



Ambulances Under Fire: A Cross-sectional Analysis of Terrorist Attacks on Ambulances and Their Medical Implications

Ateş Altındaki Ambulanlar: Ambulanlara Yönelik Terörist Saldırılarının ve Tıbbi Etkilerinin Kesitsel Bir Analizi

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ABSTRACT

Objective: This study aims to conduct an epidemiological analysis of the country, race, weapon type, and type of attack, along with the medical consequences of terrorist attacks on ambulances.

Methods: The population of this retrospective cross-sectional epidemiological study consisted of terrorist attacks on ambulances, as documented in the Global Terrorism Database provided by The National Consortium for the Study of Terrorism and Responses to Terrorism, covering the period from 1970 to July 2021. Incidents, deaths, and injuries from these terrorist attacks were analyzed according to country, attack type, and weapon type. Additionally, incidents, deaths, injuries, and material losses from attacks against ambulances were analyzed by year.

Results: In the last 52 years, 80 terrorist incidents occurred, and 444 people were adversely affected medically in 75 of these incidents. In 96.3% of these cases, the terrorist organization achieved its desired goal, and 71.3% resulted in material loss. During this period, terrorist attacks on ambulances were reported in 27 countries. In 17 of these incidents, the nationality of the attacker was different from that of the target person, and 70 people were adversely affected medically. These incidents featured seven different types of attacks and five different types of weapons. The most preferred type of attack was bombing (n=38), while the most commonly used weapon type was explosives (n=39).

ÖZ

Amaç: Bu çalışma, ambulanslara yapılan terörist saldırıların tıbbi sonuçları ile birlikte ülke, ırk, silah türü ve saldırı türünün epidemiyolojik bir analizini yapmayı amaçlamaktadır.

Yöntemler: Bu retrospektif kesitsel epidemiyolojik çalışmanın evreni, 1970'ten Temmuz 2021'e kadar olan dönemi kapsayan, Ulusal Terörizm ve Terörizme Tepki Araştırmaları Konsorsiyumu tarafından sağlanan Küresel Terörizm Veri Tabanı'nda belgelendiği gibi, ambulanslara yönelik terör saldırılarından oluşuyordu. Bu terör saldırılarından kaynaklanan olaylar, ölümler ve yaralanmalar ülkeye, saldırı türüne ve silah türüne göre analiz edildi. Ayrıca, ambulanslara yönelik saldırılardan kaynaklanan olaylar, ölümler, yaralanmalar ve maddi kayıplar yıllara göre analiz edildi.

Bulgular: Son 52 yılda 80 terör olayı meydana geldi ve bu olayların 75'inde 444 kişi tıbbi olarak olumsuz etkilendi. Bu olguların %96,3'ünde terör örgütü amacına ulaşmış, %71,3'ü maddi kayıpla sonuçlanmıştır. Bu dönemde 27 ülkede ambulanslara yönelik terör saldırıları bildirildi. Bu olayların 17'sinde saldırganın uyruğu hedef kişinininkinden farklıydı ve 70 kişi tıbbi olarak olumsuz etkilendi. Bu olaylarda yedi farklı saldırı türü ve beş farklı silah türü yer aldı. En çok tercih edilen saldırı türü bombalama (n=38), en sık kullanılan silah türü ise patlayıcılar (n=39) oldu.

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ABSTRACT

Conclusion: In the last six years, there has been an increase in terrorist attacks, adversely affecting many people medically. The main reasons for this increase include growing civil unrest in countries, easy access to ambulances, perceived lack of threat, and a rise in individual armament. Due to these issues, it is crucial to train health workers, take precautions, make preparations, and create emergency action plans to mitigate terrorist attacks.

Keywords: Prehospital care, healthcare security, ambulance services, terrorist attacks, public health safety

ÖZ

Sonuç: Son altı yılda, birçok insanı tıbbi olarak olumsuz etkileyen terör saldırılarında bir artış oldu. Bu artışın başlıca nedenleri arasında ülkelerde artan sivil huzursuzluk, ambulanslara kolay erişim, algılanan tehdidin eksikliği ve bireysel silahlanmadaki artış yer alıyor. Bu sorunlar nedeniyle terör saldırılarını azaltmak için sağlık çalışanlarının eğitilmesi, önlem alınması, hazırlıkların yapılması ve acil eylem planlarının oluşturulması büyük önem taşımaktadır.

Anahtar Sözcükler: Hastane öncesi bakım, sağlık güvenliği, ambulans hizmetleri, terör saldırıları, halk sağlığı güvenliği

Introduction

Terrorist attacks involve acts of threat, fear and violence, both nationally and internationally. This attack is made up of a pre-designed structure with the aim of causing mass casualties (1), injuries, destruction, and excessive fear within society (2). This structure can target the health system both directly and indirectly. The reason for this is that health services are accessible 24/7, are a public sphere and contain a large number of people, materials and information. In other words, healthcare is considered as a soft target for terrorist (3).

Attackers carry out terrorist acts against health services in various ways. These acts have a negative impact on the health system. For example, as a result of terrorist acts directly or indirectly targeting the health system, a large number of people may be in urgent need of medical care and endanger health personnel (4). In addition, attacks on health services cause physical and psychological injuries, destruction of infrastructure, disruptions in maternal and child health care, restricted access and fear of going to health services (5). Attacks targeting healthcare workers occur both intentionally and unintentionally. These attacks include delaying, obstructing, damaging ambulances, stealing medical devices such as ambulances, or directly attacking or kidnapping personnel (6). In addition, after a terrorist attack, ambulance crews arriving at the scene are at risk of becoming the target of a secondary attack.

In the literature, it is noted that terrorists sometimes target or use ambulances because these vehicles can increase the destructive power of an attack, do not arouse suspicion, provide access to secure areas, and can carry a large number of bombs (1,7). Therefore, it is extremely important to detect, prevent and manage terrorist acts against ambulances and to develop data collection and reporting mechanisms. In the literature, there are studies that retrospectively analyse the impact of terrorist attacks on the health system (1,5,8-12). However, there are no studies that medically analyse the terrorist attacks against ambulances. In this study, it is aimed to analyse the medical dimension of terrorist attacks against ambulances in the world with various variables.

Methods

This study is a cross-sectional epidemiological study. The population of the study consists of terrorist attacks against ambulances between 1970 and 2021 taken from the Global Terrorism Database (GTD) data file provided by The National Consortium for the Study of Terrorism and Responses to Terrorism (START). An epidemiological analysis of the scene (country), year distribution, weapon, type of attack, attacker and material damage and medical consequences of terrorist attacks on ambulances was aimed.

Data Source

The data source of the study was the GTD data file available on the START website, which is a database on terrorism. GTD is a free access database containing information on terrorist incidents that occurred in the world between 1970 and July 2021 (except 1993). The database systematically records information on terrorist incidents, both national and international, and currently contains more than 200,000 incidents. For each incident, information is available on a number of variables such as the year of the incident, the location, the number of injured and killed, the target and the group responsible. Publications produced from GTD data are regularly available on the START website (13). This study constitutes a secondary survey of GTD data.

Definitions

START, also known as START, is a research and education centre that conducts scientific research on the causes and medical consequences of national and international terrorism. START website has many databases such as START datasets, IVEO Knowledge Matrix, GTD, Big Allied and Dangerous, TEVUS Portal, PIRUS dataset, Nuclear Facilities Attack Database (14).

The GTD, available on the START website, is a database containing systematic data on national and international terrorist incidents. According to this database, a terrorist attack is defined as the unlawful threat or use of force and violence by a non-state person or group (actor) to achieve a political, economic, religious or social objective through fear, coercion or intimidation (15). In order for an incident to be included in the GTD, it must be intentional and the incident must constitute a certain level of violence or an immediate threat of violence.

Inclusion Criteria

In order for an event to be considered as a terrorist attack, it is included in GTD’s raw data file if it meets the three inclusion criteria predetermined by GTD:

- Criterion 1: The act must be aimed at attaining a political, economic, religious, or social goal.
- Criterion 2: There must be evidence of an intention to coerce, intimidate, or convey some other message to a larger audience (or audiences) than the immediate victims.
- Criterion 3: The action must be outside the context of legitimate warfare activities.

Events are excluded when an event does not fulfil any of GTD’s three inclusion criteria or when there is uncertainty. These criteria of GTD are determined within the database, not by the authors.

In order to achieve the aim of the study, the researchers developed inclusion criteria among 135 variables in the GTD (Table 1). Events including these criteria were included in the study.

Data Preparation

The GTD metadata file was downloaded from the START website in November 2023. The downloaded GTD metadata file was uploaded to IBM SPSS Statistic Version 19 and a search was performed for terrorist attacks targeting ambulances. As a result of the search, the data suitable for the inclusion criteria of the study were saved in the Microsoft Excel file. At the stage of downloading the GTD metadata file, data for the period between August 2021 and 2023 were not yet available, so data for the relevant years were not recorded.

Statistical Analysis

Frequency analysis was performed to determine the number of incidents, deaths and injuries of terrorist attacks against ambulances by year, country, weapon and type of attack. The data of the study was designed to retrospectively analyse the scene, weapon, attack, perpetrator information, material damage and medical outcomes of terrorist attacks on ambulances based on an open access data set. Therefore, ethics committee review was not sought for the data of the study. The identities of the attackers in the GTD metadata file were removed from the study data file. The accuracy of GTD data was not evaluated.

Results

General Results

There were 80 terrorist incidents against ambulances in the world between 1970 and July 2021, which meet the inclusion criteria of the study. In 96.3% of these terrorist attacks, the terrorist organisation achieved the desired target and 71.3% of these attacks resulted in material loss. However, since 16% of the terrorist incidents against ambulances were lost due to various reasons in GTD data, 75 terrorist attacks were analysed. Four hundred forty four people were adversely affected medically by these terrorist attacks.

Table 2 analyses the number of incidents, injured and dead according to logistical, ideological and miscellaneous variables of terrorist attacks against ambulances. The logistical variable made a comparison between the nationality of the attacker and the country where the attack took place. This table revealed that among 7 terrorist incidents, the attackers’ nationalities diverged from the regions where the attacks occurred, resulting in adverse

Table 1. GTD variables and subcategories in the study

Variables	Subcategories
Date	Year (1970- July 2021)
Inclusion criteria	Criterion 1, criterion 2, criterion 3
Country	All
Attack type	Assassination, hijacking, kidnapping, barricade incident, bombing/explosion, armed assault, unarmed assault, facility/infrastructure attack, unknown
Succes of attack	Yes/no
Suicide attack	Yes/no
Weapon type	Biological, chemical, radiological, nuclear, firearms, explosives, fake weapons, incendiary, melee, vehicle, sabotage equipment, other, unknown
Casualties and consequences	Total number of fatalities
	Total number of injured
	Property damage (yes/no/unknown)
	Extent of property damage
International - logistical	Yes/no/unknown
International - ideological	Yes/no/unknown
International - miscellaneous	Yes/no/unknown
GTD: Global Terrorism Database	

medical consequences for 14 individuals. Ideological variable enabled a comparison between the nationality of the attacker and the nationality of the target. As per the data presented in this table, it was evident that among the 17 terrorist incidents examined, the nationality of the perpetrator diverged from that of the target individual, resulting in adverse medical repercussions for 70 individuals. Miscellaneous variable showed whether the attacker targeted a person of a different nationality. According to this table, it was concluded that there was no incident in which the attacker targeted a person of a different nationality.

Medical Outcomes and Property Damage by Year and Country

Table 3 shows the distribution of incidents, injuries, deaths and material losses according to the years of terrorist attacks against ambulances. According to this table, the first terrorist attack against ambulances occurred in 1985. With the increase in terrorist attacks between 2000 and 2014, 219 people were adversely affected medically during these years. In the last six years, it was seen that the number of terrorist attacks and material loss was the highest compared to other years. While the highest number of attacks on ambulances occurred in 2013 and 2019, the highest number of deaths (n=26) and injuries (n=53) occurred in 2018 compared to other years.

Table 4 shows the medical analysis of the distribution of terrorist attacks against ambulances according to the countries. According to this table, terrorist attacks on ambulances occurred in 27 countries. Iraq was the country where the highest number of terrorist incidents occurred among 27 countries and the most medically affected country. Libya was the most medically affected country after Iraq. The most medically affected countries after Libya were Thailand, Yemen and Syria respectively. It was concluded that Türkiye, Israel, India, Cameroon and Central Africa Republic countries were not medically affected by terrorist attacks on ambulances.

Analysis of Medical Outcomes by Type of Attack and Weapon

Table 5 shows the medical analysis of terrorist incidents against ambulances in the world according to attack and weapon types.

Table 2. Analysis of medical results based on logistical, ideological, and miscellaneous categories

Logistical	Event	Wound	Kill
International	7	9	5
Domestic	38	121	82
Unknown	30	153	74
Ideological	Event	Wound	Kill
International	17	43	27
Domestic	28	87	60
Unknown	30	153	74
Miscellaneous	Event	Wound	Kill
International	-	-	-
Domestic	72	274	161
Unknown	3	9	-

According to this table, it was seen that 7 different attack types and 5 different weapon types were preferred in terrorist incidents against ambulances. While the most preferred type of attack in the incidents against ambulances was bombing, the most preferred weapon type was explosive weapons. Among the attack types, bombing and armed assault caused more deaths and injuries than other attack types. Among the weapon types, explosive and firearms types had the highest number of deaths and injuries.

Discussion

This study holds significance as the inaugural attempt to epidemiologically delineate the weaponry, attack modality, and medical ramifications across 75 terrorist incidents targeting ambulances worldwide from 1970 to July 2021. Moreover, the study encapsulates three distinct subcategories: the overarching findings of the 75 terrorist assaults; medical outcomes and material damages categorized by annual distribution and impacted nations; and a nuanced analysis of medical consequences contingent upon attack and weapon typology.

In the literature on health services, it is emphasised that there are many terrorist attacks targeting facilities rather than personnel (16). Within the array of attacks directed at facilities, ambulance services, which administer initial care to patients and facilitate their transfer to appropriate hospitals, are included. Attacks on ambulances result in the potential deprivation of urgent care

Table 3. Incident, death, and injury counts, and material damage by year distribution

Year	Event	Wound	Kill	Property
1985	1	6	4	1
1987	2	1	2	2
1989	1	-	-	1
1990	1	-	1	-
1994	1	-	2	-
1997	1	-	2	1
1998	1	2	-	1
2007	2	1	2	2
2008	1	5	-	-
2009	4	27	13	2
2011	2	45	18	2
2012	3	37	9	3
2013	9	42	20	5
2014	6	5	5	5
2015	7	3	10	6
2016	6	11	7	4
2017	4	6	3	3
2018	8	53	26	5
2019	9	19	9	5
2020	6	7	12	5
2021	5	13	16	4
Total	80	283	161	57

for individuals or the community, pose threats to healthcare professionals, and contribute to the system's weakening (4). In the analysis of this study, it was observed that 444 individuals were adversely affected medically due to attacks on ambulances. Moreover, it was concluded that these terrorist attacks occurred frequently in the last six years (Table 3). This is believed to stem from assailants having easy access to ambulances, minimal threat perception, and possessing significant capacity for carrying weapons (17). However, the reason for the increase in attacks on ambulances in recent years may be due to the under-reporting of terrorist incidents in previous years (3).

Attacks on healthcare services tend to be prevalent in countries experiencing internal conflicts and wars (3). For example, it is emphasised that terrorist attacks on health care have increased, as reported in the Russian-Ukrainian war, the attack on the occupied Palestinian territories and the wars in Syria (5). In the findings of the study, it was seen that terrorist attacks on ambulances occurred in 27 countries and the most affected countries are the regions where there was war such as Iraq, Yemen, Libya and Syria. Another factor that causes ambulances to be targeted in regions where there is civil unrest or war is that healthcare workers come from

a different country or ethnic group (18). In this study, analysis revealed that in 17 instances of terrorist attacks, the nationality of the assailant differed from that of the target, resulting in adverse medical effects on 70 individuals. Additionally, findings indicated attacks on ambulances in countries without ongoing warfare or internal strife. This occurrence was attributed to disruptions during various protests, impeding the ambulances' operations at the scene. For instance, a report detailing an attack on an ambulance highlighted the assailants' intent to hinder the transport of an injured police officer to the hospital by assaulting the ambulance (19).

Various types of attacks and weapon usage are employed against the healthcare system. In incidents targeting ambulances within the study, the most commonly preferred attack type was bombing, while the predominant weapon type was explosive devices. In an analysis of attacks on primary healthcare services, it was emphasized that 55% of the assaults involved bombings, while among weapon types, 55% comprised the use of explosive devices (12). The reason for the widespread use of this type of weapon is that it is relatively easy and inexpensive to manufacture, simple to use and easy to execute, requiring a small number of attackers (9). However, it has been observed that the use of these types of weapons has increased in recent years due to their easy production, easy crossing of international borders and easy availability (20). This increase leads to a greater medical impact on those at the scene and more people dying.

Reducing easy access and developing incident preparedness/response plans are important to reduce the frequency and medical consequences of terrorist attacks on ambulances (21). A study on health care emphasises that ambulances are often left unguarded and unlocked (7). Therefore, in the event of a terrorist attack, medical personnel should leave the ambulance in a safe place, minimise unattended time, choose safe routes, lock the vehicle and know what to do in the event of an attack. The International Committee of the Red Cross, in its report Ambulance and Prehospital Services in Risky Situations, emphasises that to prevent

Table 4. Incident counts and medical analysis by country

Country	Incident	Wound	Kill
Afghanistan	3	3	5
Algeria	2	-	9
Burkina Faso	3	-	6
Cameroon	1	-	-
Central African Republic	1	-	-
Colombia	2	1	-
Egypt	8	9	2
El Salvador	1	-	2
India	1	-	-
Iraq	16	129	58
Israel	1	-	-
Kenya	3	7	5
Libya	2	40	21
Mali	2	-	7
Myanmar	1	-	1
Nicaragua	2	1	-
Pakistan	5	4	5
Philippines	4	6	3
Somalia	3	5	1
Sri Lanka	1	6	4
Sudan	1	2	0
Syria	2	17	11
Thailand	1	35	4
Türkiye	1	-	-
Ukraine	2	2	1
Yemen	5	13	16
Yugoslavia	1	2	-

Table 5. Incident, wound, and kill counts by type of attack and weapon

Attack type	Event	Wound	Kill
Assassination	2	-	3
Armed assault	25	21	18
Bombing	38	256	137
Hijacking	3	1	2
Kidnapping	1	-	-
Facility/Infrastructure attack	4	-	-
Unknown	2	5	1
Weapon type	Event	Wound	Kill
Firearms	30	21	20
Explosives	39	138	257
Incendiary	3	-	-
Melee	1	-	2
Unknown	2	5	1

and mitigate terrorist attacks on ambulances, local legislation for ambulances should be strengthened, the roles and responsibilities of stakeholders should be clearly defined and coordination with all stakeholders, including the armed forces, should be ensured (18). These actions are considered to contribute to the reduction of terrorist attacks against ambulances.

Study Limitations

There are several limitations in this study. First, as mentioned in the methodology, the data of the study were obtained from the GTD database. GTD comprehensively records global terrorist incidents in its database. This database uses media reports to obtain data on terrorist incidents. Therefore, there is a possibility of bias and data gaps in the available data and the study constitutes a secondary analysis of GTD data. However, as the database records terrorist attacks perpetrated by non-state actors, not all terrorist attacks on ambulances may be included. The GTD database does not include terrorist attacks that occurred after July 2021. Therefore, terrorist incidents against ambulances in the last two years were not included in the study. Finally, there were 80 terrorist attacks against ambulances in the GTD database. However, since the data on 5 terrorist attacks were missing, the medical outcomes of 75 terrorist attacks were analysed.

Conclusion

Terrorism threatens health care both nationally and internationally. This threat to health care causes many people to die, disrupting the system and restricting access. Ambulances are the first team to arrive at the scene after an incident. Therefore, they are at risk of being exposed to terrorist attacks both directly and indirectly. In the last fifty-two years, there were 80 terrorist attacks on ambulances and 444 people were adversely affected medically in 75 incidents. These terrorist incidents occurred mostly in countries where there was civil unrest or war and were the most medically affected countries. The most common type of explosive weapon was used in terrorist incidents and this type of weapon caused more people to be adversely affected medically than other types of weapons. When compared by years, there has been an increase in terrorist incidents in the last six years. The main reasons for this increase are the increase in civil unrest in the countries, easy access to ambulances, lack of threat and increase in individual armament. Due to these problems, it is necessary to train healthcare workers, take precautions, make preparations and create emergency action plans against terrorist attacks against ambulances. In addition, strategies for healthcare services against terrorist attacks should be developed.

Ethics

Ethics Committee Approval: Ethics committee approval is not required.

Informed Consent: Informed consent is not required.

Footnotes

Authorship Contributions

Concept: K.K., C.Ç., Design: K.K., C.Ç., Data Collection or Processing: N.D., C.Ç., H.K., Analysis or Interpretation: K.K., N.D., C.Ç., H.K., Literature Search: N.D., C.Ç., H.K., Writing: K.K., N.D.

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