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Trauma, terrorism, and disaster

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For us, this was something that did not compute. We could not keep up fast enough with the implications of what was going on. We could not accept it. We could not believe it . . .. That it could be damaged I could accept, but when I learned that the Towers had collapsed, I was just speechless. I could not believe it. I could not comprehend it because these are massive structures, and it was unbelievable to think that something like that could happen. You could not even begin to think about the human toll at first, inasmuch as you were trying to respond to the situation itself, which was so shocking . . .. It turned out that there was no need because there were no survivors of the magnitude we anticipated. That was both surprising and horrifying as we began to understand why.

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A traumatic event is defined by its capacity to evoke terror, fear, helplessness, or horror in the face of a threat to life or serious injury (American Psychiatric Association, 1994). A wide host of traumatic events can stun, terrify, and disrupt communities. Communities exposed to disasters experience multiple traumatic events including threat to life, loss of property, exposure to death, and often economic devastation. Disasters by definition overwhelm institutions, health care, and social resources and require from months to years for both individuals and communities to recover. Natural disasters can strike without much notice, as can human-made traumas such as transportation disasters, factory explosions, and school shootings which have become a seemingly common part of modern-day life.

Individual traumatic events such as motor vehicle accidents, sudden unexpected death of a close friend or relative, or witnessing violence and physical assault, put a huge demand on individuals and families but usually have little consequence for the larger community. In many Western cultures (but not all cultures), such individual traumas are seen as accidents that do not disrupt cultural assumptions

about social values or destroy access to social processes. Surveys in the general population estimate that approximately 69 percent of the US population are exposed to disasters or individual traumatic events over their lifetime (Norris, 1992). Of those exposed, 15 to 24 percent develop posttraumatic stress disorder (PTSD) (Breslau *et al.*, 1991; Kessler *et al.*, 1995).

Large-scale terrorist attacks are a particular type of disaster. They are human-caused, intentional interpersonal violence. Terrorists have used bombings, contamination, and weapons of mass destruction including chemical agents. The sarin nerve gas release in Tokyo and the anthrax attacks in the United States demonstrate the particular ability of chemical and biological weapons to create fear and social disruption. In addition to injuries and killing victims, the anthrax attack also forced the desertion of commercial and public buildings, disrupted the distribution of mail, occasioned social conflict, and evoked considerable fear and concern despite the fact that these attacks produced fewer casualities than car accidents and probably no greater economic loss. Terrorist events such as the Tokyo subway sarin gas attack in 1995, the bomb that exploded on a busy shopping street in Omagh, Northern Ireland, the World Trade Center attack on September 11, the 1998 embassy bombing in Nairobi, Kenya, and the 1995 Oklahoma City bombing, vividly demonstrate the strong psychological and social responses engendered by terrorism (North *et al.*, 1999; Pfefferbaum, 1999; Murakami, 2000; Tucker *et al.*, 2000; Schuster *et al.*, 2001; Galea *et al.*, 2002; Koplewicz *et al.*, 2002; Luce *et al.*, 2002; North *et al.*, 2002) and their impact on our beliefs and values (Jernigan *et al.*, 2001; *Morbidity and Mortality Weekly Report*, 2001).

Whether the perpetrators of terrorist acts represent powerful nations attempting to exert social control or small revolutionary religious or political groups attempting to impose their will upon their opponents, the purpose of most terrorists is to change the behavior of others by frightening or terrifying them and to kill those 'who do not believe' (Benedek *et al.*, 2002). Terrorism destroys the sense of safety and creates terror in individuals, communities, and nations. How the psychological response to a terrorist attack is managed may be the defining factor in the ability of a community to recover (Holloway *et al.*, 1997).

The deliberate infliction of pain and suffering as occurs in a terrorist attack is a particularly potent psychological stressor. In a nationally representative survey in the United States conducted the week after the September 11 terrorist attack, 44 percent of the adults reported one or more substantial symptoms of stress, and 90 percent reported at least low levels of stress symptoms (Schuster *et al.*, 2001). In the area most directly affected by the September 11 attack, 17.3 percent of the population were estimated to have PTSD or depression 1–2 months after the attack (Galea *et al.*, 2002). In a national study 1–2 months after September 11, rates of probable PTSD were 11.2 percent in New York City, 2.7 percent in Washington DC,

3.6 percent in other metropolitan areas, and 4.0 percent in the rest of the United States (Schlenger *et al.*, 2002). Approximately 35 percent of those directly exposed to the Oklahoma City terrorist bombing developed PTSD by 6 months (North *et al.*, 1999). An ongoing threat of terrorist attacks affects both the severity and duration of posttraumatic stress responses (Shalev, 2000).

Preventive medicine, a familiar organizing structure for conceptualizing infectious outbreaks, can also organize our understanding and interventions for behavioral and psychological responses to disasters (Ursano *et al.*, 1995b; Pfefferbaum and Pfefferbaum, 1998). In this model one identifies the pathogen, its source, and those exposed. For the psychiatric consequences of disasters the stressful psychological, physiological, and social events of the disaster are the pathogens. Terrorist attacks differ from disasters in the prominence of terror as the agent of disease and disruption.

Primary (preevent), secondary (event), and tertiary (postevent) interventions can decrease the risk of maladaptive behaviors, distress, mental disorder and disrupted functioning (Sorenson, 2002). Importantly, preevent interventions to decrease exposure to the traumatic event (e.g., practice drills) or its severity (e.g., seat belts) are an important and often overlooked component of mental health disaster planning (Aguirre *et al.*, 1998; Ursano, 2002). Identifying the groups of people that are most highly exposed to these stressors is the critical second step in determining the community consequences of a disaster or terrorist attack.

Characteristics and dimensions of traumatic events, disasters, and terrorism

Traumatic events can be first characterized by who is exposed, individuals or communities/populations (e.g., rape versus tornado). Individually experienced traumatic events can be further classified as intentional (e.g., assault) or unintentional, i.e., 'accidental' such as motor vehicle accidents. Similarly, community/population based traumatic events (i.e., disasters) are broadly categorized as human-made (e.g., terrorism, war, industrial accidents) or natural (e.g., earthquakes, floods, hurricanes) (Fig. 1.1). Often human-made disasters have been shown to be more disturbing and disruptive than natural disasters (for review see Norris, 2002). However, this distinction is increasingly difficult to make. The etiology and consequences of natural disasters often are affected by human beings. For example, the damage and loss of life caused by an earthquake can be magnified by poor construction practices and high-density occupancy. Similarly, humans may cause or contribute to natural disasters through poor land-management practices that increase the probability of floods. Interpersonal violence between individuals (assault) or groups (war, terrorism) is perhaps the most disturbing traumatic experience. Disasters, as well as individual traumatic events, are also characterized by their severity as well

Table 1.1 Dimensions of traumatic events

Threat to life
Exposure to the grotesque (dead)
Physical harm or injury
Loss of significant others
Loss of property
Information stress

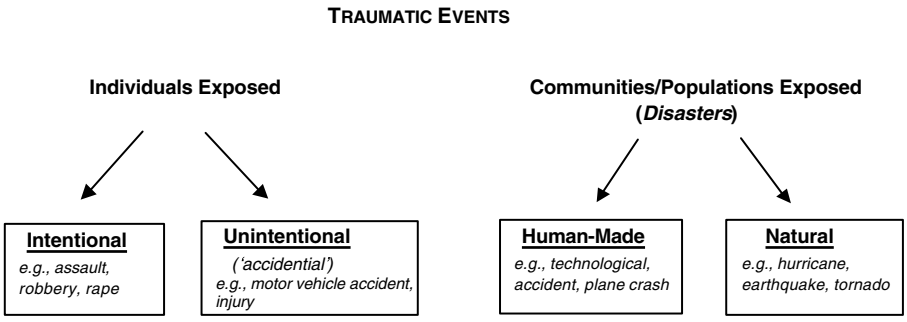

Figure 1.1 Characteristics of traumatic events.

as the nature of the stressful dimensions of the particular disaster (Green, 1990) such as: threat to life, exposure to the grotesque, physical harm or injury, loss of significant others, loss of property, or information stress (Table 1.1).

A major component of all traumatic events is disruption of the experience of safety. Some dimensions of traumatic events are more likely to engender psychiatric morbidity. High perceived threat, low controllability, lack of predictability, and high loss and injury are associated with the highest risk of psychiatric morbidity (American Psychiatric Association, 1994; Epstein *et al.*, 1997; Boudreaux *et al.*, 1998; North *et al.*, 1999; Schuster *et al.*, 2001; Zatzick *et al.*, 2001). For example, exposure to the dead and mutilated increases the risk of adverse psychiatric events (Ursano and McCarroll, 1990; Ursano *et al.*, 1995a; McCarroll *et al.*, 1996). Some groups such as first responders (firefighters, police, and Emergency Medical Technicians), hospital workers, and mortuary volunteers are routinely exposed to the dead and injured and therefore are nearly always at increased risk for a psychiatric illness and morbidity.

Increasingly, traumatic bereavement is recognized as posing special challenges to survivors (Raphael, 1977; Fullerton *et al.*, 1999; Prigerson *et al.*, 1999; Shear *et al.*, 2001). Interventions for bereavement are different than those for exposure to life threat both for adults and children (Pynoos *et al.*, 1987; Pynoos and Nader, 1993).

Table 1.2 Similarities and differences in terrorism, natural disaster, and technological disaster

Dimension	Terrorism[a]	Natural disaster[b]	Technological disaster[c]
Altered sense of safety	+++	+++	+++
Intentional	+++		
Unpredictable	+++	++	+++
Localized geographically		+++	++
Local fear	++	+++	+++
National fear	+++		
National bereavement	+++	+	+
Consequences spread over time	+++	++	++
Loss of confidence in institutions	+++	+	+++
Community disruption	+++	+++	+++
Target basic societal infrastructure	+++		
Overwhelm health care systems	+	+++	++
Hoaxes/copycats	+++		

[a] Terrorism, e.g., bombings, hostage-taking.
[b] Natural disaster, e.g., hurricanes, tornadoes, earthquakes.
[c] Technicological disasters, e.g., nuclear leaks, toxic spills.

In children traumatic play, a phenomenon similar to intrusive symptoms in adults, is both a sign of distress and an effort at mastery (Terr, 1981). While the death of loved ones is always painful, an unexpected and violent death can be more difficult. Even when not directly witnessing the death, family members may develop intrusive images based on information gleaned from authorities or the media.

Witnessing or learning of violence to a loved one increases vulnerability to psychiatric distress as well as does knowledge that one has been exposed to toxins (e.g., chemicals or radiation) (Baum *et al.*, 1983; Weisaeth, 1994). In this case, information itself is the primary stressor. Often times toxic exposures have the added stress of being clouded in uncertainty as to whether or not exposure has taken place and what the long-term health consequences may be. Living with the uncertainty can be exceedingly stressful. Typically uncertainty accompanies bioterrorism and is the focus of much concern in the medical community preparing for responses to terrorist attacks using biological, chemical, or nuclear agents (Holloway *et al.*, 1997; DiGiovanni, 1999; Benedek *et al.*, 2002).

Terrorism often can be distinguished from other natural and human-made disasters by the characteristic extensive fear, loss of confidence in institutions, unpredictability and pervasive experience of loss of safety (Table 1.2). In a longitudinal national study of reactions to September 11, 64.6 percent of people outside of New York City reported fears of future terrorism at 2 months and 37.5 percent at 6 months

(Silver *et al.*, 2002). In addition, 59.5 percent reported fear of harm to family at 2 months and 40.6 percent at 6 months. Terrorism is one of the most powerful and pervasive generators of psychiatric illness, distress, and disrupted community and social functioning (Holloway *et al.*, 1997; North *et al.*, 1999).

Health consequences of terrorism and disaster

The psychosocial, cognitive, and biologic effects of traumatic events are complex and interrelated (McEwan, 2001; Ursano, 2002; Yehuda, 2002). The behavioral and psychological responses seen in disasters are not random and frequently have a predictable structure and time course. For most individuals posttraumatic psychiatric symptoms are transitory. These early symptoms usually respond to education, obtaining enough rest, and maintaining biological rhythms (e.g., sleep at the same time, eat at the same time). Media exposure can be both reassuring and threatening. Limiting such exposure can minimize the disturbing effects especially in children (Pfefferbaum *et al.*, 2001). Educating spouses and significant others of those distressed can assist in treatment as well as in identifying the worsening or persistence of symptoms. At times, traumatic events and disasters also have beneficial effects serving as organizing events and providing a sense of purpose as well as an opportunity for positive growth experiences (Ursano, 1987; Foa *et al.*, 2000).

For some, however, the effects of disaster linger long after its occurrence, rekindled by new experiences that remind the person of the past traumatic event. PTSD is not uncommon following many traumatic events from terrorism to motor vehicle accidents to industrial explosions. In its acute form PTSD may be more like the common cold, experienced at some time in one's life by nearly all. If it persists, it can be debilitating and require psychotherapeutic and pharmacological intervention.

PTSD is not, however, the only trauma-related disorder, nor perhaps the most common (Fullerton and Ursano, 1997; North *et al.*, 1999; Norris, in press) (Table 1.3). People exposed to terrorism and disaster are at increased risk for depression, generalized anxiety disorder, panic disorder, and increased substance use (Breslau *et al.*, 1991; Kessler *et al.*, 1995; North *et al.*, 1999, 2002; Vlahov *et al.*, 2002). Forty-five percent of survivors of the Oklahoma City bombing had a post-disaster psychiatric disorder. Of these 34.3 percent had PTSD and 22.5 percent had major depression (North *et al.*, 1999). Nearly 40 percent of those with PTSD or depression had no previous history of psychiatric illness (North *et al.*, 1999). After a disaster or terrorist event the contribution of the psychological factors to medical illness can also be pervasive – from heart disease (Leor *et al.*, 1996) to diabetes (Jacobson, 1996). Importantly, injured survivors often have psychological factors affecting their physical condition (Shore *et al.*, 1989; Kulka *et al.*, 1990; Smith *et al.*, 1990; North *et al.*, 1999; Zatzick, 2001).

Table 1.3 Health outcomes

Psychiatric diagnoses
Posttraumatic stress disorder
Acute stress disorder
Major depression
Substance-use disorders
Generalized anxiety disorder
Adjustment disorder
Organic mental disorders secondary to head injury, toxic exposure, illness, and dehydration
Psychological factors affecting physical disease (in the injured)
Psychological/behavioral responses
Grief reactions and other normal responses to an abnormal event
Family conflict

Acute stress disorder (ASD) was introduced into the diagnostic nomenclature in *DSM-IV* (American Psychiatric Association, 1994). ASD is a constellation of symptoms very similar to PTSD but persists for a minimum of 2 days and a maximum of 4 weeks and occurs within 4 weeks of the trauma. The only difference in symptom requirements between the two diagnoses is that dissociative symptoms must be present in order to diagnose ASD. The dissociative symptoms can occur during the traumatic event itself or after it. A common early response to traumatic exposure appears to be a disturbance in our sense of time, our internal time clock, resulting in time distortion – time feeling speeded up or slowed down (Ursano and Fullerton, 2000). Along with other dissociative symptoms this time distortion indicates an over four times greater risk for chronic PTSD and may also be an accompaniment of depressive symptoms.

Traumatic bereavement (Prigerson *et al.*, 1999), unexplained somatic symptoms (Ford, 1997; McCarroll *et al.*, 2002), depression (Kessler *et al.*, 1999), sleep disturbance, increased alcohol, caffeine, and cigarette use (Shalev *et al.*, 1990), as well as family conflict and family violence are not uncommon following traumatic events. Anger, disbelief, sadness, anxiety, fear, and irritability are expected responses. In each, the role of exposure to the traumatic event may be easily overlooked by a primary-care physician. Anxiety and family conflict can accompany the fear and distress of new terrorist alerts, toxic contamination, and the economic impact of lost jobs and companies closed or moving. Medical evaluation which includes inquiring about family conflict can provide reassurance as well as begin a discussion for referral, and be a primary preventive intervention for children whose first experience of a disaster or terrorist attack is mediated through their parents.

Community effects of terrorism and disaster

While there are many definitions of terrorism and disaster, a common feature is that the event overwhelms local resources and threatens the function and safety of the community. With the advent of instantaneous communication and media coverage, word of terrorism or disaster is disseminated quickly, often in real time witnessed around the globe. The disaster community is soon flooded with outsiders: people offering assistance, curiosity-seekers, and the media. This sudden influx of strangers affects the community in many ways. The presence of large numbers of media representatives can be experienced as intrusive and insensitive. Hotel rooms have no vacancies, restaurants are crowded with unfamiliar faces, and the normal routine of the community is altered. At a time when, traditionally, communities turn inward to grieve and assist affected families, the normal social supports are strained and disrupted by outsiders.

Inevitably, after any major trauma, there are rumors circulated within the community about the circumstances leading up to the traumatic event and the government response. Sometimes there is a heightened state of fear. For example, a study of a school shooting in Illinois noted that a high level of anxiety continued for a week after the event, even after it was known that the perpetrator had committed suicide (Schwarz and Kowalski, 1991).

Outpourings of sympathy for the injured, dead, and their friends and families are common and expected. Impromptu memorials of flowers, photographs, and memorabilia are frequently erected. Churches, synagogues, temples, and mosques play an important role in assisting communities' search for meaning from such tragedy and in assisting in the grief process.

Over time, anger often emerges in the community. Typically, there is a focus on accountability, a search for someone who was responsible for a lack of preparation or inadequate response. Mayors, police and fire chiefs, and other community leaders are often targets of these strong feelings. Scapegoating can be an especially destructive process when leveled at those who already hold themselves responsible, even if, in reality, there was nothing they could have done to prevent adverse outcomes. In addition, nations and communities experience ongoing hypervigilance and a sense of lost safety while trying to establish a new normal in their lives.

There are many milestones of a disaster which both affect the community and may offer opportunities for recovery. There are the normal rituals associated with burying the dead. Later, energy is poured into creating appropriate memorials. Memorialization carries the potential to cause harm as well as to do good. There can be heated disagreement about what the monument should look like and where it should be placed. Special thought must be given to the placement of memorials. If the monument is situated too prominently so that community members cannot

Table 1.4 High-risk groups

Directly exposed to life threat
Injured
First responders
Bereaved
Single parents
Children
Elderly
Women
Individuals with:
prior PTSD
prior exposure to trauma
prior or current psychiatric or medical illness
lack of supportive relationships

avoid encountering it, the memorial may heighten intrusive recollections and interfere with the resolution of grief reactions. Anniversaries of the disaster (one week, one month, one year) often stimulate renewed grief.

High-risk groups

Posttraumatic stress is most often seen in those directly exposed to the threat to life and the horror of a traumatic event. The greater the 'dose' of traumatic stressors, the more likely a group is to develop high rates of psychiatric morbidity. Importantly, as noted earlier, psychiatric illness can develop even in those with no previous psychiatric history (North *et al.*, 1999). Therefore those needing treatment will not all have the usually expected accompanying risk factors and coping strategies of other mental health populations. While each disaster has its unique aspects, certain groups are routinely exposed to the dead and injured and, therefore, are at risk for psychiatric sequelae (Table 1.4). Adults, children, and the elderly in particular who were in physical danger and who directly witnessed the events are at risk. Traumatically bereaved parents of adult children are a group often forgotten as community programs and neighbors remember the spouse or partner and children of the deceased.

Those at greatest risk include the primary victims, those who have significant attachments with the primary victims, first responders, and support providers (Wright and Bartone, 1994). Those who were psychologically vulnerable before the terrorist attacks may also be buffeted by the fears and realities of job loses, untenably longer commutes, or eroded interpersonal and community support systems overtaxed now by increased demands.

Similarly, police, paramedics, and other first responders who assist the injured and evacuate them to medical care, and hospital personnel who care for the injured are all groups that need opportunities to process what happened, education on normal responses, and information on when to seek further help. Those who are charged with cleaning up the site of the tragedy are also vulnerable to persistent symptoms. Overidentification with the victims (e.g., 'It could have been me') and their pain and grief can perpetuate the fear response (Ursano *et al.*, 1999). This normally health and growth promoting mechanism of identification with victims and heroes can turn against us in this setting like an autoimmune disorder. Inevitably, each disaster situation will also contain individuals who are 'silent' victims and often overlooked. By paying close attention to the patterns and types of exposure, these individuals can be identified and be given proper care.

Risk communication

Multiple studies confirm that we assess risk and threat based on our feelings of control and our level of knowledge and familiarity with an event (for example, see MacGregor and Fleming, 1996). Therefore peanut butter is not recognized sufficiently as a risk to health and air travel is seen as overly risky (Slovic, 1987). Widespread fear, uncertainty, and stigmatization are common following terrorism and disasters. These fears require education about the actual risk and instruction in how to decrease risk whether the risk is falling buildings in an earthquake or infection from a biological weapon. Instruction in active coping techniques can increase feelings of control and efficacy. In particular, fears of biological contagion or other contaminants can decrease community cohesion and turn neighbor against neighbor as one tries to feel safe by identifying those who are exposed or ill as 'not me'.

The fear of exposure to toxic agents, including biological, chemical, and radiologic agents, can lead hundreds or even thousands to seek care, overwhelming our hospitals and health care system. Belief that one has been exposed to chemical and biological weapons leads individuals to seek health care and change life patterns regardless of actual exposure. After the Aum Shinrikyo attack in Tokyo in which 11 victims died, over 5000 people sought care for presumed exposure (Okumura *et al.*, 1998). In Israel, after a SCUD missile attack during the Gulf War, fear of chemical weapons exposure was the reason for nearly 700 of 1000 war-related emergency room visits (Karsenty *et al.*, 1991; Bleich *et al.*, 1992). The resources demanded by such events are large and made larger by the uncertainties associated with the event. Triage of anxious and distressed individuals is critical to being able to provide appropriate care to those who are physically injured.

Clear, accurate, and consistent information exchange is needed between health care professionals, government and local leaders, and the general public in times