have inadvertently placed child occupants in a structurally vulnerable part of the building. Similarly, a Social Security Administration office was located in close proximity to the blast site. Protection of older and younger building occupants can be improved by placement of such facilities in more structurally reinforced areas. Regular evacuation training of personnel and clearly defined egress points and routes may also reduce fatality in a building bombing.

The generalizability of these findings to other building bombings is unknown. However, the characteristics of the Oklahoma City bombing—a targeted building accessed by a civilian vehicle containing a charge and significant explosive material that was detonated remotely, with significant resultant injury morbidity and mortality—is a pattern used frequently worldwide.[3] Future analyses of risk and protective factors in other bombing events are needed to better understand the influence of other bomb, building, and victim characteristics. Although primary prevention efforts are essential, in light of the increasing magnitude of terrorist bombings, this research can inform policy and injury prevention endeavors to significantly reduce morbidity and mortality.

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EDITORIAL COMMENTARY

Terrorism events around the world have been rising sharply in terms of overall numbers and people affected. Terror-related injuries have become a threat to almost every population throughout the world. Explosive events occur more frequently and are more sophisticated, causing larger numbers of injuries and more cases of multitrauma. Most of the recent attacks related to terrorism have been conventional bombings. Although these bombings comprise 53% of the total number of terrorism events in the world, they were responsible for 85% of all of the injuries caused by terrorist attacks.[1]

Glenshaw and her colleagues' research article on the bombing of the Alfred P. Murrah Federal Building in Oklahoma City in 1995 investigates aspects of preventive injuries and public health in the collapse of buildings.[2] The explosive device used in the bombing was made of 1814 kg of ammo-

nium nitrate, which had been soaked in fuel oil and detonated with high explosives, causing the partial collapse of the building.[3] An important fact to examine is that of the 168 people who died at this event, 163 were located inside the Murrah Building[2]; in other words, 87% of the fatalities occurred within the collapsed regions of the building.[3]

Important factors that affected the outcomes of the morbidity and mortality sustained in the Oklahoma City bombing include the type of explosive, density of the population, the number of people who were in the building at the time, where they were located in the building, where the explosive was placed within the building, the age of the building, the type of building in question, and whether a warning was received. Every factor is distinct and important. Glenshaw and associates' study design takes some of these factors into account.

The main questions these researchers attempted to address are the following: Can we really prevent injuries in victims after the building has already collapsed? Or should we focus our attention on preventive measures before the event that will reduce the chance that the building will collapse, thereby reducing the number of potential victims?

Before answering these questions, a general understanding of factors that affect morbidity and mortality from improvised explosive events must be understood:

1. *Type of area*—If the explosion happens in an open area or in a closed area.[4] This will influence the number and the type of the casualties, the accessibility of the rescue teams to the casualties, and the mechanisms used to rescue and recover victims. Also, when dealing with explosions in closed spaces, much depends on the actual type of closed space. For instance, the effect of an explosion inside a building is different than the effect of an explosion inside a bus.[4,5] Furthermore, outcomes will differ within a building depending on whether the event occurred in a room on the 9th floor, in the basement of a tower, or in a shopping mall.

2. *Type of explosive used*—Different types of explosions lead to different types of casualties. In most incidents casualties will have burns and blast and blunt impact injuries. In cases in which the explosion includes shrapnel, nails, and other materials, numerous penetration injuries will also be found. Some explosions result in compound, "multitype" casualties involving penetrating, blast, blunt and burn combined, and sometimes even crush injuries.

3. *Weight of the explosive*—Often, damage is affected by the weight of the explosive. For example, ≈2 tons of explosives, as were carried in the rented truck involved in the Oklahoma City bombing,[6] have a huge impact in comparison to 15 kg of explosives strapped to the body of a suicide bomber.

4. *Density of the crowd*—As the density and number of people in a crowd rises, the total number of victims will increase. Crowded places include nightclubs, restaurants, shopping malls, and office towers during working hours.[7]

After an explosion, survival is generally a factor of the effectiveness of the rescue team. Accessibility to the survivors, number of rescue teams, traffic patterns, time of day, and location (whether in the same area of the building and on the same floors) are important. Furthermore, terror events generally happen "out of the blue," so the chance of advance warning is usually nonexistent. Therefore, in a situation in which an explosion causes the immediate collapse of the building, preventive measures cannot be useful.

As Glenshaw and her colleagues correctly suggest, the focus should be on planning and mitigation. This means that, as a preventive measure, it should be accepted that every building will be built as a structure that will provide the highest level of security and safety to the people located within it. It is, however, beyond fiscal capabilities (it is, at least, not cost-effective) to reinforce or reconstruct all of the existing buildings in the US along these lines. Therefore, pragmatically, some steps to prepare for or possibly prevent some of the injuries that will occur can be suggested:

1. Identify buildings and places at high risk.
2. For buildings identified as being at high risk, define and prepare a security solution that includes the following:
   - Prevent unauthorized vehicles or people from approaching or entering the building.
   - Construct the building with special elements such as windows or walls that are capable of preventing or reducing the damage.
   - Construct "safe zones" in the building for important people or tasks.
   - Construct the building so that it will not collapse and will allow safe evacuation of the occupants.
   - Design safer buildings.
3. Educate and train the people who work in these buildings about how to react in situations of this kind (eg, when and how to evacuate the building).
4. Educate and train rescue teams to deal with such events to increase their ability to handle these situations.

Implementing these steps and others may, in fact, reduce the chance that a building will collapse as a result of a terrorist-instigated explosion. Nonetheless, we should remember that because there are so many factors that influence the outcome of acts of terrorism, even by reducing mitigating circumstances we may not eliminate the possibility that such events will actually occur.

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