Managing Mild Casualties in Mass-Casualty Incidents: Lessons Learned from an Aborted Terrorist Attack

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Abbreviations:
EMS = emergency medical services
EPA = Early Phase of Admission
HFC = Israel Defense Forces Home Front Command
MCI = mass-casualty incident
SPA = Second Phase of Patient Presentation

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Abstract

Introduction: Mildly injured and "worried well" patients can have profound effects on the management of a mass-casualty incident. The objective of this study is to describe the characteristics and lessons learned from an event that occurred on 28 August 2005 near the central bus station in Beer-Sheva, Israel. The unique profile of injuries allows for the examination of the medical and operational aspects of the management of mild casualties.

Methods: Data were collected during and after the event, using patient records and formal debriefings. They were processed focusing on the characteristics of patient complaints, medical response, and the dynamics of admission.

Results: A total of 64 patients presented to the local emergency department, including two critical casualties. The remaining 62 patients were mildly injured or suffered from stress. Patient presentation to the emergency department was bi-phasic; during the first two hours following the attack (i.e., early phase), the rate of arrival was high (one patient every three minutes), and anxiety was the most frequent chief complaint. During the second phase, the rate of arrival was lower (one patient every 27 minutes), and the typical chief complaint was somatic. Additionally, tinnitus and complaints related to minor trauma also were recorded frequently.

Psychiatric consultation was obtained for 58 (91%) of the patients. Social services were involved in the care of 47 of the patients (73%). Otolaryngology and surgery consultations were obtained for 45% and 44%, respectively. The need for some medical specialties (e.g., surgery and orthopedics) mainly was during the first phase, whereas others, mainly psychiatry and otolaryngology, were needed during both phases. Only 13 patients (20%) needed a consultation from internal medicine.

Conclusions: Following a terrorist attack, a large number of mildly injured victims and those experiencing stress are to be expected, without a direct relation to the effectiveness of the attack. Mildly injured patients tend to appear in two phases. In the first phase, the rate of admission is expected to be higher. Due to the high incidence of anxiety and other stress-related phenomena, many mildly injured patients will require psychiatric evaluation. In the case of a bombing attack, many of the victims must be evaluated by an otolaryngologist.

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Introduction

The frequency of mass-casualty incidents (MCIs) due to terrorist attacks increased during the last decade.[1-4] The success of the medical management of a MCI is dependent on a rational allocation of resources that will ensure the best possible treatment for the largest number of casualties in the appropriate amount of time. This objective is attained by triaging the casualties as either urgent or non-urgent.

By definition, non-urgent patients require fewer immediate intensive surgical and medical interventions than urgent ones. However, by improving the

management of the non-urgent casualties, the burden on the system can be reduced, improving resource utilization and outcome. Moreover, proper treatment of the non-urgent casualties is essential, since an emotionally traumatized person may require both medical and psychosocial support for years.

While much has been published regarding the large number of non-urgent casualties expected in a non-conventional setting (i.e., biological, chemical, radiological), only a few focus on the management of the mildly injured in the conventional setting.

On 28 August 2005, a suicide bomber detonated an explosive device near the central bus station in Beer-Sheva, Israel. Due to the quick response of bystanders and security personnel, the suicide bomber activated the explosive device in a relatively remote area, directly injuring only two people.

This study defined the lessons learned from this unique event, especially regarding the distribution of chief complaints, usage of healthcare resources, and dynamics of presentation of the large number of mild casualties and stress victims to the emergency department. Management guidelines to cope with similar future events are presented.

Methods

Collaboration in Management

The Medical Department of the Israeli Home Front Command (HFC) deploys a Medical Operations Center that communicates with all relevant organizations, acquiring and transmitting real-time information and instructions to manage MCIs and other emergencies.[3–6] The nearby Level-1 Trauma Center (Soroka Medical Center) activated its MCI protocols after receiving early notification of a MCI from the emergency medical services (EMS) and the HFC Medical Department. Home Front Command Officers were dispatched to the affected area, EMS headquarters, and Soroka Medical Center. The HFC officers, physicians, and nurses gathered and transmitted information to the Operations Center, hospitals, EMS, and other relevant organizations. Post-MCI debriefings were held in all relevant organizations, including the HFC Medical Department and Soroka Medical Center. Each debriefing was conducted according to a standardized protocol—with each organization reporting its data and answering questions. In order to allow free communication between organizations, such debriefings were closed to the media. The data presented were retrieved from the HFC formal debriefing.[7]

Medical data were collected from hospital records of all patients (n = 64) treated at Soroka Medical Center with a chief complaint that was related to the MCI. Information regarding the patients' complaints, injuries, diagnosis, and treatment was collected, as well as personal information (age, gender, occupation, etc.). The data were coded and processed using Microsoft Excel software (Microsoft, Inc., 2003, Redmond, WA). Due to the small number of casualties, only descriptive statistics were used.

Results

It appears that the primary plan of the suicide bomber was to board a crowded city bus and activate the device inside the bus. However, while attempting to board the bus, the suicide bomber was spotted by the bus driver, who closed the doors of the bus, preventing the bomber from boarding, and called for security. In response, two security officers approached the bomber. The suicide bomber then activated the explosive device in an open and relatively remote area of the central bus station, killing himself and severely injuring two security officers. A timetable of the event is provided in Table 1.

Sixty-four patients were treated at the nearby Soroka Medical Center. During initial treatment, two casualties (3%) suffered multiple, traumatic injuries, and were classified as urgent. The remaining 62 were classified as non-urgent. Among these victims, anxiety was the most frequent complaint, and was recorded in 30 (47%) of the patients. Other frequent complaints included weakness and dizziness (30%), tinnitus (28%), and headache (19%). A full report of the main complaints is presented in Table 2.

Dynamics of Hospital Admissions

The accumulation of emergency department admissions is shown in Figure 1. Forty-eight patients (75%) presented to the emergency department within the first two hours after the bombing. Thus, the arrival rate to the emergency department in the first two hours was approximately one patient every three minutes. After the first two hours (during the SPA), the rate decreased to one patient every 27 minutes.

Variations in Chief Complaints

The nature of the complaints between the two phases of presentation differed. Anxiety was recorded in 25 (52%) of the patients evaluated during the Early Phase, but only in five (16%) of patients during the Second Phase. In contrast, somatic complaints (e.g., weakness, nausea, non-cardiac chest pain) were recorded in only 19 (40%) of the patients during the Early Phase, and in 12 (75%) of cases during the second phase. Figure 2 specifies and compares the complaints in both phases. The major difference between the phases is the shift from anxiousness to somatic phenomena. A total of 83% of all patients complaining of anxiety arrived at the emergency department within the first two hours, whereas only 64% of all patients with somatic complaints arrived within that same timeframe (Figure 1).

Healthcare Personnel Requirements

The casualties were examined by a variety of healthcare professionals (Table 3). A psychiatrist was involved in the critical incident stress diagnosis and treatment of 58 patients (91%). Counseling from social workers was necessary in 47 cases (73%). Due to the profile of the injuries, surgical specialists were involved in a relatively small number of cases. Table 3 also specifies the differences in the utilization of healthcare professionals between the two phases. While some specialties (e.g., orthopedics) mostly were required during the Early Phase, psychiatry and otolaryngology specialists were required throughout both phases of the event.

Discussion

This terrorist attack in Beer-Sheva is unique in the frequency distribution of injuries, because only two of the vic-

Time from bombing	Actual time	Description of event
0:00	08:27	Initial notification EMS center
0:06	08:33	First ambulance at the scene
0:13	08:40	First urgent victim admitted to the ED
0:14	08:41	First non-urgent victim admitted to the ED
1:19	09:46	Termination of EMS evacuation of casualties
9:31	17:58	Last non-urgent patient admitted to the ED

Table 1—Timetable of the medical efforts in the terrorist attack (ED = emergency department; EMS = emergency medical services)

Complaints[1]	Number of Patients	% of non-urgent patients[2]
Anxiety	30	48%
Weakness and dizziness	19	30%
Tinnitus	18	29%
Headache	12	19%
Chest pain[3]	9	15%
General pain	4	6%
Nausea	3	5%
Facial trauma[4]	3	5%
Torso or limb trauma[5]	3	5%
Syncope or "near-syncope"	3	5%

Table 2—Chief complaint distribution
[1]Other complaints, such as: back pain, arthraligia, etc., were recorded in <3 patients each.
[2]The sum is >100% because some of the patients had more than one complaint.
[3]All chest pain complaints were found to be non-cardial in nature.
[4]Facial trauma was due to falls, and not from debris or direct explosion.
[5]All victims of minor trauma, released from the hospital without any special intervention.

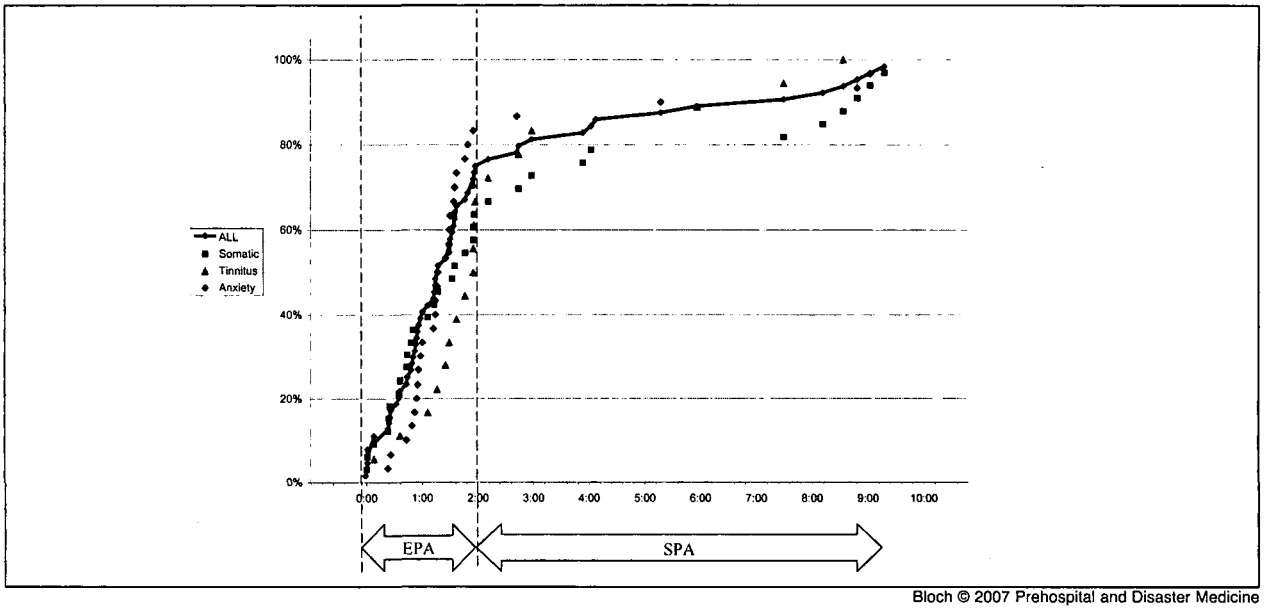

Figure 1—Accumulation of patients in the emergency department (based on time of arrival). Note the high rate of patient accumulation in the early phase. (EPA = Early Phase Admissions; SPA = Second Phase Admissions)

tims were close enough to the explosion to suffer direct injuries. This incident allows for the examination and identification of the characteristics and dynamics of the non-urgent causalities in a MCI. The unique profile of this event contradicts the common practice of extrapolating the number of expected non-urgent casualties by multiplying the number of urgent casualties by a preconceived number. Even an aborted terrorist attack can produce mass casualties who required medical attention. Defining and specifying the needs of these patients may help improve protocols for the operation of mild injury sites during MCIs.

Dynamics of Patient Arrival

The patients presented to the hospital in two phases. The Early Phase of Admission (EPA) duration was two hours from the first admission. Patients that arrived during this

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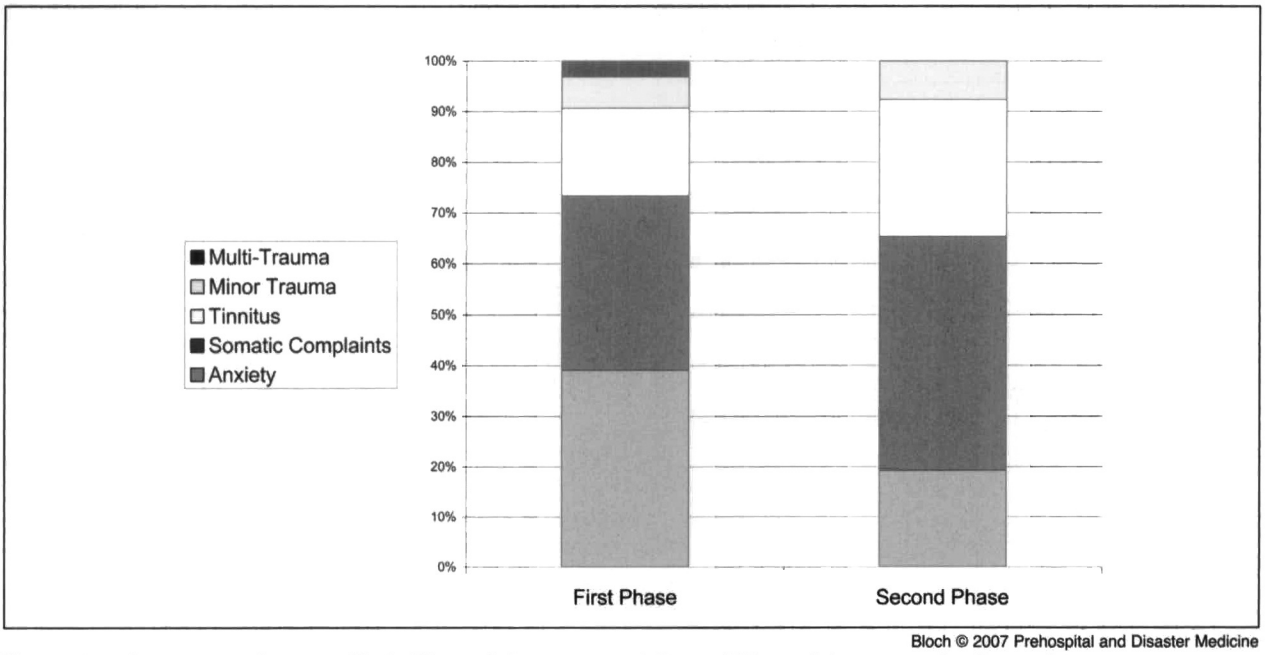

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Figure 2—Comparison between Early Phase Admissions and Second Phase Admissions chief complaints

Specialty[1]	Number of cases (% of all cases)	% of EPA cases	% of SPA cases
Nurse	61 (95)	94	100
Surgery	28 (44)	50	25
Psychiatry	58 (91)	94	81
Social Workers	47 (73)	90	25
Orthopedics	10 (16)	21	--
Otolaryngology	29 (45)	48	38
Internal Medicine	13 (20)	13	44

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Table 3—Healthcare professionals utilization in the two phases (EPA = Early Phase Admissions; SPA = Second Phase Admissions)
[1]Other specialists such as neurosurgeons and gynecologists were consulted in a few cases.

Early Phase Presentation	Second Phase Presentation
Expected medical conditions (by frequency): -Anxiety -Somatic Complaints -Tinnitus -Minor Trauma	*Expected medical conditions (by frequency)* -Somatic Complaints -Anxiety -Tinnitus -Minor Trauma
Rate of admission: High	*Rate of admission:* Low
Resources usage: High	*Resources usage:* Normal
Medical staff: -Nurse -Psychiatrists -Social Worker -Otolaryngologist -Surgeon Other professions such as internal medicine, gynecology, and orthopedics should be available	*Medical staff:* -Nurse -Psychiatrists -Social Worker -Otolaryngologist Internist should be available because of a high rate of somatic complaints

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Table 4—Main characteristics of early phase presentation versus second phase presentation

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phase more commonly complained of anxiety, and some of them suffered from minor trauma. The Second Phase of Patient Presentation (SPA) lasted for several hours, and was characterized by a lower rate of patient arrival and a higher frequency of somatic complaints (e.g., chest pain, headache, dizziness). The characteristics of each phase are summarized in Table 4.

The duration of each phase can vary depending on a range of factors, including the: (1) distance between the site of the event and the nearest medical center; (2) means of evacuation; and (3) severity of the event. Identifying the shift between the two phases during an event may be difficult, but may be aided by recognizing a sharp decline in the rate of new arrivals.

The biphasic behavior can be explained in more than one way. Perhaps it takes longer to develop somatic phenomena (after the heroic and honeymoon periods), as opposed to anxiety that tends to appear immediately after the event. Another explanation could be that some of the patients arriving in the Second Phase are looking for secondary gain, such as sick leave or insurance compensation. Further research is needed in order to find the exact cause of this phenomenon.

Utilization of Healthcare Professionals

Throughout the event, a variety of professionals were utilized. After examining the utilization of professionals during the two phases, it was apparent that some were needed only during the Early Phase (surgical and orthopedic consults), whereas others (psychiatrists and otolaryngologists) where needed throughout both phases.

Limitations

This is a retrospective study of a single, unique, event. Due to the relatively small number of patients, no statistical significance was identified. In order to learn from these findings, more data must be collected from similar events and large-scale disasters.

Conclusions

A mild injury site should be activated following a MCI, and should be kept active for a reasonable period of time after the last urgent casualty arrives. There must be a separate stream for the treatment of mildly injured patients. This site might be located in close proximity to the emergency department, since that is where the patients will present spontaneously, and so that patients with minor injuries who present to the emergency department can be redirected, decompressing the acute care area. During the EPA, one can expect a high rate of patient presentation. After the EPA, the rate of patient arrival will decrease. Many of the patients arriving during the EPA, and most of the patients arriving during the SPA will need psychiatric evaluation. In the event of an explosion, evaluation by an otolaryngologist will be required during both phases. Surgical specialists will be utilized mainly during the EPA. More research is needed on the exact cause for the biphasic admission behavior.

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