

Secondary Ambulance Transfers During the Mass-Casualty Terrorist Attack in Israel on October 7, 2023

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Abbreviations:

ALS: Advanced Life Support
BLS: Basic Life Support
BMC: Barzilai Medical Center
EMT: emergency medical technician
MCE: mass-casualty event
MDA: Magen David Adom
SMC: Soroka Medical Center

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Specific Event Identifiers

Event Type: Mega Mass-Casualty Terrorist Attack

Event Onset Date: October 7, 2023

Location of Event: Southern Israel bordering Gaza including between Zikim, Sderot, Netivot, and Kerem Shalom

Geographic Coordinates: 31°36'35.4"N 34°31'15.4"E 28m; 31°31'22.1"N 34°35'44.1"E 95 m; 31°25'24.2"N 34°35'42.1"E 154 m; 31°13'44.3"N 34°17'03.6"E 88m

Dates of Observation Reported: October 7-8, 2023

Response Type: Prehospital Ambulance Service

Abstract

On October 7, 2023, Israel experienced the worst terror attack in its history – 1,200 people were killed, 239 people were taken hostage, and 1,455 people were wounded. This mass-casualty event (MCE) was more specifically a mega terrorist attack. Due to the overwhelming number of victims who arrived at the two closest hospitals, it became necessary to implement secondary transfers to centers in other areas of the country. Historically, secondary transfer has been implemented in MCEs but usually for the transfer of critical patients from a Level 2 or Level 3 Trauma Center to a Level 1 Center. Magen David Adom (MDA), Israel's National Emergency Pre-Hospital Medical Organization, is designated by the Health Ministry as the incident command at any MCE. On October 7, in addition to the primary transport of victims by ambulance to hospitals throughout Israel, they secondarily transported patients from the two closest hospitals – the Soroka Medical Center (SMC; Level 1 Trauma Center) in Beersheba and the Barzilai Medical Center (BMC; Level 2 Trauma Center) in Ashkelon. Secondary transport began five hours after the event started and continued for approximately 12 hours. During this time, the terrorist infiltration was still on-going. Soroka received 650 victims and secondarily transferred 26, including five in Advanced Life Support (ALS) ambulances. Barzilai received 372 and secondarily transferred 38. These coordinated secondary transfers helped relieve the overwhelmed primary hospitals and are an essential component of any MCE strategy.

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Introduction

A mass-casualty event (MCE) presents challenges whether it occurs in a rural or densely populated area.¹ Considerations taken when evacuating victims from the scene include the receiving capacity of the hospitals that are close to the incident, hospital staff capabilities, and the condition of the victims. An MCE that occurs in a rural area can lead to a hospital receiving a large number of casualties that it is unable to handle.² In such cases, secondary transfer of casualties to more distant hospitals is necessary after initial triage is performed at the nearest hospital.³ A multi-theater MCE is such as occurred in Madrid, Spain on March 11, 2004 when bombs detonated on four separate commuter trains and immediately killed 177 and injured more than 2,000. At the closest receiving hospital, 312 victims were treated without any secondary transfer. One of the lessons was that there was probably over-triage to this hospital to save ambulance response time.⁴

Transferring Hospital	Receiving Hospital	Distance (km)	ALS	BLS – Emergent	BLS – Non-Emergent	Totals
BMC	Sheba Tel-HaShomer Medical Center, Ramat Gan	57	3	3	3	
BMC	Other		1			
BMC	Rabin Medical Center, Petah Tikva	62.1	1	2	1	
BMC	Shamir Medical Center, Be'er Ya'akov	55.8	2	1	5	
BMC	Tel Aviv Sourasky Medical Center, Tel Aviv	59.4	2	4	3	
BMC	Hillel Yaffe Medical Center, Hadera	103		2		
BMC	Meir Medical Center, Kfar Saba	71.7	1	3		
BMC	Hadassah University Hospital-Ein Kerem, Jerusalem	72.5	1			
Total from BMC			11	15	12	38
SMC	Edith Wolfson Medical Center, Holon	101		5		
SMC	Carmel Medical Center, Haifa	194		2		
SMC	Laniado Hospital, Netanya	142		1	1	
SMC	Meir Medical Center, Kfar Saba	116	1	2		
SMC	Rabin Medical Center, Petah Tikva	109	1	1	1	
SMC	Tel Aviv Sourasky Medical Center, Tel Aviv	109	2	2		
SMC	Hadassah University Hospital-Ein Kerem, Jerusalem	93.9	1	1		
SMC	Shaare Zedek Medical Center, Jerusalem	103		2		
SMC	Samson Assuta Ashdod University Hospital, Ashdod	85.8		1		
SMC	Hadassah University Hospital-Mount Scopus, Jerusalem	107		1		
SMC	Sheba Tel-HaShomer Medical Center, Ramat Gan	104		1		
Total from SMC			5	19	2	26
Overall Totals			16	34	14	64

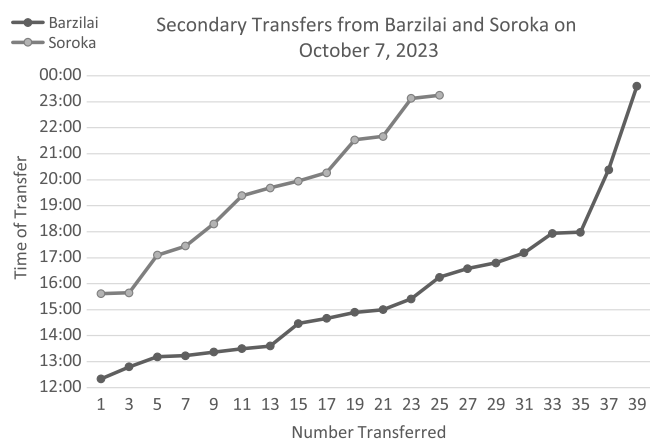
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Table 1. Secondary Transfers by MDA of Patients from Barzilai Medical Center (BMC) and Soroka Medical Center (SMC), Including Receiving Hospital, Triage Status, and Distance Between Hospitals Based on Google Maps
Abbreviations: ALS, Advanced Life Support; BLS, Basic Life Support; BMC, Barzilai Medical Center; SMC, Soroka Medical Center; MDA, Magen David Adom.

Magen David Adom (MDA; Tel Aviv, Israel) is Israel's National Emergency Pre-Hospital Medical Organization and a member of the International Committee of the Red Cross (Geneva, Switzerland). It operates 169 primary stations and dispatching points in 11 geographical regions. Assets include 1,000 Basic Life Support (BLS) ambulances, 450 Advanced Life Support (ALS) ambulances, 650 motorcycles, three helicopters, and one national command and control truck. Responders from MDA include 2,600 salaried employees (1,000 of which are paramedics and the rest are emergency medical technicians [EMTs]) and 30,000 volunteers (mostly EMTs). There are also 9,500 on-call volunteer first responders who are dispatched through a location-based application and provide initial medical assistance until the arrival of ambulances. All MDA salaried employees and volunteers are trained in mass-casualty response. The MDA ambulances transport patients to one of the 29 emergency departments in Israel, which has a population of 9.8 million. Of these, seven are Level 1 Trauma Centers.

Narrative

At 06:30 on October 7, 2023, a massive missile attack began from Gaza against the Israeli population in southern and central Israel. That morning, approximately 400 ambulance crews were working across the country, and around 15 of them were operating in the



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Figure 1. Secondary Transfers Performed by MDA Over a 12-Hour Period on October 7, 2023.

Note: The grey line indicates the transfers from Soroka Medical Center (SMC) and the black line indicates the transfers from Barzilai Medical Center (BMC). There was a total of 64 patients transferred: 38 patients were transferred from Barzilai Medical Center and 26 from Soroka Medical Center. Abbreviation: MDA, Magen David Adom.

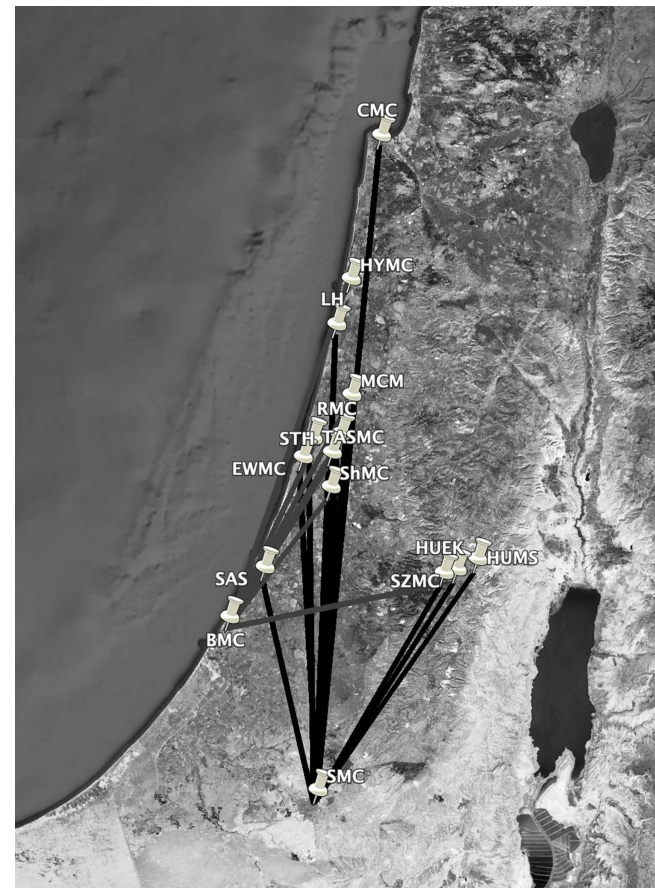
area of the attack. When the missile attack began, MDA raised its alert, and within half-an-hour, the number of teams doubled from 400 to 960. Using the missile attack as cover, 3,000 Hamas terrorists invaded from Gaza, shooting at every person in their path, blowing up vehicles and homes, and setting them on fire. Weapons included Kalashnikov automatic rifles and rocket-propelled grenades. The area of this mega terrorist attack is rural with over 25 kibbutzim (communal settlements) and villages, and three cities with a total population of around 100,000. Thousands of calls regarding gunshot victims from the area under attack by Hamas terrorists were received by MDA, with the first one coming in at 06:59. As attacks on civilians grew, so did the number of emergency calls. Many of the wounded suffered from high-velocity bullet wounds, shrapnel injuries, and burns. In addition to civilians, three MDA personnel – one ambulance driver, one paramedic, and one on-call volunteer first responder – were killed. Seven MDA ambulances were intentionally shot and one was burnt, rendering them useless. Approximately 1,200 people were killed in this attack, 239 were taken as hostages, and 1,455 were injured.^{5,6} The nature of the injuries required large numbers of ambulances to transport severely injured and dying patients to nearby hospitals. The two hospitals closest to the area are Barzilai Medical Center (BMC) in Ashkelon (20-30km), a Level 2 Trauma Center to the north with 560 beds, and Soroka Medical Center (SMC) in Beer Sheva (30-50km), a Level 1 Trauma Center with 1,123 beds. Due to the fighting, many roads were closed, extending travel and limiting initial regulation between hospitals.

Victims began arriving at SMC at 07:30 and at BMC at 09:00. By 09:00, all MDA ambulances in the organization were manned. During the day, these two hospitals received 650 and 372 casualties, respectively. There were at least 600 patients transferred directly from the scene by MDA to the other hospitals in Israel. Besides MDA, other victims were brought by military helicopters, other ambulance services, or private vehicles.

Because of the overwhelming number of victims taken to SMC and BMC, it became necessary to implement a strategy of secondary transfer. Over a 12-hour period on October 7, 2023, there was a total of 64 patients transferred. The first transfer began from BMC at 12:20, whereas only at 15:37 from SMC, with both hospitals transferring patients until close to midnight (Figure 1). A total of 38 patients from BMC and 26 patients from SMC were secondarily transferred. Fourteen hospitals received patients from the two transferring hospitals; the closest transfer was from BMC to Sheba, Tel-HaShomer Medical Center in Ramat Gan (57km), and the furthest transfer was from SMC to Carmel Medical Center in Haifa (194km). Overall, 16 were transported by ALS ambulance, 34 emergently by a BLS ambulance, and 14 non-emergently by a BLS ambulance (Table 1; Figure 2).

Discussion

Israel unfortunately has had years of experience with MCEs due to terror which includes suicide bombing, stabbings, and vehicle rammings.⁷⁻⁹ Israel defines a mega terrorist attack whereby there are more than 500 victims. Until now, this has been theoretical rather than reality.¹⁰ Any MCE presents multiple challenges, particularly with the treatment of patients at the scene, and a mega terrorist attack even more so. The concept of a triage or evacuation hospital is whereby only the most emergent patients are treated at the closest hospital and all others are transferred.¹¹ Actual studies describing secondary transfers are quite sparse. In 2009, a Turkish airline crashed near Amsterdam resulting in 126 surviving



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Figure 2. Map Based on Google Earth Depicting the Secondary Transfers from Soroka Medical Center (SMC) and Barzilai Medical Center (BMC) on October 7, 2023.

Abbreviations: BMC, Barzilai Medical Center; SMC, Soroka Medical Center; STH, Sheba Tel HaShomer Medical Center; RMC, Rabin Medical Center; ShMC, Shmair Medical Center; TASM, Tel Aviv Sourasky Medical Center; HYMC, Hillel Yaffe Medical Center; MCM, Meir Medical Center; HUEK, Hadassah University Hospital-Ein Kerem; EMMC, Edith Wolfson Medical Center; CMC, Carmel Medical Center; LH, Laniado Hospital; SZMC, Shaare Zedek Medical Center; HUMS, Hadassah University Hospital Mount Scopus; SAS, Samson Assuta Ashdod University Hospital.

casualties. Only three were secondarily transferred – all from either Level 2 or Level 3 Trauma Centers to a Level 1 Trauma Center.¹² In Israel in 2005, a suicide bomber detonated explosives outside a major metropolitan area in Israel. Four victims died at the scene and a total of 58 wounded were evacuated. Two with significant head injuries were secondarily evacuated from the local Level 2 Trauma Center to a more distant Level 1 Trauma Center – one by helicopter and one by ambulance.³ In a study of 33 mass-casualty terror attacks in Israel from 2000-2002, out of 1,156 injured patients, only 27 underwent secondary transfer within two hours to a different facility. Most of these were from a lower-level facility to a trauma center.¹³

The prehospital response to the MCE from October 7, 2023 is unique in a few aspects. It was the first mega terrorist attack in

Israel's history – resulting in combat-type injuries in a civilian population. The secondary transfers may have occurred first from BMC as it is a smaller hospital and a Level 2 Trauma Center as opposed to SMC which is much larger and a Level 1 trauma facility. It should be noted that because of the overwhelming numbers of injuries, even those that were less severe were secondarily transferred to other centers. Another unique aspect is that the secondary transfers were carried out while the MCE was on-going – including continuous missile fire at Israel and terrorists who were still active. It should be noted that there was no lack of

ambulances, and that throughout the MCE, vehicles from regions throughout the country participated. One critique of the emergency management on October 7, 2023 is that even more patients should have been secondarily transferred.

By providing a post-hoc analysis of a mega MCE, one can incorporate lessons to provide better care in future events. These lessons include the earlier implementation of secondary transfers and the importance of conducting secondary transfers even from a Level 1 Trauma Center when the sheer number of victims overwhelms the system.

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