EDITORIAL

Preparing for the Inevitable: Terrorists' Use of Explosives

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In this issue of *Disaster Medicine and Public Health Preparedness*, Peleg and Savitsky present the results of a 5-year retrospective analysis comparing injuries from terrorist acts to those from road traffic accidents as recorded in the Israel Trauma Registry (ITR). Their findings, both in this study and in previous work,[1,2] highlight 1 simple fact: casualties of terrorist attacks are more seriously injured than victims of everyday trauma. Their data demonstrate a higher Injury Severity Score (ISS), a lower Glasgow Coma Score (GCS), an increase in intensive care unit utilization, a higher inpatient mortality, and a longer rehabilitation period among those injured in incidents of terrorism. The authors analyzed injury data from all acts of terrorism as a single group. With regard to mechanisms reported in the ITR, explosions and bombings represented the majority of the terrorist events, with most of the remainder consisting of gunfire.

Despite justifiable concerns about the dangers of chemical, biological, or nuclear attack, it must be recognized that bombings with conventional explosives remain the terrorists' method of choice; most terrorist attacks are associated with explosions.[3] An overwhelming majority of terrorist attacks involving a large number of casualties are caused by explosions.[4,5] On February 12, 2009, the US Director of National Intelligence reported, "Conventional weapons and explosives will continue to be the most often used instruments of destruction in terrorist attacks."[6] Similarly, in its 2006 report on the future of emergency care in the United States, the Institute of Medicine noted that explosions are the most common cause of casualties associated with terrorism.[7–9]

The recent devastation wrought in India, Pakistan, Spain, and the United Kingdom demonstrates the impact that can be achieved by detonating explosives among densely packed civilians. In an instant, an explosion can wreak havoc, producing numerous casualties with complex, technically challenging injuries not commonly seen after natural disasters such as floods, tornadoes, or hurricanes. Explosions can inflict multisystem injuries on numerous patients simultaneously, produce unique management challenges to health care providers, and result in an immediate surge of patients into surrounding health care facilities. The potential for large numbers of casualties and a rapid surge of patients may stress and limit the ability of emergency medical services (EMS) systems, acute care hospitals, and other health care facilities to provide care for the onslaught of critically injured victims.[4,10,11]

Casualties of terrorist bombings are more critically injured than their counterparts from "routine" trauma.[2] Blast injuries are caused by impact from the supersonic overpressure blast wave (primary blast injury), blunt or penetrating trauma due to flying debris (secondary blast injury), blunt or penetrating trauma resulting from the body being displaced and thrown by the blast wind (tertiary blast injury), as well as other associated causes such as burns, crush, contamination, and exacerbation of existing disease (quaternary blast injury).[3] Bombing casualties may sustain multiple types of injuries simultaneously, requiring complex medical management. The environment of the bombing event can affect the types and severity of injuries. Bomb detonation in enclosed spaces (eg, bus, train, building) magnifies the effect of the blast overpressure wave, resulting in greater mortality and more severe injuries.[12]

The ongoing and increasing threat of terrorist activities, combined with documented evidence of decreasing emergency care capacity within the US health care system,[13–20] requires preemptive action. There is a need for specialized training and education for our nation's providers in the management of terror-related injuries, in particular blast injuries from bombings. Health care systems, public health agencies, individual hospitals, and health care personnel must collaborate to ensure that strategies are in place to effectively receive, evaluate, and treat large numbers of injured patients; to rapidly identify and stabilize the most critically injured; to evaluate these efforts; and to strategically plan for future incidents.[21]

Beginning in 2003, the Centers for Disease Control and Prevention has led a collaboration between national organizations of professionals in acute medical care, trauma, and EMS with state and local public health programs to efficiently and effectively respond to mass casualty events resulting from terrorism. Established and supported through cooperative agreement, this collaboration came to be known as the Terrorism Injuries: Information Dissemination and Exchange (TIIDE) project (past and current member organizations of the TIIDE project include the American College of

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Emergency Physicians, American College of Surgeons Committee on Trauma, American Medical Association, American Trauma Society, National Association of County & City Health Officials, National Association of EMS Physicians, National Association of Emergency Medical Technicians, National Association of State EMS Officials, National Native American EMS Association, Southern Nevada Health District, and State and Territorial Injury Prevention Director's Association). As part of its preevent preparedness, the Centers for Disease Control and Prevention and TIIDE partners are working to reduce the impact and improve management of injuries from terrorist bombings through the dissemination of blast injury educational products for health care providers, to include a PowerPoint educational module with lecture notes,[22] an interactive scenario-based training CD-ROM, 17 clinical blast injury fact sheets whose topics range from crush injuries and burns to the treatment of children and older adults, a quick-reference wall poster, and a quick-reference pocket guide. A blast injury surveillance instrument is also available. These products may be accessed at *www.emergency.cdc.gov/BlastInjuries*.

Blast injury from terrorist bombings is not an obscure disease. A terrorist bomb is being detonated nearly every day somewhere in the world. The United States is not immune to this global problem; a suspect who allegedly plotted the worst domestic terrorist attack on the United States since those of September 11, 2001 was being held in a Brooklyn, New York, jail at the time of this writing. It is vital that health care providers acquire knowledge in the treatment of blast injuries and that acute care facilities are prepared to apply strategies to deal with the surge of patients expected in a mass casualty bombing event.

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