Response Times of Emergency Medical Services in Ankara over the Last Five Years

Ankara 112 İl Ambulans ve Çağrı Servisi 'nin Son Beş Yıl İçindeki Vaka Tepki Sürelerinin İncelenmesi

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ABSTRACT

Aim: Emergency medical services (EMS) must be delivered continuously and quickly in order to treat patients as soon as possible. The purpose of this study was to assess the activities and response times of the EMS in Ankara over the last five years.

Material and Methods: Database of the Ministry of Health, Emergency Health Automation System (ASOS), was used to obtain data for the past five years (01.01.2015 - 31.12.2019). Reasons and outcomes of the calls, response times, and the number of EMS personnel and ambulances were evaluated in the study.

Results: This study showed that the total number of people who received treatment from EMS in Ankara over the past five years is 2,036,734. The number of cases was 359,686 (mean response time = 7 minutes and 20 seconds) in 2015, 391,057 (mean response time = 6 minutes and 34 seconds) in 2016, 417,155 (mean response time = 6 minutes and 41 seconds) in 2017, 421,452 (mean response time = 6 minutes and 9 seconds) in 2018, and 447,384 (mean response time = 6 minutes and 12 seconds) in 2019. Emergency calls were mostly for medical reasons, followed by health measures, whereas the least common reason of emergency calls was the need for transfer to the morgue.

Conclusion: In the provision of EMS, early intervention can save lives. EMS has a proper coordination system and a continuously increasing number of ambulances and personnel, which provides short EMS response times despite the expanding population and increasing number of cases over the years.

Keywords: Emergency medical services, response time, ambulance

ÖZ

Amaç: Acil sağlık hizmetlerinin kesintisiz ve hızlı bir şekilde sunulması hastaların ilk müdahalelerinin en kısa sürede yapılabilmesi için hayati önem taşımaktadır. Bu çalışmada Ankara 112 İl Ambulans Servisi'nin son beş yıl içindeki faaliyetleri ve olaya müdahale sürelerini ayrıca 112 çağrı merkezine yapılan başvuruların incelenmesi amaçlanmıştır.

Gereç ve Yöntemler: Bilgiler Ankara İl Sağlık Müdürlüğü acil sağlık otomasyon sistemi (ASOS) üzerinden geçmişe dönük son beş yıl (01.01.2015 - 31.12.2019) olarak taranmıştır. Çalışmada taranan veriler; acil sağlık hizmetindeki çağrı nedenleri ve sonuçları, ambulans hizmetlerinin vakalara ortalama ulaşım süreleri, acil yardım personeli ve ambulans sayıları olarak belirlenmiştir.

Bulgular: Çalışmamızda; Ankara ilinde son 5 yılda acil sağlık hizmeti sunulan toplam 2.036.734 hasta olduğu görüldü. Veriler incelendiğinde yıllara (2015 – 2019) göre vaka kabul sayıları ve vakalara ortalama ulaşım süreleri sırası ile; 2015: 359.686 vaka ortalama 7 dakika (dk) 20 saniye (sn), 2016: 391.057 vaka ortalama 6 dk 34 sn, 2017: 417.155 vaka 6 dk 41 sn, 2018: 421.452 vaka 6 dk 9 sn, 2019: 447.384 vaka 6 dk 12 sn olduğu görülmüştür. Aramaların nedenlerine bakıldığında ise tarama yılından bağımsız olarak birinci sırada "medikal" ikinci sırada ise "sağlık tedbirleri" gelmekteydi. En son sırada gelen çağrı nedeni ise yine tarama yılından bağımsız olarak sırası ile "ex-morga nakil" olarak belirlenmiştir.

Sonuç: ASH sunumunda vakalara yapılacak erken müdahaleler hayat kurtarıcı olmaktadır. Yıllar içinde artan popülasyon ve vaka sayısına rağmen acil çağrı merkezlerine yapılan yardım çağrıları sonrası benzer sayıda acil yardım ambulansı ve personeli ile uygun bir koordinasyon sistemi sayesinde kısa tepki süreleri içinde vakalara müdahale gerçekleştirebilmektedir.

Anahtar Kelimeler: Acil sağlık hizmeti**,** tepki süresi, ambulans

Introduction

An emergency call that arrives at the call center is the first step in the provision of Emergency Medical Services (EMS). An ambulance squad then arrives at the scene after dispatch of the nearest squad by the command and control center. According to previous studies, of all deaths caused by accidents or injuries, 10% occurred within the first 3-5 minutes, whereas 55-60% within the first 30 minutes after an accident or injury (1). Therefore, considering the fact that fast response has an impact on whether the patient lives or dies, EMS crews should get to the scene as fast as possible (2). Moreover, EMS crews should be qualified so that they can provide proper treatment, after which the patient will be transferred to a center to receive emergency care as soon as possible. Practicing such standard procedures swiftly would lead to a decreased mortality rate and lower incidence of disability (3-5). In the light of this information, many developing countries establish organized Emergency Medical Services (6-9).

EMS crews provide emergency care and basic life support in addition to playing an important role in rapidly transferring a patient to a center to receive advanced medical care and life support (1, 8). Response time, which is defined as the time between receipt of the first emergency call and arrival of the ambulance crew at the scene, is the most important indicator of efficiency in EMS administration (10, 11). Therefore, the number of cases in different regions should be one of the most important determinants of ambulance station locations (1). The main goal of EMS is to shorten response time, since it is directly associated with death or disability caused by accidents or diseases (12, 13). There are

numerous methods that aim to shorten response times. The most important method involves increasing the number of ambulances and personnel. Moreover, the existing infrastructure and workforce can be utilized most effectively when ambulance stations are positioned in a manner to ensure operation at maximum efficiency (14, 15).

The aim of this study is to answer the following questions; 1) Have the number of cases and ambulance response times of the EMS system in Ankara changed in the last 5 years? 2)Is there any difference between the reasons and outcomes of emergency calls?

Material and Methods

In Turkey, the provision of EMS starts with a call to 1-1-2. A call handler at the command and control center takes the call and dispatches the nearest ambulance after a brief talk with the caller. The first medical intervention is provided at the scene and the patient is then transferred to the emergency department of the nearest suitable hospital (16). The EMS hotline 1-1-2 can be reached from anywhere in Turkey and anyone who is in need of such a service can receive emergency medical services free of charge.

In this retrospective study, EMS data for the last five years (01.01.2015-31.12.2019) obtained from the database of the Ministry of Health - i.e. ASOS - were evaluated with the permission of Ankara Provincial Directorate of Health. The study was approved by the local Ethics Committee (approval number: 2020-452). The inclusion criteria of the study; all calls which reached to the EMS hotline 1-1-2 in the last five years, while the exclusion criterion is EMS delivered by air
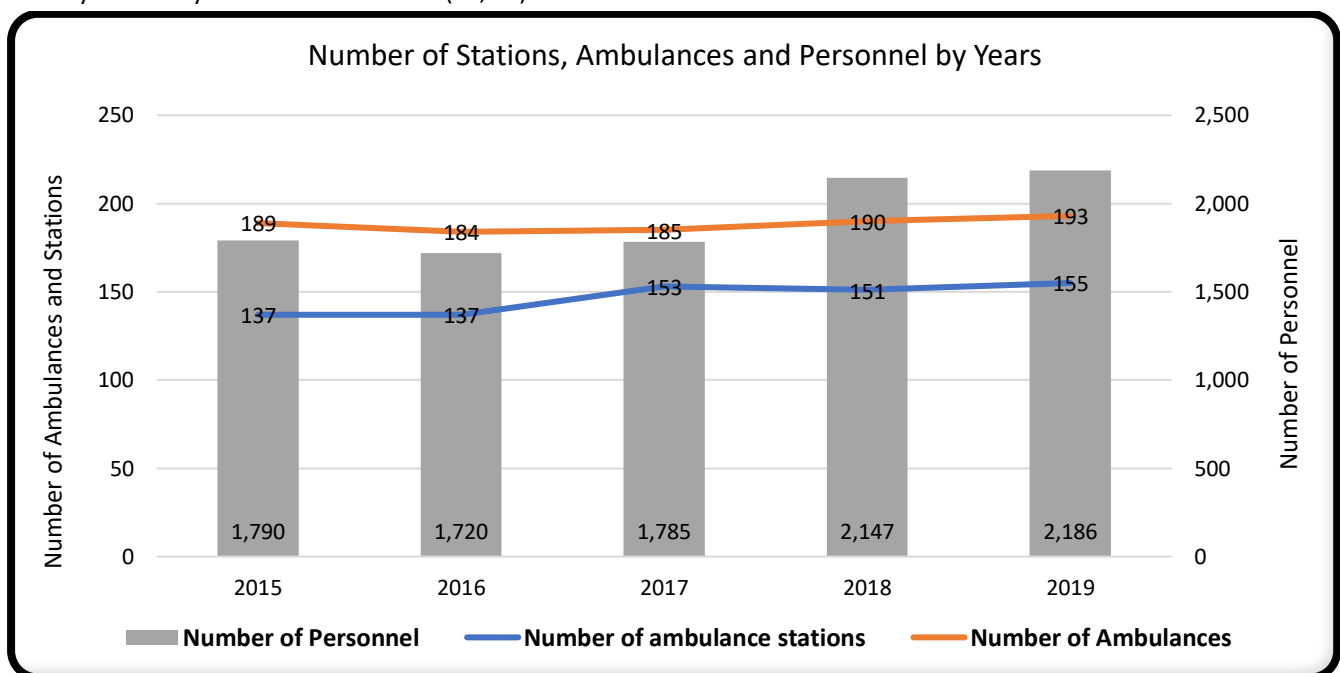

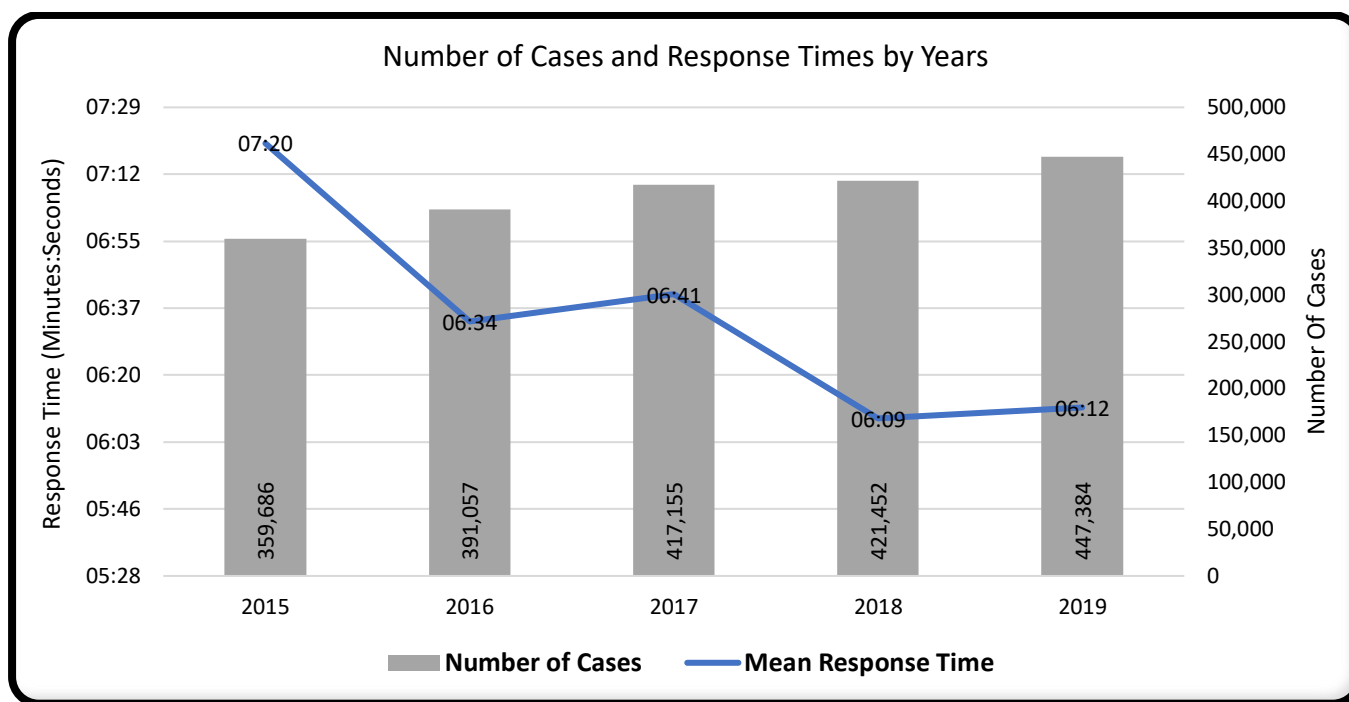**Figure 1:** Number of Stations, Ambulances and Personnel by Years

Figure 2: Number of Cases and Response Times by Years

ambulance. The database was screened in terms of response times, outcomes of emergency calls, and the number of personnel and ambulances. The mean response times were calculated for years and months due to the large data size. The reasons and outcomes of emergency calls were evaluated according to years. The study also included an evaluation of EMS efficiency.

Statistical Analysis

Analysis of data was performed using IBM SPSS 25.0 (Armonk, NY: IBM Corp.) statistical package program. Descriptive statistical methods such as frequency, percentage, and average have been used in the evaluation of the data.

Results

In this study, it was found that a total of 2,036,734 people were served by the EMS in Ankara within the last five years. The number of cases was 359,686 in 2015, 391,057 in 2016, 417,155 in 2017, 421,452 in 2018, and 447,384 in 2019. Moreover, EMS services in Ankara were provided with 137 ambulance stations in 2015 and 2016, 153 stations in 2017, 151 stations in 2018 and 155 stations in 2019 (Figure 1). The mean response times by years were as follows: 7 minutes and 20 seconds in 2015, 6 minutes and 34 seconds in 2016, 6 minutes and 41 seconds in 2017, 6 minutes and 9 seconds in 2018 and 6 minutes and 12 seconds in 2019 (Figure 2).

The highest number of cases was observed in December in 2015, January in 2016 and 2019, and July in 2017 and 2018. Table 1 shows the distribution of the number of cases and response times according to months.

The number of EMS personel was 1,790 in 2015, 1,720 in 2016, 1,785 in 2017, 2,147 in 2018 and 2,186 in 2019 (Figure 1). In addition, the total number of emergency vehicles (land ambulances, specially equipped ambulances and motorcycle ambulances) was 189 in 2015, 184 in 2016, 185 in 2017, 190 in 2018 and 193 in 2019 (Figure 1).

	2015	2016	2017	2018	2019
January	28,976	36,361	34,857	35,275	41,508
February	28,025	29,652	30,198	30,051	31,835
March	31,969	32,254	34,532	35,502	35,422
April	29,690	33,516	33,800	35,807	34,627
May	30,963	35,559	36,068	34,938	35,320
June	28,629	32,430	32,641	34,785	35,659
July	30,567	32,050	38,404	37,647	38,460
August	31,258	34,161	36,965	36,648	38,157
September	28,611	30,230	35,257	34,134	38,757
October	28,194	32,582	35,747	36,053	39,442
November	29,532	30,738	32,778	33,708	37,148
December	33,272	31,524	35,908	36,904	41,049
Total	**359,686**	**391,057**	**417,155**	**421,452**	**447,384**

Table 1: Number of Cases by Years and Months

Emergency calls were mostly for "medical reasons", followed by "health measures". Other reasons of the emergency calls included traffic accidents, other accidents, injuries, suicide, fire and occupational accidents,

respectively (Table 2). Considering the outcomes of emergency calls, the most common outcome was "transfer to a hospital", followed by "transfer rejection" and "cancellation of duty", respectively (Table 3).

Call Reasons	2015	2016	2017	2018	2019	Total
Medical	221.133	253.958	269.873	263.744	275.956	**1.284.664**
Health measures	66.089	59.844	66.115	72.820	82.661	**347.529**
Traffic accidents	34.311	34.185	34.957	34.370	32.892	**170.715**
Other injuries	24.570	28.566	30.974	33.204	36.438	**153.752**
Injuries	7.534	8.339	8.937	10.308	11.027	**46.145**
Suicide	3.288	2.941	2.975	3.255	3.433	**15.892**
Fire	1.153	1.639	1.889	1.973	3.278	**9.932**
Occupational accidents	1.608	1.585	1.435	1.778	1.699	**8.105**
Total	**359.686**	**391.057**	**417.155**	**421.452**	**447.384**	**2.036.734**

Table 2: Number of Call Reasons by Years

Discussion

Response times vary in many studies to investigate emergency health services. These differences depend on the population of the study areas and the capacity of the EMS servers. The EMS response times were reasonable despite the rise in the number of emergency calls in Ankara, which is the most important finding of this study.

According to the literature, ambulance response times are much shorter than the time it takes for a patient to reach a hospital individually (17). Therefore, EMS response time measurement is of utmost importance for clinical documentation and scientific research, particularly in treatments required for rapidly progressing and time-critical medical events such as cardiopulmonary resuscitation, thrombolysis and traumatic bleeding (18, 19). This study, which involved the evaluation of emergency response times recorded in the ASOS database within the last five years since 2015, was found to have the largest data set in Turkey. Response times exhibit variations based on the country and region according to the literature (16, 20-22). In a study by Hanaki et al., the mean EMS response time was found to be 6.3 minutes (7). Blanchard et al. stated that a mean response time of 8 minutes or longer led to increased mortality (8). According to another study conducted by Terzi et al. within the province of Samsun in Turkey, the mean response time was 10 minutes (1). On the other hand, the ideal EMS response time should be shorter than 8 minutes according to the World Health Organization (23). The present study showed that the mean EMS response times exhibited a gradual reduction over the years and went down to 6 minutes in 2019.

Outcomes	2015	2016	2017	2018	2019	Total
Transfer to hospital	188.264	202.939	215.312	218.674	230.170	**1.055.359**
Transfer rejection	56.184	61.064	62.015	61.650	60.426	**301.339**
Cancellation of duty	22.922	30.912	41.907	40.561	46.405	**182.707**
Transfer between hospital	30.900	34.036	34.668	36.895	41.277	**177.776**
Waiting at the scene	16.711	15.249	19.186	20.808	28.736	**100.690**
Transport by another vehicle	8.459	9.453	9.889	7.535	6.943	**42.279**
Other	8.379	7.883	6.840	7.938	8.675	**39.715**
Transfer to home	8.703	9.076	5.530	5.713	4.859	**33.881**
Onsite response	8.506	7.374	5.255	4.909	3.449	**29.493**
Ex-Left in place	4.645	4.964	5.930	6.240	6.158	**27.937**
No one in place	1.949	3.640	5.801	6.327	6.449	**24.166**
Unfounded notice	2.803	3.208	4.424	3.741	3.388	**17.564**
Transfer for medical examination	1.207	1.164	353	420	431	**3.575**
Ex- Morgue transfer	54	95	45	41	18	**253**
Total	**359.686**	**391.057**	**417.155**	**421.452**	**447.384**	**2.036.734**

Table 3: Number of Outcome by Years

Therefore, it is possible to say that the mean EMS response time in Ankara is within the ideal limits provided in the literature. It is possible to observe prolonged EMS response times with the expanding population (22, 24). The population of Ankara was found to expand between 2015 and 2019, which was accompanied by a parallel increase in the number of patients receiving EMS. According to the literature, employing experienced teams in the provision of EMS leads to decreased mortality and shorter response time (25, 26). The present study showed that there was no significant increase in the number of ambulances and EMS personnel in Ankara between 2015 and 2019. Therefore, we are of the opinion that the reason for the shortened response time, in spite of the aforementioned findings, is the employment of experienced EMS teams.

In a study, Abed Khanizad et al. evaluated the myocardial infarction cases served by the EMS in 2017 in the city of Arak and found that the mean shortest and longest response times were observed in the spring and winter, respectively (27). According to Akshay Bagai et al., the highest incidence of out-of-hospital cardiac arrest was observed in December. Moreover, the mean number of emergency cases was found to be significantly higher in winter than the same in summer. However, the present study showed that the number of EMS cases in Ankara did not exhibit a significant difference according to months between 2015 and 2019. Similarly, there was no difference between the summer and winter seasons in terms of the number of cases. In addition, the distribution of the shortest and longest response times did not depend on months or seasons.

According to a study by Terzi et al., there were three main reasons of emergency calls, i.e. "medical reasons", "traffic accidents" and "other accidents", respectively ranked according to the number of cases (1). These three reasons accounted for 96.7% of all emergency calls. Ten most common reasons of EMS calls as determined by Hanaki et al. included cardiopulmonary arrest, stroke, loss of consciousness, abdominal pain, acute coronary syndrome, trauma and burns (7). In this study, the most common reasons of the EMS calls made in Ankara were "medical reasons" and "health measures", respectively. Therefore, the findings of this study were partly consistent with the literature.

There were several limitations of this study. First of all, the study did not provide data for the entire country, since it was limited to one region. Moreover, a detailed analysis could not be performed since medical diagnoses were not available for the intervened cases. On the other hand, this study can be considered the first comprehensive study conducted in Turkey, as it has a large data set and provides a retrospective 5-year analysis. EMS response times can be further improved with additional data analysis to be conducted in the future.

Conclusion

In the provision of Emergency Medical Services, early intervention can save lives. EMS has proper coordination and a continuously increasing number of ambulances and crew, which provides short EMS response times despite the increase in the population and number of cases over the years.

Conflict of Interest: The authors declare no conflict of interest regarding this study.

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Authors' Contribution: All authors contributed equally to the preparation of this article.

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