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Terror Medicine: Birth of a Discipline

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Abstract

Increased global terrorism has given rise to unique medical requirements that may be described as terror medicine. Using Israeli experience as a reference base, this paper notes four broad areas of terror medicine: preparedness, incident management, mechanisms of injuries and responses, and psychological consequences. Whether terror medicine is treated as a stand-alone discipline or part of disaster medicine, or of a larger enterprise like public health, its parameters should be understood and taught. Efforts to discourage and prevent terrorist attacks should be among a society's highest priorities. No less important are the requirements to prepare for, respond to, and recover from these events. The more that individuals and institutions become familiar with the essentials of terror medicine, the greater the protection they can provide to the public.

KEYWORDS: terror medicine, preparedness, management, emergency response

Increased global terrorism has given rise to unique medical requirements that may be described as terror medicine. Whether terror medicine is treated as a stand-alone discipline or part of a larger enterprise, like public health, its parameters should be understood and taught. Recent Israeli experiences provide a useful reference for its understanding. Since 2000, some 1,100 Israeli civilians were killed and 7,500 injured, often from close-quarter explosives detonated by suicide bombers. Similar bombings have occurred in much of the world, including in Spain, the United Kingdom, Turkey, Indonesia, Jordan, and with increasing frequency Iraq. The Israeli experience in particular has prompted advances in medical management in four broad areas: preparedness, incident management, mechanisms of injuries and responses, and psychological consequences.

Preparedness

Preparedness ranges from the development of standard operating procedures to the stockpiling of supplies at accessible locations. These stored materials should match the needs of casualties, not only from explosives but other potential weapons including biological, chemical, and radiological agents.

They include: the antibiotics ciprofloxacin and doxicycline to treat anthrax and other illnesses associated with select biological agents; atropine and pyridostigmine bromide to counter the effects of sarin or soman nerve agents; and potassium iodide to mitigate damage from exposure to certain types of radiation. Like Israel, the U.S. is well-positioned in this regard. Its National Pharmaceutical Stockpile includes 50-ton packets of medical materials stored at eight secret locations around the country. Within 12 hours a packet can be flown to any site in the country to enhance local stockpiles.[1]

Preparedness also requires the ability to address sharp increases in the number of casualties. The government of Israel mandates that on brief notice every hospital be able to handle at least 20 percent more emergencies above its usual capacity. Several Israeli hospitals developed back-up plans that exceed the minimal requirement. In 2005, a newly built Center for Emergency Medicine was opened at the Hadassah-Ein Kerem hospital in Jerusalem. In minutes, the emergency bed capacity can be doubled to more than 100. The center's 4-foot-thick cement walls can withstand massive explosive impact. Two sets of shatterproof glass for each window can confine indoor air to a recirculating ventilation system for more than a week. Other hospitals, including Tel Hashomer in Tel Aviv and the Western Galilee Hospital in Nahariya, have underground rooms with hundreds of empty beds and IV stands at the ready.

Finally, preparedness requires educating healthcare workers about the various conventional and non-conventional agents, their clinical effects, and their implications for medical and administrative management. This is accomplished through lectures, seminars, and simulation exercises. Hospitals in Israel periodically participate in citywide and regional exercises that build on lessons from actual events. A practice drill may involve hundreds of simulated "casualties" from a variety of weapons.[2]

Incident Management

A second defining area of terror medicine relates to incident management. In Israel, distinctive procedures begin when Emergency Medical System responders arrive at a scene and a pre-assigned triage commander assesses the condition of each victim.
Since the modus operandi is "scoop and run," only minimal treatment is provided at the attack site, like maintenance of an airway and pressure to stop external bleeding. The most severely injured survivors are triaged to a “level 1 trauma center,” a hospital with advanced equipment and special expertise in trauma therapy. The less seriously injured may be sent to level 2 or 3 trauma centers, with efforts not to overload any single hospital. Israeli approaches now assure that ambulances begin to arrive at hospitals within 20 minutes after an attack.[3]

A second triage occurs at each hospital where patients may arrive as often as one every 20 seconds.[4] At the emergency area entrance, the designated surgeon-in-charge assesses each new patient. Patients are triaged to one of three admission sites according to severity of injury: 1) severe and critical, 2) moderate, and 3) mild. In Israel, the frequency of recent events has prompted hospitals to refine triage and hasten the admissions process.[5]

Protocols are also in place for communications requirements that connect hospitals with each other as well as with law enforcement authorities and inquiring families. With computer assistance, hospitals now can more quickly share information about patients so that family members can find each other.[6] This need was highlighted by news reports in August 2003, when a young mother and her baby were among scores of victims of a suicide bombing of a Jerusalem bus. She awoke in Shaare Zedick Hospital without her baby. At first frantic, her distress was eased after hospital-to-hospital inquiries located the unidentified baby at another hospital, where he was being treated for non-critical injuries.[7]

Terrorists have also sought to exploit the medical system. Since the discovery in 2003 of arms and gunmen in some Palestinian ambulances, all ambulances, even if conveying critically injured victims, must pause for brief inspection at the perimeter of a hospital’s grounds.[8]

Injuries and Responses

The third area of terror medicine encompasses the nature of injuries and manner of treatment. The worldwide spate of attacks with explosives has signaled the need for physicians and other healthcare providers to become familiar with the effects of blast devices[9, 10] Analysts have divided the cumulative information about blast effects into four categories.[11] Primary blast injuries arise from rapid changes in air pressure that can rupture the tympanic membrane (ear drums) and severely disrupt the lungs and other organs. Secondary blast injuries include penetrating wounds from fragments and other uneven projectiles. Tertiary blast injuries arise from compression caused by the collapse of buildings and the hurling of victims or surrounding objects. The fourth category covers all other injuries from blast, including burns, crush injuries, and damage from the inhalation of toxic particles.

Accepted forms of treatment for each type of injury generally predated

contemporary terrorism. But a close quarter bombing generates a combination that is otherwise rarely seen in a single individual: penetration wounds from small projectiles that damage soft tissues and vital organs; fracture bone and sever arteries and nerves; blast effects on the lungs, ear drums, and other organs, and severe burns.

This expansive list of injuries suffered by large numbers of victims prompted Israeli trauma surgeons to modify their response protocols. For example, multiple penetration wounds are now simply packed, to avoid excessive loss of blood and loss of heat, while the patient is operated on for more serious injuries. Experience also showed that patients who seemed stable were sometimes suffering from severe injury that was not initially obvious. Thus, repeated reassessments are warranted, which makes more likely the discovery of critical injuries not at first apparent.

Beyond injuries from explosives, terror medicine includes understanding and treating the effects of non-conventional agents. If recognized in time, infection from bacterial agents like Bacillus anthracis and Yersinia pestis (the cause of plague) can be treated with antibiotics. In the case of smallpox, vaccination may offer protection even if administered a few days after exposure to the virus. Similarly antidotes, if administered in time, can neutralize the effects of certain chemical agents and some forms of radiation. The Israeli experience also suggests interest by terrorists in delivering lethal combinations of conventional and non-conventional agents. Organizations including Hamas and al-Fatah sought to detonate explosives mixed with the anticoagulant rat poison warfarin, with AIDS-tainted blood, and with the chemical hydrogen cyanide.[12, 13]

Psychological Consequences

The fourth component of terror medicine involves the psychological effects of terror assaults. Terror incidents are recognized as a new kind of traumatic event that combines features of criminal assaults, disasters, acts of war, homicide, and political violence. As manifested by survivors of the 9/11 jetliner attacks, the sense of rage, grief, and despair becomes compounded.[14] The Israeli experience has also shown that initial psychological reactions after a terror attack are more intense than from other traumatic events like road accidents. Accordingly, early psychological intervention is essential. If not appropriately treated during the first six months after an incident, patients may suffer irreversible stress disorders.[15]

Israelis have undertaken a community response to the psychological effects of terrorism. Teams of psychologists and social workers visit day-care centers and schools to interview teachers about the behavior of youngsters in their care. They have been able to identify and help children who have been traumatized by terror incidents but whose parents had not previously sought psychological assistance for them.[16]

The psychological aspects of terror medicine also encompass the heightened emotional effects prompted by certain weapons. Biological weapons in particular can generate frightening reactions. People experiencing more common forms of attack, such as the bombing of a bus or building, tend to act responsibly because their sensory cues enable them to assess the threat and plan the rescue. But lethal bacteria and viruses might not produce symptoms for days or weeks after exposure. The insidiousness of a bioattack and the extended period of uncertainty after exposure can activate emotional responses that are more difficult to direct with reason.[17]

The anthrax attacks in the United States in the fall of 2001 underscored the widespread anxiety that can be caused by a bioattack. Perhaps a half-dozen letters containing spores of Bacillus anthracis were mailed to government and media offices, causing 22 people to become infected, five of whom died. Because of leakage from the letters, some 30,000 others were considered at risk of exposure and were treated with prophylactic antibiotics. But anxiety reached far beyond, as evidenced by the fact that people in all parts of the country became afraid to open mail.[18]

The particularly stressful effect of deliberately released biological agents is attributable to their being invisible, potentially lethal, and hard to avoid and control. Understanding the emotional reaction to such events may be enhanced through the prism of "terror management theory," which includes consideration of an individual's worldview and awareness of one's own mortality.[19]

Conclusion

The medical issues related to terror attacks can best be understood collectively as terror medicine. Although aspects of terror medicine overlap with emergency and disaster medicine, several characteristics, as have been shown here, are distinctive. Besides preparedness, management, the nature of injuries, and psychological effects, they include the intentionality behind an attack, the threat to healthcare providers, and special security measures. Thus terror medicine integrates knowledge relevant to the medical management of terror victims as well as the spectrum and pattern of their injuries. It serves as a basis for developing curricula and standard operating procedures toward prevention, treatment, and rehabilitation, both of individuals and communities.

The salience of this new discipline was acknowledged in 2005 with an agreement between the Hadassah Medical Organization in Jerusalem and the Robert Wood Johnson University Hospital in New Brunswick, New Jersey to establish an International Center for Terror Medicine (ICTM). The purpose of the ICTM includes the development and dissemination of information on best practices for caring for victims of terrorism and other mass casualty events.[20]

Efforts to discourage and prevent terrorist attacks should be among a society's highest priorities. No less important are the requirements to prepare for, respond to, and recover from these events. The more that individuals and institutions become familiar with the essentials of terror medicine, the greater the protection they can provide to the public.

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