Received: 10 Jul 2024 | **Accepted:** 23 Sep 2024 **Genel Tıp Derg. Volume** 34/**Issue** 5 (October), 702-707
DOI: 10.54005/geneltip.1513474

ORIGINAL ARTICLE

Knowledge, Experience and Awareness of Anesthesia Technicians in Our Country About Automatic External Defibrillator (AED) Devices: Survey Study

Ülkemizdeki Anestezi Teknisyen ve Teknikerlerin Otomatik Eksternal Defibrilatör (OED) Cihazları Hakkındaki Bilgi Deneyim ve Farkındalıkları: Anket Çalışması

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How to cite ?

Sökmen S, Çakmak EB, Yardımcı C, Şenaylı Andıran Y. Knowledge, Experience and Awareness of Anesthesia Technicians in Our Country About Automatic External Defibrillator (Aed) Devices: Survey Study. Genel Tıp Derg. 2024;34(5):702-07.

ABSTRACT

Objective: The aim of this study was to evaluate the knowledge, experience and awareness of anesthesia technicians about Automatic External Defibrillator (AED) devices.
Materials and Methods: This study is a cross-sectional-descriptive study. The population of our research consists of people who graduated as Anesthesia Technicians in Turkey. The online survey form contains a total of 28 questions, 8 of which are sociodemographic. The data was collected online between 05.01.2024-20.01.2024. The acquired analyzes were performed with IBM SPSS version 20.0 program.
Results: A total of 392 anesthesia technicians were reached in Turkey. The average age was 28±7.72 years. 71.9% of the participants were female, 64% were single, 48.2% had been working between 1-5 years. 27.8% of the participants received First Aid Training, 20.4% received AED training, 26.5% used AED, 39.3% reported that AED device should be used by anesthesia technicians, 79.8% reported that AED device should be available in the hospital.
Conclusion: In the result of this study, it was determined that anesthesia technicians had limited knowledge about the AED device and its application, and those who got first aid training did not apply AEDs on patients during training. Training can be organized to increase anesthesia technicians' knowledge about the AED device, and their application skills can be increased by using the AED device in training.

Keywords: Automatic External Defibrillator, Anesthesia Technician, Ventricular Fibrillation, Survey.

ÖZ

Amaç: Bu çalışmanın amacı; anestezi teknisyen/teknikerlerinin Otomatik Eksternal Defibrilatör (OED) cihazları hakkındaki bilgi ve farkındalıklarının değerlendirilmesidir.
Gereç ve Yöntem: Bu çalışma kesitsel-tanımlayıcı bir çalışmadır. Araştırmamızın evrenini Türkiye'de Anestezi Teknisyen/Teknikeri olarak mezun olan kişiler oluşturmaktadır. Online hazırlanan anket formunda 8'i sosyodemografik toplam 28 soru bulunmaktadır. Veriler, internet üzerinden 05.01.2024-20.01.2024 tarihleri arasında toplandı. Toplanan veriler IBM SPSS versiyon 20.0 programı ile analiz edildi.
Bulgular: Türkiye'de anestezi teknisyeni/teknikeri toplam 392 kişiye ulaşılmıştır. Yaş ortalaması 28±7,72 yıl'dır. Katılımcıların %71,9'u kadın, %64'ü bekâr, %48,2'si 1-5 yıl arası çalışmaktadır. Katılımcıların %27,8'i İlk Yardım Eğitimi almış, %20,4'ü OED eğitimi almış, %26,5'i OED kullanmış, %39,3'ü OED cihazının anestezi teknikerleri tarafından kullanılması gerektiğini, %79,8'i OED cihazının hastanede bulunması gerektiğini bildirmiştir.
Sonuç: Bu çalışmanın sonucunda anestezi tekniker/teknisyenlerinin OED cihazı ve uygulanması hakkında bilgilerinin sınırlı olduğu, ilk yardım eğitimi alanların eğitimlerde ve hastalarda OED uygulamadıkları tespit edilmiştir. Anestezi teknisyen/teknikerlerin OED cihazı hakkında bilgilerinin artırılması için eğitimlerin düzenlenmesi, OED cihazının eğitimlerde kullandırılması sağlanarak uygulama becerilerinin artırılması sağlanabilir.

Anahtar Kelimeler: Otomatik Eksternal Defibrilatör, Anestezi Teknisyen/Teknikeri, Ventriküler Fibrilasyon, Anket.

Introduction

The World Health Organization reported that the mortality rate due to non-communicable diseases has increased to 74% as of 2019. Cardiovasculary system diseases take the first place among non-communicable diseases (1). In our country, circulatory system diseases are in the first place with the ratio of 35.4% when analyzing the causes of death in Turkish Statistical Institute (Türkiye İstatistik Kurulu-TÜİK) statistics for 2022 (2). In sudden cardiac arrest due to circulatory system diseases, early diagnosis and call for help, early Cardiopulmonary Resuscitation (CPR), early defibrillation and post-resuscitation care constitute the chain of patient survival. Each link of the chain must be strong. To achieve return of spontaneous circulation, each link of the chain must be perfectly fulfilled.

Early defibrillation is one of the important part of the chain in the treatment of in-hospital and out-of-hospital circulatory system diseases, especially ventricular

Peer-Review: Double anonymized - Two External
Plagiarism Checks: Yes - intihal.net
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Selcuk University Press
Genel Tıp Dergisi | e-ISSN: 2602-3741
https://dergipark.org.tr/tr/pub/geneltip
https://yayinevi.selcuk.edu.tr/

fibrillation and pulseless ventricular tachycardia. The defibrillator device, which provides defibrillation, is a instrument that stimulates the heart, whose rhythm is disturbed and therefore cannot pump blood to the body, with electroshock and returns it to its normal rhythm. In 1956, the first direct defibrillation was performed by Reagan, Beck and colleagues and the first external defibrillation was performed by Zoll and colleagues in the same year (3,4). Manual defibrillators can only be used by healthcare professionals and are therefore kept in healthcare facilities. However, in overcrowded environments such as airports, shopping malls, public buildings and bus stations, the need for devices that provide life-saving shocks was felt in the first interventions performed by people without medical knowledge until the arrival of healthcare personnel to patients with circulatory disorders. In the early 1970s, AEDs were manufactured to guide the user for defibrillation (5). The use of AED devices produced especially for out-of-hospital use and for the general public has shown successful results in the USA and Europe (6). Over time, AED devices produced for out-of-hospital use have started to be used in common areas in hospitals such as outpatient clinics, blood collection and imaging centers where patients cannot be closely monitored.

The first rhythm recorded in sudden cardiac arrest is ventricular fibrillation (VF) with a rate of 40% to 80% (7). Early defibrillation in VF increases the success of resuscitation. The ideal time is <5 min. The AED device, which detects VF almost 100% accurately, not only provides early information to all healthcare personnel but also provides rapid defibrillation. For this reason, in the First Aid Regulation published in the Official Gazette in July 29, 2015 with the number 29429, 2-hour AED introduction, situations in which it is used and AED application were added to first aid trainings (8).

Anesthesia technicians, who are at the forefront of basic and advanced life support, are among the healthcare personnel who are most frequently encounter with sudden cardiac arrest both in operating rooms and code blue shifts. Therefore, they should have sufficient knowledge and experience about the AED device.

This study aimed to evaluate the first aid, knowledge about AED devices, behaviors about the use of AEDs, opinions about the use of AED devices in the hospital resuscitation and AED trainings of anesthesia technicians who are in the forefront of cardio-pulmonary resuscitation efforts in our country.

Materials and Methods

Ethical Approval

Ethical approval was obtained from Yozgat Bozok University Ethics Commission (Date 21.12.2023 and number 09/26).

This study is a descriptive and cross-sectional study. Main audiences of this study anesthesia technicians in Turkey. The first anesthesia technician trainings were founded in health vocational schools in 1984-1985 and the total number of graduates and students until today is 63763. Considering this number (n=63763), a sample group containing 382 people is calculated with a 95% confidence interval and a margin of error of 0.05. Survey method was preferred in order to reach all anesthesia technicians. The questionnaire form was prepared on Google form and the participants were reached via internet groups platforms. 402 people participated in the survey form. Exclusion of ten people who were not anesthesia technicians from the survey were exerted. 392 people were included in the study.

Survey consists of 28 questions in two sections. The first section includes eight questions "age, gender, marital status, educational status, occupation, duration of employment in anesthesia, institution of employment and region of employment".

The second section comprises 20 questions about the knowledge and awareness of anesthesia technicians about AED devices.

The acquired data analysis was made with IBM SPSS version 20.0 software.

Results

In our study, 392 people were enrolled. The mean age was 28 ± 7.72 years. 71.9% of the participants were female, 68.1% were in the 21-30 age group, 64% were single, 65.6% had an associate degree, 48.2% had 1-5 years work experience, 28.1% worked in a state hospital, and 33.9% were from the Central Anatolia Region (Table 1).

Table 1. Distribution of Participants in terms of Sociodemographic Characteristics

Sociodemographic Characteristics		n=392	%
Age	0-20 years	20	5,1
	21-30 years old	267	**68,1**
	31-40 years old	66	16,8
	41 years and older	39	9,9
Gender	Male	110	28,1
	Female	282	**71,9**

Marital Status	Married	141	36,0
	Single	251	**64,0**
Education Status	Health Vocational High School	10	2,6
	Associate Degree	257	**65,6**
	License	111	28,3
	Master's Degree	12	3,1
	PhD	2	0,5
Total Employment Duration	Not working	67	17,1
	1-5 years	189	**48,2**
	6-10 years	40	10,2
	11-15 years	28	7,1
	16 years and above	68	17,3
Employed Institution	Not working	73	18,6
	State Hospital	110	**28,1**
	Training and Research Hospital	76	19,4
	Private Hospital	72	18,4
	City Hospital	25	6,4
	University Hospital	24	6,1
	Foundation University Hospital	3	0,8
	Other	9	2,3
Work Location	Marmara Region	118	30,1
	Aegean Region	35	8,9
	Mediterranean Region	32	8,2
	Central Anatolia Region	133	**33,9**
	Black Sea Region	47	12,0
	Eastern Anatolia Region	13	3,3
	South Eastern Anatolia Region	14	3,6

In terms of first aid and AED knowledge of the participants, 89.3% received first aid training, 20.4% received AED training, 79.6% did not see any visuals such as signs indicating AED, 58.4% had never seen an AED device, 73.5% did not apply AED on a model, 89.8% did not apply AED on a patient, and 67.3% reported that they would prefer to use an AED device in case of cardiac arrest (Table 2).

Table 2. Participants' Knowledge about First Aid Training and Automatic External Defibrillator (AED)

Participants' Knowledge, Training, Experience and Attitudes Towards First Aid Training and Automatic External Defibrillator (OED)		n	%
a. Have you received First Aid Training?	Yes	350	**89,3**
	No.	42	10,7
b. Have you received training on Automatic External Defibrillator (AED)?	Yes	80	20,4
	No.	312	**79,6**
c. Have you ever noticed a sign etc. indicating the presence of an Automatic External Defibrillator (AED)?	Yes	115	29,3
	No	277	**70,7**
d. Have you ever seen an Automated External Defibrillator (AED)?	Yes	229	**58,4**
	No	163	41,6
e. Have you ever applied an Automated External Defibrillator (AED) on a model? F	Did not apply	288	**73,5**
	1-5 times	92	23,5
	6 and above	12	3,0
f. Have you applied an Automated External Defibrillator (AED) on a patient?	Did not apply	352	**89,8**
	1-5 times	26	6,6
	6 and above	14	3,6
g. Would you prefer to use an Automated External Defibrillator (AED) device in case of cardiac arrest?	Yes	264	**67,3**
	No	128	32,7

When we look at the answers of the participants to the question about the functions of the AED device, 74.2% stated that the device performs defibrillation, 60.5% stated that the device performs rhythm analysis, 29.6% stated that the device has the ability to perform chest compressions, and 16% stated that they did not have information about the functions of the device (Table 3).

Tablo 3. Functions of the Automated External Defibrillator (AED) Device

Functions of the Automated External Defibrillator (AED) Device*	n	%
a. Defibrillation	291	74,2
b. Rhythm analysis	237	60,5
c. Cardioversion (synchronized defibrillation)	230	58,7
d. Chest compression	116	29,6
e. I don't know	63	16,1
f. Other	14	3,6

*More than one option is selected.

When the answers of the participants to the questions about who should use the AED device were examined, 53.1% stated that it can be used by Specialist Doctors, 39.3% by Anesthesia Technicians, 16% by Nurses and "only" 7.9% by anyone (Table 4).

Table 4. People who can use the Automated External Defibrillator (AED) device

People Who Can Use an Automated External Defibrillator (OED) Device*	n	%
a. Specialist Doctor	208	**53,1**
b. Anesthesia Technicians	154	39,3
c. Assistant Doctor	134	34,2
d. I don't know	130	33,2
e. Paramedic	94	24,0
f. Emergency Medicine Technician	70	17,9
g. Nurse	65	16,6
h. Certified First Aid Trained People	56	14,3
i. Only Operating Room, Emergency, Subspecialties and Intensive Care Unit Staff	54	13,8
j. Everyone	31	7,9
k. Other	17	4,3

*More than one option is selected.

When the answers of the participants to the questions

about the places where the AED device should be located, 79.8% stated that it should be located in the hospital, 76.3% in the airport and 66.8% in airplanes (Table 5).

Table 5. Places where an Automated External Defibrillator (AED) device should be located

Where an Automated External Defibrillator (AED) Device Should Be Located*	n	%
a. Hospital	313	**79,8**
b. Airport	299	76,3
c. Airplane	262	66,8
d. Metro station	230	58,7
e. School	220	56,1
f. Restaurant	144	36,7
g. Mosque	135	34,4
h. Apartment	85	21,7
ı. Other	43	11,0
j. I don't know	20	5,1

*More than one option is selected.

Looking at the participants' responses to the reason for not preferring to use the AED device, 71.2% of them gave the answer 'lack of certification', 45.4% of them gave the answer 'not enough practice' and 43.9% of them gave the answer 'insufficient knowledge of how to use the device' (Table 6).

Table 6. Reason for Not Preferring an Automated External Defibrillator (AED) Device

Reason for Not Preferring an Automated External Defibrillator (AED) Device	n	%
a. Lack of a certificate of proficiency	279	**71,2**
b. Not enough practice	178	45,4
c. Insufficient knowledge of device use	172	43,9
d. Concern about assuming legal liability	115	29,3
e. Other	93	23,7
f. Fear of disease transmission	34	8,7
g. Fear of harming patients	31	7,9

*More than one option is selected.

Discussion

This study determined that anesthesia technicians have limited knowledge of the AED device and its application, and that they do not apply AEDs to patients during training.

In patients with sudden cardiac arrest, early CPR and early defibrillation increase the survival rate of patients (9). In order to increase this rate, the AED device was invented and made available to everyone with and without health education. In our country, AED device training has been carried out within first aid training since 2015

In the USA and European countries, the concept of anesthesia technician was termed as "Anesthesia Nurse" (10). In our country, anesthesia technicians who graduated from health vocational high schools before 2017 and those who graduated from two-year associate degree programs since 2017 are termed differently.

Due to their employment position, anesthesia technicians working in both operating rooms and code blue shifts have a very high probability of encountering cardiac arrest cases. Since they are at the forefront of the first intervention teams in the hospital, they should have sufficient knowledge and skills about the AED device. Therefore, our study was conducted on anesthesia technicians.

In our study, 89.3% of the participants answered "Yes" to the question "Have you received first aid training?". In a study performed with nurses in a state hospital by Aygin et al., 78.6% received first aid training (11); in a study conducted by Kara et al. with nurses, 74.5% received first aid training (12); and in a study conducted by Kaan et al. with all healthcare workers in a university hospital, 67% of the participants received first aid training (13). In our study, the reason why anesthesia technicians received more first aid training compared to other healthcare personnel may be that they encounter patients in need of first aid and advanced life support more frequently in their daily work and accordingly, given more emphasis in their training.

When the training of the participants about the AED device was examined, it was found that more than half of them had not seen the AED device, the majority of them had not received training, and they did not use it on the model or in the patient. In a study by Metin and Atış, it was reported that 61.5% of emergency medicine physicians and only 31.4% of other physicians could recognize the AED device (14). In our study, the reason why anesthesia technicians were inadequate in recognizing and using the AED device may be that manual defibrillators were given priority in trainings because manual defibrillators were generally found in operating rooms and in places where code blue call, the lack of AED training in the trainings given before 2015, and the insufficient recurrent trainings of those who received training before 2015.

When the participants were asked about the features of the AED device, more than half of them answered that the device "performs cardioversion" and about one third of them answered "performs chest compressions". Also, 32.7% answered "No" to

the question "Would you prefer to use an AED device in case of cardiac arrest?". When the reasons for not preferring to use the AED device were examined, "Lack of a certificate of proficiency" (71.2%), "Not enough practice" (45.4%), "Insufficient knowledge of the use of the device" (43.9%) and "Concern about assuming legal responsibility" (29.3%) were among the reasons for not using the AED device. Al Radini et al. In their study investigating the reasons for not using AEDs in certified individuals who received CPR training in Saudi Arabia, they reported that the responses were "I was never taught what to do" (28.1%), "I was afraid that I might accidentally harm the victim" (17.4%), "My duty is only to call ambulance and wait for help" (17%) (15). In our study, the fact that the participants were not sufficiently aware of the features of the AED device and felt the need for a certificate to use it is due to incomplete knowledge about the AED. The purpose of using the AED device is to increase the patient's chance of survival by providing the first defibrillation at the scene until the arrival of non-medical personnel who do not have a certificate. For this reason, stating that there is no need for a certificate to use an AED during trainings will increase the rate of use of the AED device. Again, enough practice with device during the trainings will ensure that the AED device can be used easily.

In spite of the concerns of the health personnel about assuming legal responsibility, health personnel are legally secured by laws known as "Good Samaritan Laws" in the USA, Canada and some European countries, which provide legal protection to those who provide reasonable assistance to people who are injured, ill, in danger, or otherwise incapacitated or believed to be incapacitated, and even punish those who do not help (16). Also in our country, Turkish penal code; Article number 97- (1) rules to help an individual in danger by saying "A person who abandons a person who is unable to manage himself/herself due to his/her age or illness and is therefore under the obligation of protection and supervision, shall be punished with imprisonment from three months to two years (2).

If the victim suffers from a disease, is injured or dies as a result of abandonment, the penalty shall be imposed in accordance with the provisions on aggravated crime. Article 98- (1) Anyone who fails to help a person who is unable to manage himself/herself due to age, illness or injury or for any other reason, to the extent permitted by the circumstances, or who fails to report the situation immediately to the relevant authorities, shall be sentenced to imprisonment for up to one year or a judicial fine (2). If the person dies as a result of failure to fulfill the obligation to help or report, imprisonment from one year to three years shall be imposed." The provision makes it compulsory for all citizens to provide first aid and stipulates criminal sanctions for those who fail to do so (17). In order to minimize the concerns of anesthesia technicians, it is thought that it would be useful to include legal issues in the trainings.

More than half of the participants answered "Specialist Doctor" to the question "Who should use the AED device?", while "People with Certified Training" and "Everyone" were answered very rarely. Fan KL. et al. reported in a study that public knowledge about OED use was low (18). Kaan M. et al. reported in a study conducted that there was no significant difference between the success rates of doctors and nurses in using defibrillators (19). In our study, the reason why specialist doctors use the AED device is that anesthesia technicians work under the responsibility of doctors, that in Turkey they do not have the authority to perform invasive procedures on the patient alone, and that only a specialist doctor intervenes in order to avoid both medical and legal problems due to the lack of training received to intervene in cardiac arrest. It may be due to the belief that it is necessary.

When participants were asked where the AED device should be placed, the first answer was "Hospital." This is followed by the airport, airplane and metro station. Although the intended use of the AED device is considered as first aid outside the hospital, it is known that the condition of patients worsens and code blue call is activated, especially in places where the patient is not closely monitored, such as polyclinics, blood donation centers, imaging centers and hospital canteens. In these places, first aid is not always given by a doctor, and hospital personnel other than the doctor may intervene as the first rescuer. An AED can be used for early defibrillation until the Code Blue team arrives. Hanefeld C, et al. In his study, he investigated the use of AEDs by first responders to patients with cardiac arrest before the arrival of the hospital resuscitation team and reported that early defibrillation provides a better prognosis for patients with in-hospital cardiac arrest (20). In our study, anesthesia technicians report that an AED device is needed in the hospital.

Conclusion

As a result of our study, it is seen that anesthesia technicians do not have sufficient knowledge about

the AED device, the majority of them aren't familiar to the device its use. Most of them hadn't used it on the model or on the patient, and are hesitant to use it due to legal aspects. It is thought that the survival rate in cases of cardiac arrest will be increased by increasing the effective use of AEDs in and out of the hospitals by anesthesia technicians receiving training on AED devices in health vocational schools and in-house training, and by renewing the training of those who received first aid training before 2015.

Acknowledgement

We thank to all participants of this study.

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