



Europe on Fire; Medical Management of Terror Attacks - New Era and New considerations

Amir Khorram-Manesh*

Prehospital and Disaster Medicine Center, Department of Surgery, Institute of Clinical Sciences, Sahlgrenska Academy, Gothenburg University, Gothenburg, Sweden

*Corresponding author: Amir Khorram-Manesh
Address: Regionens Hus, 405 44, Gothenburg, Sweden.
Tel: +46-707-722741
e-mail: amir.khorram-manesh@surgey.gu.se

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The impact of the constantly changing world on healthcare in recent years, technological innovations and economic austerity, as well as, the increasing number of pure “Social Disruptions” at hospitals (e.g. power outages, IT problems), and out of hospitals (e.g. mass gatherings) challenges the healthcare in how to organize itself at the time of major events and disasters (e.g. terror attacks) [1-3].

Terrorism is not a new phenomenon, but its modern version, formed after the Second World War and the rise of nationalist movements in the old empires, has become more violent [4]. Although the number of deaths in population due to other causes such as under-nutrition and obesity is far more than that of terrorism, the media has particularly focused on the number of deaths in terrorist attacks [4]. Recent developments in Europe have shown that the terrorist attacks have a new face, may occur everywhere and demands immediate involvement of healthcare [5, 6]. In such a scenario, the already affected healthcare system with radical reduction of emergency hospitals and hospital beds, overutilized EMS (Emergency Medical Services) and sub-specialization of medical profession, will be challenged both medically and organizationally [1,6].

The new pattern of terrorism aims to target masses rather than individuals. Mass casualties and severe military like injuries, not only challenges our

values, organizations and infrastructure, but also the competency of all organizations involved and calls for a total readiness, including risk and vulnerability analysis, research and education [7-10].

Type of Injuries

Blast injuries are caused by rapid pressure waves created by the detonation of explosives and cause multisystem, life-threatening injuries in single or multiple victims simultaneously. Indoor explosions cause the most severe injuries and have the worst outcomes. Survivors have predominantly primary and tertiary blast injuries. Secondary blast injuries may mainly occur in suicide bombings in open and/or semi-confined spaces. Life-threatening injuries involve lungs and hollow viscera. Limb injuries are rare in civilian setting and are mostly caused by a secondary blast effect created by projectiles and shrapnel implanted in explosive devices. Blast injury associated with skeletal damages may involve multiple skeletal sites and organ systems. Non-operative management and damage control techniques together with tertiary surveys to identify missed injuries are part of the treatment regimen [7,8,10].

The “Low” or “High” velocity energy delivered by a gunshot, results in a multimodal injury sustained to the vital organs. The impact of the bullet (damages) on tissues is characterized by a cavitation process or

direct delivery of energy. Muscles, bone, and blood vessels are mainly affected in the limbs. Almost all high-energy gunshots are considered contaminated and should be treated accordingly. Stabilization of bone, soft tissue care, adequate wound coverage, and restoration of limb function are important parts of the treatment strategy. Bone loss and soft tissue coverage together with maintenance of limb alignment and joint congruency restoration in cases of severe comminution are the big challenges [8,9].

Healthcare as a Key Player

The outcome of a terror attack is strongly related to the medical management and knowledge of healthcare on scene, at hospitals and during transportation between these two sites. Besides good organizational structures and policies, education, and training are important for a successful outcome [11-13].

EMS has long been used as a transporting unit. However, geographical distribution of patients, continuous demands in public health and safety together with new technology and overcrowded emergency departments, etc. has imposed new demands for a more advanced and educated EMS. There are two main philosophical approaches in the provision of EMS. Physician-led (Franco-German) ambulance care is staffed by physicians, is better equipped and brings the emergency department to the patients, 2) the Anglo-American approach, is staffed by EMS allied (e.g. paramedics) and the type of ambulance used is classified according to the skill levels of the staff. Although a third approach, a combination of these two has emerged, the conclusion is that the level of EMS competency differs globally and depends on existing legislation, education, and the economy, etc. of that region [14-16].

Although more standardized, hospitals are often classified as specialized or general hospitals. The pros and cons of sub-specialization and its impact within the hospitals has already been experienced by many countries and will not be discussed here. However, the medical impact will be the worst at the time of emergencies and when all resources are needed. Trauma and emergency hospitals should have all specialities needed to manage severe incidents, however, of different reasons only few can be found in a defined geographical area [1,17,18].

Beside competencies, other important criteria for a successful management of a mass casualty event e.g., command and control, communication, coordination and collaboration and logistic can be fully observed in recent terror attacks in France; 1) existing national disaster plans to mobilize hospital, prehospital and remote resources, 2) quick and vital decision of initiating the plan, 3) establishing regulatory crisis teams to organize triage and dispatch mobile units, 4) the use of a simple triage system (prehospital and hospital); - Absolute Emergency (red and orange), - Relative Emergency (yellow and green), and - expectant (blue), 5) the use of prehospital strategy

of damage control to allow the fastest possible hemostatic surgery by using tourniquet and clotting agents/devices and hypothermia prevention, 6) quick transport of victims in small groups to the appropriate hospital, 7) readiness of hospital and their crisis management center based on pre-designed disaster plans, 8) Quick identification of victims and utilization of provisional IDs, 9) Re-triage of patients at the hospital by experienced physicians, 10) continuous training in a multidisciplinary setting including creation of common protocols and guidelines [5,6,19].

Are We Prepared?

In a recent report, terror attacks in Boston, Paris and Brussels were discussed and some key factors such as 1) mutual prehospital triage, 2) similar prehospital and hospital triage, 3) short ambulance transport time, 4) existing mass casualty plans, 5) plans for blood delivery, 6) prehospital use of Tourniquets, 7) prehospital use of clotting devices, 8) mutual communication system, 9) psychological follow up, and 10) annual training were highlighted [20].

In a pilot study we asked 17 European experts (13 surgeons, 2 anesthesiologist and 2 nurses), some of them actively involved in different terror attacks, to answer these questions. Fourteen participants (10 surgeons, two anesthesiologist and two nurses from Belgium, Croatia, France, Germany, Italy, Netherlands, Portugal, Romania, Spain, Sweden, and United Kingdom) replied. The result showed that almost half of participants had no mutual prehospital triage and only five out of eight had the same triage in both prehospital and hospital setting. The average transport time was around 17 minutes. Almost all had a mass casualty plan at hospitals, but only 50% had a plan for blood delivery. Over 70% used tourniquets at prehospital setting, while almost none used clotting devices. Only 50% had a mutual communication system for multidisciplinary communication, 65% had a psychological follow-up program for their staff, and finally, only 57% had an annual training for their staff (unpublished data).

Is There Any Need for Improvement?

There are always a need for improvements. The new pattern of injury calls for a closer Civilian –Military cooperation, including mutual teaching activities. Training and exercises increases the reliability of the needed multidisciplinary management of major incidents. It also helps to standardize the response by creating protocols and guidelines for mutual approach and sharing information [16-19]. One may advocate the top-down organizational structure in Paris as one important cause of success. However, various country has its own structure and this statement should be proven scientifically.

Despite good management in Brussels, the

communication system collapsed early. Mutual communication systems should be identified, tested and used. Special attention should be made to the public communication system and potential risks for the healthcare[12].

A better medical and organizational management of terror attacks starts with working before it happens by planning, researching, educating, and training. This first step will prepare us for the needed

leadership, cooperation and collaboration under the critical hours of incident management. Finally, evaluation of the outcome, documentation, and presentation of lessons learned will continuously increase the possibility for improvement [1, 3, 5, 6, 12, 13]. Let us never forget that “to not plan is to plan to fail”.

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