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Casualties from Terrorist Bombings

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The physical factors responsible for injury following an explosion in a room or building are: direct exposure to overpressure; blast-induced whole body displacement; impact of blast-energized debris; burns from flash and hot gases. The patterns of injury seen in the casualties from four terrorist bombings are described to illustrate the types and severity of particular wounds. The most common fatal injury is brain damage; 'blast lung' is uncommon in civilian terrorist bombings; flash burns, fractures, serious soft-tissue damage, and eardrum injuries are seen in people close to the bomb, who usually require hospital admission; many others taken to hospital can be treated for injury by debris and released. The environment and its internal structure and the position of the occupants of the space can influence the type and severity of injuries.

Terrorism has been responsible for a large number of bomb explosions in Northern Ireland (NI) and the United Kingdom mainland over the last decade. Many of these attacks are designed to inflict economic loss by the destruction of property and the disruption of everyday life. A significant proportion are also designed to produce casualties—this is particularly true of bomb attacks on the UK mainland. Bombings designed to produce casualties are invariably successful if the device detonates. Busy public places such as public houses are obvious targets providing a large number of potential victims and an environment possessing tables, glasses, and bottles which may be fragmented and energized by the overpressure to inflict penetrating and nonpenetrating injuries.

Small explosions within confined spaces such as a public bar produce compound injuries of types that many hospital casualty units may not have experienced in any numbers. They may also stretch the resources of the hospital and its staff. One hundred sixty patients arrived at the St. Bartholomews Hospital, London, less than 1 hour after the explosion of a car bomb outside the Old Bailey, London, on 8 February 1973 (5). This paper attempts to define the types of minor and serious injuries resulting from explosions and also to delineate the major factors responsible for fatalities. This has been accomplished by surveying the major factors responsible for death and serious injury, and by assessing how the particular environment within which a bomb exploded affected the preponderance of particular wounds. The State Pathologist for Northern Ireland has allowed an analysis of bomb blast fatalities within the period 1969 through 1977. With the cooperation of various Police Forces it has also been possible to study in detail four bombing incidents that took place on the UK mainland in 1973 and 1974. The actual position of casualties relative to the exploding device has been determined in three of these incidents. The type and severity of injury have been assessed by the inspection of medical records.

This paper is in two parts. The first is a discussion of the types of injury that may be produced as a result of an explosion. The second part presents a description of four specific incidents.

TYPES OF INJURY

People occupying a room or building within which an explosive device detonates may be injured by a number of phenomena.

a) Direct exposure to air blast. This is a sudden change in environmental pressure propagated from the device and travelling radially at high velocity. (The velocity is dependent upon the overpressure but will be greater than or equal to the speed of sound in air, 330 m/s.)

b) Displacement by the mass movement of air with decelerative tumbling or impact against a rigid object.

c) Penetrating and nonpenetrating impact of blast-energized debris.

d) Burns from the flash and hot gases or the combustion of the surroundings.

e) Inhalation of noxious gaseous products of detonation and/or combustion.

f) Collapse of the building. This is only likely with large quantities of explosive.

The relative significance of each of these factors in

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