

# Analysis of Medical Responses in Mass Gatherings: The Commemoration Ceremonies for the 100<sup>th</sup> Anniversary of the Battle of Gallipoli

Hüseyin Koçak, MSc, PhDc;<sup>1</sup> Cüneyt Çalışkan, MSc, PhDc;<sup>1</sup> Mehmet Şerafettin Sönmezler, MD;<sup>2</sup> Kenan Eliuz, MD;<sup>2</sup> Fatih Küçükduymaz, MD<sup>3</sup>

1. Emergency Aid and Disaster Management, School of Health, Terzioğlu Campus, Çanakkale Onsekiz Mart University, Çanakkale, Turkey
2. Emergency Medical Service, Çanakkale Provincial Health, Çanakkale, Turkey
3. Orthopedics and Traumatology Department, Bezmialem Vakıf University, İstanbul, Turkey

## Correspondence:

Cüneyt Çalışkan, MSc, PhDc  
Emergency Aid and Disaster Management  
School of Health, Terzioğlu Campus  
Çanakkale Onsekiz Mart University  
17100 Çanakkale, Turkey  
E-mail: caliskan007@hotmail.com

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## Abbreviations:

EMS: Emergency Medical Services  
HNP: Historical National Park  
MOR: mobile operating room  
PDR: pre-diagnosis rate  
PPR: patient presentation rate  
TTHR: transport to hospital rate

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## Abstract

**Introduction:** Mass crowds outside the routine population create a burden of disease on Emergency Medical Services (EMS). The need for EMS in various mass-crowd events may vary. It is especially important to determine the EMS requirement that emerges during the historic commemoration ceremonies in Çanakkale (Turkey).

**Hypothesis/Problem:** This study aims to determine the unique challenges in the planning of EMS responses provided for people from various countries at the commemoration ceremony for a 100-year-old war and to identify the medical provision of those services.

**Methods:** This descriptive study examined the patient applications in the Çanakkale EMS at the commemoration ceremonies for the 100<sup>th</sup> anniversary of Gallipoli Wars (Çanakkale Amphibious Wars – Turkey) on April 24–25, 2015.

**Results:** A total of 221 cases were handled by 112 EMS in the ceremony area. Of those, 87.3% of the cases applied to a mobile operating room (MOR) stationed in the ceremony area while 12.7% of them applied directly to the health care team in a large area in the ceremony area. Overall, 13.1% of the cases were transferred to the hospital for further evaluation and treatment. Patient presentation rate (PPR) of the patients who were treated during the two days was 4.42, and transfer to hospital rate (TTHR) of the cases transferred to the hospital was calculated to be 0.58.

**Conclusion:** Further studies may create models in regard to the estimations on mass and needs based on the data of previous organizations.

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## Introduction

Although mass assemblages are defined as 1,000 or more persons in an area, in accordance with some information in literature, they are also defined as a crowd larger than 25,000 persons. The comprehensiveness of the definition expresses a large mass of humans who participated in an event that took place at a limited time in a private sphere.<sup>1,2</sup> Health risks during these organizations include outbreaks of infectious diseases, non-communicable diseases, environmental influences (such as problems and confluences related to thermal comfort), trauma, and terrorist attacks.<sup>3</sup> Predictions regarding use of medical sources in these events depend on some variables. These variables include the weather conditions, the duration of the event, consist inside or outdoors of the event, the status of audience sitting or standing, risk profiles of participants, use of alcohol and medications, crowd density, type and characteristics of the event, and geography of the place.<sup>2,3</sup>

The importance of mass assemblages appears during national and international security, crowd management, emergency preparedness, environmental health, travel medicine, vaccination, surveillance of communicable disease, and presentation of emergency medical care services.<sup>4</sup> The mass assemblage medical service includes provision of medical care to patients or injured persons, such as rapid access, triage, stabilization, and transport on the scene. This case is realized by the superior abilities of the Emergency Medical Services (EMS), which provide routine emergency services.<sup>5</sup>

In this work of mass assemblage, it was conducted for the purpose of evaluating the two-day EMS medical records carried out within the 100th anniversary commemoration

ceremonies of the Gallipoli Wars (Çanakkale Amphibious Wars – Turkey). The study is an important provision of the effective allocation of resources and in terms of planning mass medical care responses at similar events in the next years.

## Method

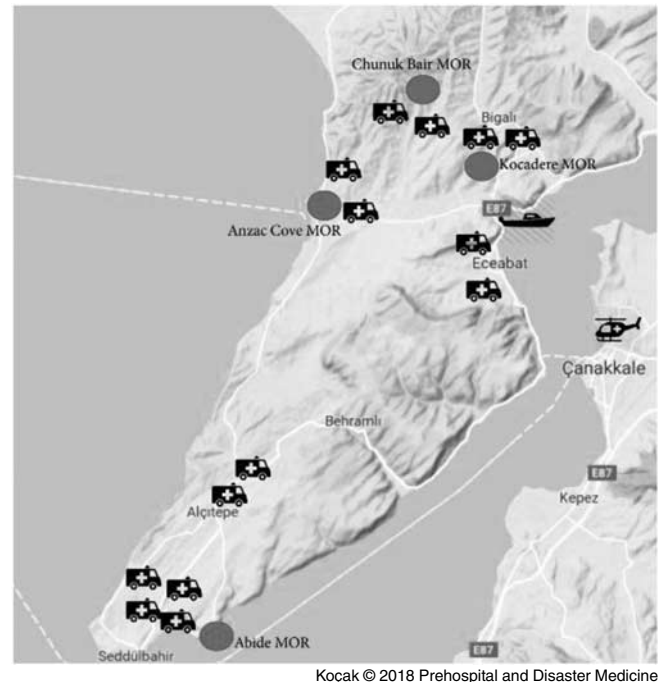
In this descriptive study, medical registration forms of Çanakkale (Turkey) EMS were evaluated, which were held within the scope of the 100th anniversary of the Gallipoli Wars in the hours of 10:00AM on April 24, 2015 through 4:00PM on April 25, 2015. For research, necessary permission had been obtained from Çanakkale Onsekiz Mart University (Çanakkale, Turkey) and ethical approval from the Clinical Research Ethics Committee and Çanakkale Provincial Directorate of Health (Çanakkale, Turkey). The medical record forms were stored both in a computer environment and in a central location. The forms were obtained from these two media. These include the sociodemographic characteristics of the patient, the station, the time, the social insurance, the call type, the call origin, the scene, the first examination findings, the Glasgow Coma Scale, the pre-diagnosis, and the hospital where the transfer was made.<sup>6</sup> Alcohol and illegal drug use are prohibited at the ceremonies. A total of 221 patients/injured registrations were reached within the ceremonies in two days. The classifications of the records were not based on a disease classification. The data obtained from medical forms and reports from the ceremonies were yielded descriptive statistics by transferring to SPSS 19.0 statistical package program (IBM; Armonk, New York USA). Furthermore, the patient presentation rate (PPR) was obtained by dividing the number of patients/injured persons admitted to the medical services into the number of total participants and multiplying the resulting number by 1,000; the transport to hospital rate (TTHR) was calculated by dividing the number of patients transferred from the region to the closest hospital into the number of participants overall and multiplying the resulting number by 1,000;<sup>2,7</sup> and the pre-diagnosis rate (PDR) was calculated by dividing the number of certain pre-diagnosis of patients/injured persons into the number of participants overall and multiplying the resulting number by 1,000.<sup>8</sup>

## Findings

### *Variables Related to the Activity*

**Resume of Mass Gathering**—One hundred years ago, in 1915, the Gallipoli Wars, which extended the First World War because of its results and was known as the “Gentlemen’s War,” broke out. The battle is also known as “Anzac Day” on the historic stage. Today, the children of the nations involved in this war attend the commemoration ceremonies, which are held annually. This year, on the occasion of the 100<sup>th</sup> anniversary of the Battle of Gallipoli in Çanakkale, a large number of people from all of the nations who sent troops to the battle were present at the ceremonies. In the commemoration ceremonies, during two days, ceremonies and walks were held in various places. Figure 1 shows the distribution of mobile operating rooms (MORs) and ambulances in the area.

**Features of the Peninsula**—The events organized as a part of the commemoration ceremonies were held in a large Historical National Park (HNP) of 33,500 hectares. The region of HNP consists of an extensive mountainous terrain and roughly resembles a triangle.



**Figure 1.** The Area Map.

Abbreviation: MOR, mobile operating room.

**Participants’ Country Profiles, Estimated Numbers, Temperature, and Weather Conditions**—The commemoration activities lasted two days in for day and night, on April 24–25, 2015, and according to the estimations of the official institutions, 50,000 people attended the ceremonies: 24,000 scouts between the age of 10–25 years; 1,000 volunteers of Turkish Red Crescent (Ankara, Turkey); 10,500 people from Australia and New Zealand (2,000 of them were disabled and elderly); and approximately 15,000 people consisting of health, safety officers, fire fighters, and other ceremonial officers, as well as the limited participation of local people who were present at the ceremonies, which lasted for 48 hours throughout the peninsula. However, the estimated demographic information for the total population participating in the event was not reached (standard deviation and sex and age).

The first day of the ceremonies, the weather was clear and partly cloudy, the temperature was between 4°C – 16°C; and the second day, temperature was between 9°C – 17°C.

**Mobile Operating Rooms, Mobile Command**—A MOR is a part of the mobile hospital systems providing emergency medical assistance in a short time in the affected areas in case of emergencies, such as disasters and wars, or when health facilities are inactive for some reason. Accordingly, each MOR in the region provided the services of triage, emergency patient care, and patient transfer.

Four MORs located in four different places (Abide, Anzac Cove, Chunuk Bair, and Kocadere) of the HNP region performed service. The EMS system was located in the MOR and ceremonial areas during the event. The ambulances in the MOR transferred the patients/injured persons to the relevant transfer vehicles (helicopters or sea ambulances) or directly to hospitals in line with the directives of mobile and central commands. Transfer operations and the applications of patients/injured persons who came to the MOR or other health teams were registered by the teams and the data were transferred to mobile command centers. Mobile command centers

Features	Number of Turkish (%)	Number of Foreigner (%)	Total Number (%)
<b>Gender</b>	<b>n = 96</b>	<b>n = 43</b>	<b>n = 139</b>
Male	62 (64.6)	16 (37.2)	78 (56.1)
Female	34 (35.4)	27 (62.8)	61 (43.9)
<b>Age</b>	<b>(n = 81)</b>	<b>(n = 42)</b>	<b>(n = 123)</b>
10-14	2 (2.5)	3 (7.1)	5 (4.1)
15-19	25 (30.9)	6 (14.3)	31 (25.2)
20-24	32 (39.5)	3 (7.1)	35 (28.2)
25-29	6 (7.4)	7 (16.7)	13 (10.6)
30-39	9 (11.1)	1 (2.4)	10 (8.1)
40-49	4 (4.9)	10 (23.8)	14 (11.4)
50-59	2 (2.5)	5 (11.9)	7 (5.7)
60+	1 (1.2)	7 (16.7)	8 (6.5)
	Mean (SD) = 24.31 (9.76); Moderate = 21.0, Smallest = 10, Largest = 61	Mean (SD) = 39.60 (20.51); Moderate = 41.0, Smallest = 10, Largest = 88	Mean (SD) = 29.53 (16.02); Moderate = 23.0, Smallest = 10, Largest = 88
<b>Application to MOR</b>	<b>n = 96</b>	<b>n = 43</b>	<b>n = 139</b>
Kocadere	82 (85.4)	8 (18.6)	90 (64.7)
Anzac Cove	8 (8.3)	35 (81.4)	43 (30.9)
Chunuk Bair	4 (4.2)	- (-)	4 (2.9)
Abide	2 (2.1)	- (-)	2 (1.4)
<b>Insurance (n = 139)</b>	<b>n = 96</b>	<b>n = 43</b>	<b>n = 139</b>
State	96 (100.0)	1 (2.3)	97 (69.8)
Private	- (-)	42 (97.3)	42 (30.2)

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**Table 1.** The Distribution of Cases Based on Certain Demographic Characteristics (Çanakkale – Turkey, 2015)

Abbreviation: MOR, mobile operating room.

were situated in the most appropriate locations in HNP region in terms of wireless communication with health teams. Furthermore, the communication between mobile command and health teams was carried out via phone and text messaging.

#### *Variables Related to the Patients*

There were 221 cases in which EMS intervened within the scope of the activities; 193 (87.3%) of the cases applied to MORs stationed in the ceremony area while 28 (12.7%) of them applied directly to the health care team stationed in a large place in the ceremony area. A total of 29 (13.1%) of the cases were transferred to the hospital for further evaluation and treatment; 25 (86.2%) of the medical transports were transferred via sea ambulances and four (13.8%) of them were transferred by air ambulances. The PPR of the patients who were treated during the two days was 4.42, and the TTHR of the cases transferred to the hospital was calculated as 0.58.

The records of 139 (72.0%) of the cases, which were intervened by EMS in MOR during the ceremonies, were accessible.

Consultancy services provided were not recorded. Overall, 96 (69.1%) of the cases belonged to Turkish citizens while 30 (21.6%) of the cases belonged to Australian citizens. Further, there were also five Azerbaijani, five New Zealander, one Bulgarian, one Senegalese, and one Kosovan among the cases intervened. The mean (SD) age of the cases was 29.53 (16.02) years; 35 (28.2%) of them were in the age range of 20-24 years; 78 (56.1%) of them were male. Moreover, 90 (64.7%) of them applied to the Kocadere MOR and 42 (30.2%) of them had private health insurance (Table 1).

Between the pre-diagnosis distributions of cases intervened by EMS in the MOR in the scope of the activities, trauma with 20 (14.5%), headache with 19 (13.8%), and acute gastroenteritis with 13 (9.4%) were respectively the first three diagnoses (Table 2).

#### **Discussion**

In general, mass gatherings have an important impact on the regional capacity of EMS. This impact derives from the

Injuries and Diseases (n = 139)	Number (%)	Injuries and Diseases (n = 139)	Number (%)
Trauma	20 (14.5)	Pharyngitis	2 (1.4)
Headache	19 (13.8)	Dyspnea	2 (1.4)
Acute Gastroenteritis, Nausea, and Vomiting	13 (9.4)	Dorsalgia	2 (1.4)
Upper Respiratory Tract Infection	11 (7.9)	Asthma	1 (0.7)
Flu	10 (7.2)	Tonsillitis	1 (0.7)
Stomachache	7 (5.0)	Respiratory Other	1 (0.7)
Reflux	5 (3.7)	Nose Bleeding	1 (0.7)
Nausea and Vomiting	5 (3.7)	Bee Sting	1 (0.7)
Myalgia	4 (3.0)	Yeast Infection	1 (0.7)
Cut on Hand	3 (2.2)	Dermatitis	1 (0.7)
Lumbalgia	3 (2.2)	Throat Ache	1 (0.7)
Twisting of Leg	3 (2.2)	Renal Colic	1 (0.7)
Normal Physical Examination	3 (2.2)	Urinary Infection	1 (0.7)
Sunburn	2 (1.4)	Acute Abdomen	1 (0.7)
Allergic Reactions	2 (1.4)	Constipation	1 (0.7)
Chest Pain	2 (1.4)	Cerebrovascular Disease	1 (0.7)
Migraine	2 (1.4)	Tachycardia	1 (0.7)
Dysmenorrhea	2 (1.4)	Hypotension	1 (0.7)
Gastritis	2 (1.4)		

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**Table 2.** The Distribution of Cases Based on Injuries and Diseases (Çanakkale – Turkey, 2015)

inadequacy of EMS to meet the excessive health service demands. This demand causes an overload on the operations of the health care system, available equipment, and personnel. For this reason, four MORs were established in the region of the HNP within the scope of the commemoration ceremonies. In this way, the potentially excessive volumes of patients who may apply to the emergency services were prevented.

When the relevant literature on mass gatherings was analyzed, it appeared that the studies on the organizations such as sports, concerts, and pilgrimages were abundant. Specially, it is known that alcohol and various drugs are used at concerts, and deaths due to overdose occur as well.<sup>9</sup> In this study, there was no evidence of illness or injury related to the use of alcohol or drugs, as in other mass gatherings, due to the prohibition of alcohol and illegal drug use during the ceremonies.

Similar to this study, in the literature, it was concluded that there were complaints related to the musculoskeletal system in certain mass gatherings.<sup>10</sup> It may result from the rugged structure of the region of the HNP, the existence of pathways, the presence of elderly and disabled people with potentially weaker musculoskeletal systems compared to other age groups among the participants, the features of the shoes that they wore (such as slippers and high heels), the exhaustion of most of the participants due to a long journey on the sea, and the ceremonies which lasted for two days.

One of the most common pre-diagnosis of the participants was gastroenteritis (n = 13; 9.4%; the PDR of 0.36). In 1986, the incidence rate for gastroenteritis cases during a pilgrimage was calculated as 0.44 per 1,000; and in a study among race volunteers in 2002, it was found that gastroenteritis cases ranked third, followed by cardiovascular and respiratory system diseases.<sup>8</sup> Food hygiene may be one of the greatest problems in the places where artificial populations gather, such as ceremonies. The issues that may occur in regard to food hygiene: epidemics might bring about.<sup>8</sup>

In this study, the PPR was calculated as 4.4 and the TTHR was calculated as 0.58. In a study performed in Singapore Formula One Races, the PPR was calculated as 2.17 and the TTHR was calculated as 0.033;<sup>7</sup> and in a music festival, the PPR was found as 4.09.<sup>9</sup> Causes of these rates being higher in this study were associated with an open area that found people from all age groups under rough terrain, like Arbon indicated.<sup>2</sup> In Formula One Races, a part of the audience can watch both in seated areas and on a flat surface by standing. As to electronic dance music events, the audience participates during the event in a flat area, depending on whether the event is performed outdoors or indoors.

#### Limitations

The number of participants was limited by the official institutions providing the organization. Specially, the transport from the city center to the peninsula was hindered by the ferries' restrictions.

Since the region of the HNP is a peninsula, there may have been unauthorized transports from the northern part of the peninsula. Moreover, there may be small deviations in calculations of PPR, TTHR, and PDR because it couldn't be reached the exact number of the health, safety, security, and other units like these in the region. For this reason, since the number of full participants is not known, it is not possible to calculate the error rate for the findings based on the impact of missing records. As there is no triage information on the forms, the severity of the patients has not been determined. As the hourly temperature data were not recorded on the days when the ceremonies were held, there was not analysis on the hours when the cases were referred to hospitals.

### Conclusion

Within the scope of the 100th anniversary of the Gallipoli Wars, medical services were provided to the citizens of

seven countries. Trauma was the most important phenomena of medical service offered. Land, sea, and air ambulances were used in patient transfers. In order to provide a better medical service for these ceremonies, which are held annually, in future studies, modelling can be done at the point of needs and estimations in the direction of the data of past organizations.

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### References

1. Memish ZA, Stephens GM, Steffen R, Ahmed QA. Emergence of medicine for mass gatherings: lessons from the Hajj. *Lancet Infect Dis.* 2012;12(1): 56-65.
2. Arbon P, Bridgewater FHG, Smith C. Mass-gathering medicine: a predictive model for patient presentation and transport rates. *Prehosp Disaster Med.* 2001; 16(3):150-158.
3. Mass gatherings health. creating a public health legacy. *Lancet.* 2012;380(9836):1.
4. Chang W-H, Chang K-S, Huang C-S, Huang M-Y, Chien D-K, Tsai C-H. Mass-gathering emergency medicine: a review of the Taiwan experience of long-distance swimming across Sun-Moon Lake. *Int J Gerontol.* 2010;4(2):53-68.
5. Biddinger PD, Baggish A, Harrington L, et al. Be prepared — the Boston Marathon and mass-casualty events. *N Engl J Med.* 2013;368(21):1958-1960.
6. T.C. Health Ministry. ÇANAKKALE 112 PROVINCE AMBULANCE SERVICE AMBULANCE REGISTRATION FORM. <http://112.canakkalesaglik.gov.tr/formlar.asp>. Accessed November 14, 2017.
7. Ho WH, Koenig KL, Quek LS. Formula One night race in Singapore: a 4-year analysis of a planned mass gathering. *Prehosp Disaster Med.* 2014;29(5):489-493.
8. Ahmed QA, Arabi YM, Memish ZA. Health risks at the Hajj. *Lancet.* 2006; 367(9515):1008-1015.
9. Lund A, Turris SA. Mass-gathering medicine: risks and patient presentations at a 2-day electronic dance music event. *Prehosp Disaster Med.* 2015;30(3):271-278.
10. Milsten AM, Seaman KG, Liu P, Bissell RA, Maguire BJ. Variables influencing medical usage rates, injury patterns, and levels of care for mass gatherings. *Prehosp Disaster Med.* 2003;18(4):334-346.