 2019 and December 2019.

91 (56.9%) notifications were recorded in in-hours work time and 69 (43.2%) in out-of-hours work time. Although the number of calls in-hours work time was high, the number of exitus was found to be 85% more in the out-of-hours work time. Number of patients without the need for intervention in-hours work time 33 (64.7%) 18 (35.3%) patients who did not need to be intervened in out off-hours work time were found. Outpatient, blood-taking and imaging areas are intensive in hours work time Initiation of blue code call to cases that feel bad except cardiac arrest cases in these units, it was given in table 1, where it statistically increased the number of patients who did not need intervention.

Number of calls reached at the scene in one minute or less during working hours time 37 (58.7%) 26 at the time off hours work (41.3%) was found.

In-hours work time, blue code teams have an average of one minute and 48 seconds to get to the scene, transportation times to the scene were determined as two minutes and six seconds out-of-hours work time.

Of the 160 total calls, 101 (63.1%) were calls other than cardiac arrest cases (syncope, hypotension, bradycardia), there were 58 (36.2%) cases of cardiac arrest and one (0.6%) cases of practical application (Figure 1).

In the method of transportation to the blue code teams, 103 (64.4%) cases were called on the domestic line 2222, 56 (35%) cases were called on the room control panel, and 1 (0.6%) cases were called on the blue code office landline. Of the 160 calls, 81 (50.6%) were male and 79 (49.4%) were female (Figure 2).

Blue code call 20 (12.5%) exitus, 28 (17.5%) transferred to the intensive care, 25 (15.6%) observed in the clinic,

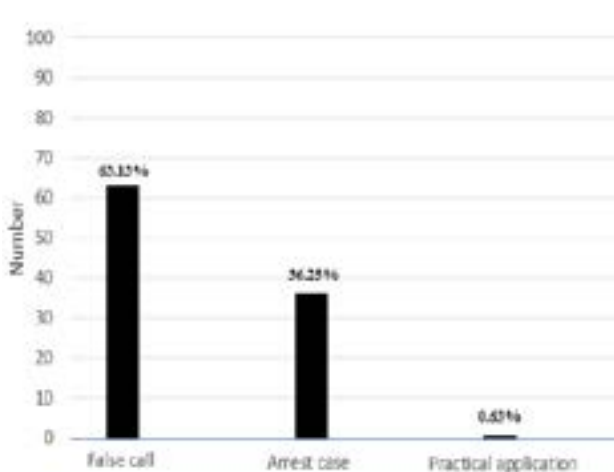


Figure 1: Blue code call availability percentage value

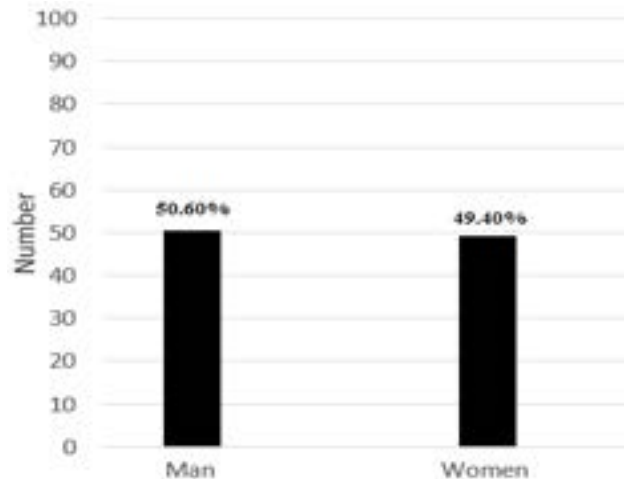


Figure 2: Gender percentage values of individuals

26 of (16.3%) transferred to the emergency department, 5 (3.1%) emergency surgery, 5 (3.1%) external center dispatch. 51 (31.9%) did not require intervention (Figure 3).

Kayseri City Training and Research Hospital has a total area of 747.859 m², including 466.379 m² closed and 281.480 m² open. 500-bed general, 273-bed gynecology and children, 200-bed physical therapy, 100 high-security forensic psychiatry, 120-bed psychiatry and has a total of 1607 beds, including a 414-bed cardiovascular hospital. It serves 413 Polyclinic rooms. Adult intensive care, child intensive care, newborn intensive care, burn intensive care and cardiovascular surgery, including intensive care. It is the 3rd largest hospital in Turkey with a total of 253 intensive care units.

After the blue code call is initiated, the time of transportation to the scene of the blue code teams at the campus of such size is one minute and 48 seconds in hours work time, it is two minutes and six seconds in out of hours work time. In many cases, the earliest transportation time is one minute and less, while the latest transportation time is eight minutes.

DISCUSSION

In the blue code system, the first goal is to allow a person to breathe with a heartbeat, which is the main life functions (3). Determining the diagnosis of the individual at the first stage without deterioration of the health condition will

prevent the cardiac arrest situation that may occur in the future (4).

In our hospital, Turkey’s 3rd largest health institution, blue code teams are on the scene in an in-hours work time of one minute and 48 seconds, it is within the standard goal of 0-3 minutes to reach two minutes and six seconds in out off-hours work time. This situation was evaluated as a success criterion when looking at the notification times of other hospitals. It has been reported by the “American Heart Association” (AHA) that survival rates are higher when cardiac arrest cases are intervened under two minutes (5). The values of the blue code studies carried out in our country after the number, duration and blue code call are present in table 2 (6,7,8).

Eisenberg et al. reported that the survival rate of individuals was 43% when arrest cases were offered basic life support in the first four minutes and advanced life support in the next eight minutes (9). In our study, the sufficient number of personnel, professional structures of teams, smooth operation of the communication network showed that success was achieved below the target time and survival rate (87.5%) was also high.

Unnecessary call notifications are the reason for the deterioration of team motivation and unnecessary effort in the blue code system. Emergency responders serving 365 days, 24 hours a day reach the scene with their equipment in the shortest way without questioning

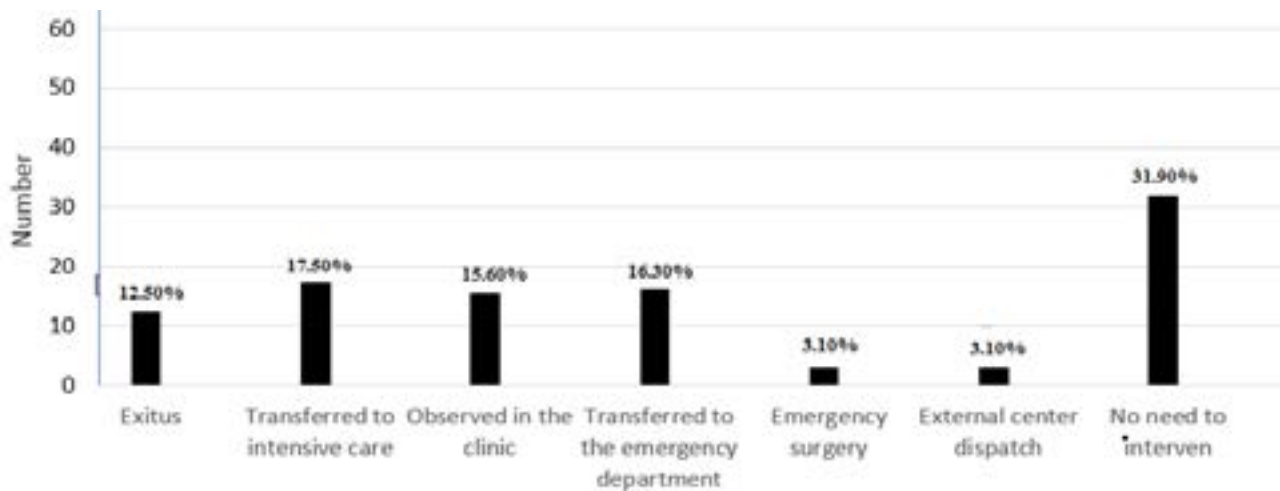


Figure 3: Status percentage values of individuals after blue code call

Table 1: Status of patients by working hours

	In-hours Time 08:00-16:00	Off-hours Time 16:00-08:00	The number of cases
Exitus	7	13	20
Transfer to intensive care	12	16	28
Observation in the clinical	12	13	25
Emergency service	22	4	26
Emergency surgery	2	3	5
External center dispatch	3	2	5
No need to interven	33	18	51
Total	91	25	160

Table 2: Other studies conducted in our country

Authors	Number	Average transportation time (min.)	Result	
			Exitus	Survival
Koltka et al. (2008), Goztepe Education and Research Hospital	610	4.02	66%	34%
Canural et al. (2009), Denizli State Hospital	23	8	?	?
Bal et al. (2010), Giresun State Hospital	137	2.17	33%	67%
Mehel et al. (2010), Çarşamba State Hospital	164	1.34	38%	62%
Yılmaz et al. (2011), Süreyya Pasha Chest and Thoracic Surgery Training and Research Hospital	65	1.81	5%	95%
Ozuturk et al. (2014), Arnavutköy State Hospital	225	1.10	39%	61%

correctly or incorrectly from the moment the call falls into the system. In this unit where seconds are important, the indistinguishability of syncope and state change of consciousness cases, calls initiated by unauthorized persons, technical failures and the initiation of blue code calls in non-urgent intubation interventions are reasons that unnecessarily occupy the system.

Keernsted et al.'s study (10) and Bayramoglu et al.'s study, (11) registered blue code notifications 74.3% and 84.5% respectively without cardiac arrest status. In our study, this figure was found to be 63.1%. In this regard, all personnel should be given information about the organization of the necessary training programs, how to start the blue code system, how to end it, and how to not start blue code calls except in the case of cardiac arrest.

Koltka et al. stated that the low level of survival rates of cases initiated in the blue code was insufficient number of personnel, lack of information of personnel facing cardiac arrest cases, lack of emergency materials in clinics and lack of monitoring, inability to make the necessary first intervention (12). In our study, the high survival rate is due to the adequate number of personnel and the application of the professional intervention. At the same time, emergency response materials (defibrillator, aspiration systems, drugs, intubation materials) are available in all units so that teams do not experience a lack of materials when a blue code call is initiated from different units.

The brain is an oxygen-sensitive organ. In individuals who develop a cardiac arrest condition, the cerebral cortex begins to suffer damage if deprived of oxygen for 3-4 minutes because oxygen is not stored in the brain (13). Fast oxygenation is very important.

The blue code team consists of a doctor, nurse, anesthetic technician, servant and security guard. The anesthesia team takes part in the process of protecting the respiratory tract and ventilation of the lungs with the training it receives. Our hospital also has anesthesiologists and technicians in the blue code team.

Large spaces have emerged with the construction of large-scale hospitals such as city hospitals. It is therefore important that blue code teams are able to quickly locate the scene.

Navigation is a system that plans to go from one point to another quickly on the shortest path. Kayis et al. developed navigation with a web application of building prototypes indoors and a mobile application that can be viewed in 2D planes. They used the fingerprint database in a positioning algorithm to find ways indoors (14).

Ozdemir et al. with sensors such as 2G, 3G, GSM, Wi-Fi, gyro, pedometer bluetooth, digital compass, barometer available on mobile devices, conducted surveys to determine the location indoors and reach the target location (15).

It is believed that it is important for response teams to use navigation technology indoors to get to the scene as soon as possible. In the literature review, there is a lack of information about the status of individuals who have started blue code after referral to the external center. This deficiency is 49.5% in the study of Cakirca et al. (16), Sağlam et al.'s study of 2.7% (17). Incesu et al. conducted by, it was found to be 15.5 % (18). In our study, this value is 3.1%.

The lack of information about the condition of individuals leads to misleading values in quality data and the lack of statistics in the study.

CONCLUSION

In such a large hospital, it was evaluated as successful to reach blue code calls below the time specified in the literature. Our country has recently gained a great momentum in the field of health with large architectural structures with a large number of beds. It has been observed that there will be problems with transportation to the scene in institutions with large areas. In this regard, it is believed that the expansion of indoor navigation systems will provide ease of transportation. Further studies on this field are needed.

Conflict Interest: No conflict of interest was declared by the authors

Ethics: This study was approved by Health Sciences University Kayseri City Training and Research Hospital Medical Specialization Training Board, (28.04.2020-37)

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