SPECIAL REPORT

National Strategy for Mass Casualty Situations and its Effects on the Hospital

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Abbreviations:
ATLS = Advanced Trauma Life Support
CT = computerized tomography
MCS = multicasualty situation
MCSP = MCS plan
MOH = Ministry of Health
SHA = Supreme Hospitalization Authority
VIP = very important person

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Abstract

A mass-casualty situation (MCS) usually is short in duration and resolves itself. To minimize the risks to patients during MCS, planning is essential. This article summarizes the preparations needed at the hospital level, for a local MCS involving numerous trauma victims arriving to the Emergency Department at a short notice. Experiences and conclusions related to the implementation of the Israeli strategy in one hospital that combines the responsibilities of both the military and civilians are summarized.

The Ministry of Health distributes the master MCS plan to each hospital where a local committee adapts it to the specific situation in a format of standing orders. After its approval by the Ministry of Health, an annual inspection is conducted to check the ability of the staff to manage a MCS. A full-scale drill is conducted every second year during which each site's readiness level and the continuity of the flow of care are tested.

In building the strategy for treating trauma victims during a MCS, a few assumptions were taken into account. The goal of treatment in a MCS is to deliver an acceptable quality of care while preserving as many lives as is possible. In theory, the capacity of the hospital is its ability to manage a load of patients in the range of 20% of the hospital bed capacity. Planning and drilling are the ways to minimize deviations from the guidelines and to avoid management mistakes. Special attention should be paid to problems related to the initial phase of receiving the first message, outside communication, inside hospital communication, and staff recruitment. Other issues include: free access to the hospital; opening a public information center; and dealing with the media and very important persons (VIPs).

A new method for creating the needed MCS plan in the hospital is suggested. It is based upon knowledge of management techniques that used multi-level documents, which are spread via Intranet between the different key figures. Using this method, it is possible to keep the strategy, the source documentation, and reasons for choosing it, as well as immediate release of checklists for each functions. This detailed, time consuming work is worthwhile in the long run, when the benefits of easy updating and better preparedness are apparent.

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Introduction

A mass-casualty situation (MCS) is defined as a situation in which at a certain moment, there are more casualties than the system is able to manage.[1] In other words, the demand for medical care is greater than the supplies available. A MCS usually is short in duration and generally resolves itself. Such situations can occur anywhere and by many scenarios, but usually relate to victims with traumatic injuries. Although the

hospitals are well-staffed, it is necessary to cautiously explore each hospital's ability to accomodate a large number of casualties that suddenly arrives at its doors. However, the injured patients will not receive the same level of medical treatment that would have been provided had they been treated as an individual rather than as one of multiple casualties arriving simultaneously (or nearly so). This results from lack of adequate staff to meet the situation—the key problem in MCS.

A MCS has been defined as "classical ambush situation".[1] A MCS always happens suddenly, usually at the least convenient time, when the staff is most unprepared. To minimize the risks to patients during a MCS, planning for such an event is essential. This article summarizes the preparations required at the hospital level for the management of MCS with trauma victims. It also suggests a mechanism to retain the knowledge invested in the preparedness plan.

National Level Demands for Hospital Organization

During most of its 50 years of existence, the State of Israel has been surrounded by proclaimed enemies, fought numerous wars for survival, and has been threatened by terrorist attacks. Consequently, the Israeli government created and reinforced a strategy for dealing with a MCS on the national level as well as on the individual hospital level. To create and implement these strategies, the Ministry of Health (MOH) created the Board of Supreme Hospitalization Authority (SHA) whose main objective is to organize the national health system during a period of strife.[2] The Director General of the MOH is head of the Authority, and its two other permanent members are the Surgeon General of the Israeli Defense Forces and the Chairman of Kupat Holim (the main medical insurance fund). The Supreme Hospitalization Authority works on a government budget, and is organized into committees: the objective of one committee is to create a strategy for the organization of hospitals in case of a MCS, and to evolve a mechanism to provide for the optimal treatment of patients in such a situation.[3] Included in this strategy are the indices for personnel needs, equipment, and supplies to be kept in storage within the hospital for use during such events.

Strategies

A closed circle of strategies is followed:

1. These strategies and decisions are recorded in a master book of guidelines called a Mass Casualty Situation Plan (MCSP);[4]
2. The master MCSP is distributed to each hospital;
3. The hospital is required by formal regulations, to develop a set of standing orders tailored to its needs by considering its geography and manpower;
4. The local MCSP is compared to the master MCSP by the Committee of the SHA, which then is approved or returned for corrections; and finally,
5. Other special committees of the Supreme Hospitalization Authority conduct an annual check of the hospital's readiness in order to assure the appropriateness and applicability of its MCSP.

Issues

The main issues for these annual checks include:

1. Familiarity of the staff with the strategy of managing trauma patient during a MCS;
2. Updating of the local standing orders according to the changes in the master MCSP, recent conclusions, local changes in the structure and personnel of the hospital, as well as results of the last drills;
3. Maintenance of caches of medical supplies, including a proper plan for the immediate mobilization of these supplies;
4. Readiness of critical electronic equipment, such as monitors and ventilation machines;
5. Suitability of the care sites during a MCS;
6. Standing orders concerning outside organizations that can assist during a MCS, and the means of communication with these organizations; and
7. Public information systems that should provide answers to the public demands for information about casualties.

Every second year, a mandatory drill is conducted. There are two types of drills:

1. *Limited-scale exercise* — A limited-scale drill is one in which the hospital management team is drilled by instructors from the SHA. In this type of exercise, a software simulation is used to create the MCS, and the hospital information system is tested. This drill mainly addresses issues of integration and operation of the systems.[5] No disturbance to the routine work of the hospita is generated.
2. *Full-scale exercise* — In a full-scale drill, the hospital is flooded with mock casualties in an effort to mimic a MCS. The hospital ceases operating as a general hospital, and, for a few hours, performs as a hospital under a MCS. Referees monitor the hospital's performance, and a written report is sent to the Director of the hospital pointing out the weak areas that should be corrected. In the unlikely event of a total failure, another full-scale drill is conducted within six months of the failed effort.

The Strategy

In building the strategy for treating trauma victims during a MCS, a few assumption are taken into account. The goal of care provided in a MCS is to deliver an "acceptable" quality of care to preserve as many lives as possible and to prevent complications. Planning and drilling are the ways to minimize deviations from the guidelines, eliminate mistakes in management, and reach an acceptable threshold set to every hospital faced with a MCS. The theoretical capacity of the hospital is its ability to manage with only short notice, a number of casualties of approximately equal to 20% of its total bed capacity. This arbitrary number is used mainly for deciding the amount of medical supplies and equipment that should be available for immediate use. The most serious problem in MCS remains the temporary lack of an adequate number of qualified staff, and the efforts directed to overcome this deficit are tested.

The key issues in the strategy include:

1. Upon arrival to the hospital area, the casualties are triaged into three separate groups before entering the hospital. An experienced surgeon assigns each casualty

1. When to start in-hospital staff mobilization?
2. Is there a need for out-of-hospital staff recruitment?
3. Does the condition demand stabilizing the patients and referring them elsewhere?
4. Are treatment sites sufficient or there is a need for opening new treatment sites?
5. Does the condition mandate stopping routine hospital work (OR, hospital clinics, ...)?
6. Prioritizing OR use
7. Shortening OR waiting list by referring patients to other hospitals
8. Does the condition mandate opening a public information center?
9. Assessing critical shortages during conducting the MCS (staff, equipment, supply...)

Table 1—Crucial questions/decisions for mass casualty situations (OR = operating room/surgical suite)

into one of three groups: A) *Critical* — beyond treatment; B) *Severe* — immediate treatment; and C) *Moderate* — postponed treatment. The critically injured are those patients with an immediate life-threatening injury, whose chance of survival are poor even during a normal situation. Patients with severe injuries are those who, if not treated immediately, may die or lose a limb. Those slightly injured may tolerate a delay of treatment, even for several hours, without endangering life or limbs;

2. The patients in each of these three groups are treated in separate locations in order to ensure that the majority of personnel is devoted to treating the most severely injured who will benefit most from use of the committed resources;
3. The Advanced Trauma Life Support (ATLS^R) guidelines are followed as closely as possible. However, some acceptable shortcuts may be taken: 1) only life-threatening injuries are sought and treated; 2) no mobile radiography is used, as this is time consuming, creates a hazard to the medical staff safety, and can be substituted by clinical judgment; and 3) quickly available ultrasonography is the method of choice for detecting whether bleeding is present in the abdominal cavity, thus minimizing the need for computerized tomography (CT) during a MCS;
4. The stay in the admitting area is limited to diagnosis and treatment of life-threatening injuries. Diagnoses and treatments of additional injuries are done in the ward after the MCS subsides; and
5. Documentation is limited to the basic diagnosis and time of treatments provided. Every effort is made to plan and educate teams for using short forms and the use of concise writing.

Anticipated Problems

An MCS results in problems that often can be anticipated including:

1. *Alert while receiving the first message* — Because the news of the MCS can be short or confusing, instructions should be written to ensure that concise information is available. Validation of the notice and delivery to the decision-maker on duty are planned and drilled;
2. *Staff recruitment and outside communication* — A planned program using advanced technical solutions should be crafted. Communication cannot be based only on the use of telephone lines, but also should rely on the availability and use of cellular telephones and pagers. An efficient, computerized, calling switchboard that can reach >100 numbers per minute, has been installed;
3. *A checklist of decisions to be made after implementation of MCS status* — There should be a written checklist for the Director of the event to help to identify problems before they become obstacles (Table 1). Different constellations such as timing and local problems may affect the decisions and should be addressed by these written orders;
4. *Internal hospital communication* — Dedicated telephone lines for incoming calls should be kept open. Internal communication should rely on intercom (stentophones) and over-head paging, or portable receivers (distributed to persons performing key functions);
5. *Access to the hospital* — A plan to secure and maintain proper access to and from the hospital should be arranged together with assistance of external agencies. e.g., police, army, and security;
6. *Secondary triage measures* — Plans should be made for transfer of treated, stabilized patients to facilities outside the region (forward movement);
7. *Medical documentation* — Medical records should be short, but informative and transferable;
8. *Public information* — During a MCS, the public will converge on the hospital. Prior accomodations should be made to relay information to the public, e.g., a reinforced telephone system, recruitment of sufficient numbers of social workers. Special solutions should be prepared for dealing with unidentified victims, e.g., use of digital cameras and passing the pictures along with data to public information centers inside and outside of the hospital; and
9. *Media and VIPs* — A special officer should be assigned to deal with the media and very important persons. This should minimize the disturbances of these individual parties.

Bottlenecks

Two bottlenecks may develop during a MCS:

1. *Imaging department* — bottlenecks in the imaging department of the hospital may be overcome by bypassing the imaging department or minimizing its use. During a MCS, no routine x-rays will be obtained. Patients will be transferred from the admitting sites to

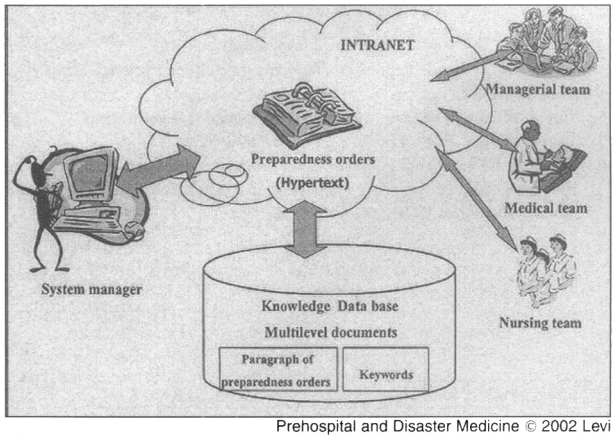

Figure 1—Knowledge and information

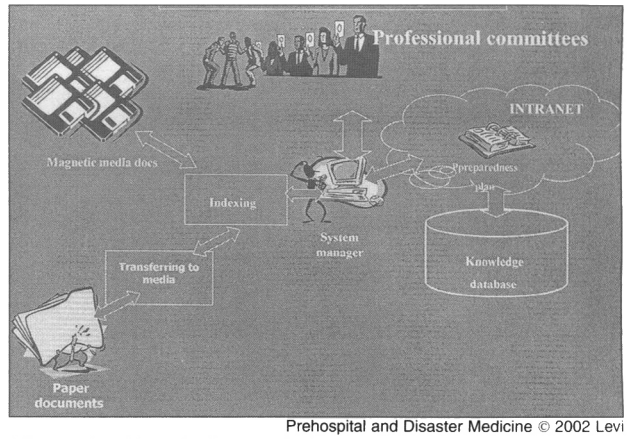

Figure 2—Knowledge updating

the OR or directly to the department. Thorough examination and initial treatment will be provided until the MCS subsides and radiography can be used again. The CT scan use should be reserved only for brain injured patients.

2. *Operating rooms (OR)* — The substitute for immediate surgery of life threatening conditions is problematic. Therefore, accepted principles for prioritizing of operations in MCS should be written in advance, such as life-saving laparotomy and thoracotomy (for bleeding and for patient in shock), as well as for major vascular injuries that endanger a limb. All other operations will not take place until it is clear that no other patients are expected, even if there is a vacant OR and staff is available. It is crucial not to start operations that do not fall into the above categories, as another wave of patients may swarm the hospital, require the attention of the medical staff, and pose a need for emergency operations. All the transfers to the OR should be coordinated with the chief of the OR to be sure that an OR is available and an operating staff is standing by.

Depending on the scenario, a plan for transferring patients to other hospitals (forward transfers), must be prepared. An anticipated delay of four hours for operation is a legitimate reason for transfer. The coordination of the transfer is done by the army, usually to a hospital outside the region of MCS. While awaiting the approval of a transfer request, the patients is transferred to a special site, which is called a "transfer waiting area". This site should in proximity to the transportation modality (ambulance parking or helicopter pad). However, it should not block the main transport route to the hospital triage area.

Development of a MCSP

A new method for creating the needed MCSP in a hospital is suggested. This is based upon the knowledge of management techniques, which use multi-level documents spread between the different key figures via Intranet (Figure 1). The process is an intranet-based, data system configured in multiple layers between the server and the clients.

The first stage consists of analysis of the system for building a peparedness protocol (set of standing orders) that currently is in place. Using this method, potential and actual pitfalls are identified including problems associated with changes of personnel and the loss of knowledge gained through local and national experience. An archiving mechanism was developed that facilitated linking of important documents to the upper level of the preset protocol. The system manager in in-charge of updating the documents and for adding knowledge-base data as "remarks" under each cogent paragraph of the plan. These data serve as references for timely discussions by the local committee (Figure 2).

Following completion of the indexing and linking of the above noted multilevel document (using hyperlink technology), basic tables outline the tasks assigned to key staff, main treatment facilities, and the critical equipment required. These tables are linked to the relevant chapters in the protocol, and then, the protocols are updated continually by the Human Resources and Logistics Departments.

The third level consists of checklists that are constructed by the department managers and approved by the local disaster committee. These checklists are attached to the plan thus facilitating their use and making them relatively easy to update. Together, these strategies enhance the ability to release the plan and the associated checklists when an incident occurs.

Conclusion

This method offers immediate access to an up-to-date MCSP through every computer that is linked to the system, which is useful in the early phase of treatment. An immediate release of the appropriate checklists for each of the key figures can be printed. The main, long-run advantage is the ability to keep not only the strategy, but the source documentation and reasons for choosing that specific decision – on the underlined levels of the document. Details of this application tested in one hospital are provided elsewhere.[6]

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