

CHAPTER 8

The Threat of Biological Weapons: Prophylaxis and Mitigation of Psychological and Social Consequences*

Harry C. Holloway, Ann E. Norwood, Carol S. Fullerton,
Charles C. Engel, Jr., Robert J. Ursano

The microbial world is mysterious, threatening, and frightening to most people. The stressors associated with a biological terrorist attack could create high numbers of acute and potentially chronic psychiatric casualties who must be recognized, diagnosed, and treated to facilitate triage and medical care. Media communications, planning for quarantine and decontamination, and the role of community leaders are important to the mitigation of psychological consequences. Physicians will need to accurately diagnose anxiety, depression, bereavement, and organic brain syndromes to provide treatment, reassurance, and the relief of pain.

Biological weapons have emerged as a significant threat in the 1990s.^{1 2} Other reports in this issue have established the potential likelihood of the use of biological weapons and the nature of the biological and toxic threats. Herein, we discuss the psychophysiological and social implications of such agents and propose recommendations for developing primary interventions and treatment.

Psychosocial Responses Following A Biological Attack

The idea of infection caused by invisible agents is frightening. It touches a deep human concern about the risk of being destroyed by a

* Permission to reproduce here given by the American Medical Association. Originally published in JAMA, August 6, 1997; Vol. 278, No. 5: 425-427, Copyright © 1997, American Medical Association, All rights reserved.

powerful, evil, imperceptible force. These beliefs activate emotions that are extremely difficult to direct with the tools of reason. The response of specialists in medicine, epidemiology, infectious disease, molecular biology, nursing, and emergency medical services can bring some discipline and rationality to this situation. To be effective, the response must be well organized and communication must be made in terms that the public understands. Multiple organizations with conflicting and overlapping goals and responsibilities (eg, health care, law enforcement, and social welfare) may increase the confusion and anxiety for the individual and community. The novelty of biological weapons in combination with the activation of deeply rooted fears predict that strong psychological and physiological responses will occur.

The immediate stressors associated with a biological terrorist attack are the threat and the consequences of infection. The specific nature of these stressors will depend on the organism or toxin used. Characteristics such as the incubation period and the virulence and toxicity of the agent will contribute to the psychological impact. The process of seeking and receiving immunization or treatment is potentially stressful. Examples of common psychosocial responses are noted in Table 1.

Table 1. Psychological Responses Following a Biological Terrorist Attack

Horror
Anger
Panic
Magical thinking about microbes and viruses
Fear of invisible agents
Fear of contagion
Anger at terrorists, government, or both
Attribution of arousal symptoms to infection
Scapegoating
Paranoia
Social isolation
Demoralization
Loss of faith in social institutions

One can anticipate that there will be acute and chronic psychiatric casualties as in other disasters.^{3 4 5 6} While the majority of people do not develop long-term psychiatric sequelae following disasters, certain groups are at higher risk (eg, the previously traumatized, those without social supports, and first-responders, such as police and emergency medical personnel). Biological agents may cause mental disorders due to toxins or infectious conditions such as viral encephalitis or bacterial meningitis. Illness and injury secondary to the attack increase the risk of the development of acute stress disorder and posttraumatic stress disorder, as well as depression and bereavement in survivors.^{7 8} Psychiatric disability is a likely chronic outcome of biological attack. The incidence and prevalence of such problems remain a matter of speculation, although past occurrences can be used to anticipate consequences. Experiences with chemical weapons used by terrorists have demonstrated that psychiatric casualties are likely.⁹

The psychiatric sequelae will depend on the nature of and the response to the assault. In contrast to explosive or chemical weapons, biological weapons may not produce instantaneously horrifying results. (An exception to this might be the use of a biological toxin that kills quickly and with frightening manifestations, such as seizures or suffocation.)

As the attack is discovered and the media reports the news, exposed and unexposed individuals may experience acute autonomic arousal. Signs and symptoms of muscle tension, tachycardia, rapid breathing (perhaps hyperventilation), sweating, tremor, and a sense of foreboding are likely to generate health concerns. These signs and symptoms may be misattributed to infection or intoxication. The acutely stressed and symptomatic individuals will add complexity and additional patients for triage during the initial phase of the crisis. However, if initial triage and management are successful, the risk for the development of psychiatric problems can be minimized.

Forensic issues involved in the medical response influence psychological responses and treatment options. Preservation of evidence maximizes the possibility of the perpetrators' being punished. The perception that justice is ultimately served can have a very positive psychological impact on those exposed and society. Some survivors may be critical witnesses in future legal actions. This may have little

consequence for immediate lifesaving care, but it might prompt the selection of psychotropic drugs that minimally interfere with recall or discourage the use of a technique, like hypnosis, that can potentially damage the future credibility of a witness report.

Acute Intervention Following A Biological Attack

Rapid, accurate triage and effective treatment (or immunization) will be the cornerstones of initial management (Table 2). Distinguishing symptoms of hyperarousal from those of intoxication and infectious disease prodromes will be crucial. The type of exposure and any lack of complete information about the agent will increase uncertainty and the risk of psychiatric morbidity. The risk for secondary psychological trauma will increase if actions by leaders or helpers fail to provide a quick, accurate diagnosis, a sensitive process for communicating the nature of the risk, and a supportive environment for those exposed and their families.

Table 2. Psychiatric Intervention

Prevention of group panic
Careful, rapid medical evaluation and treatment
Avoidance of emotion-based responses (eg, knee jerk quarantine)
Effective risk communication
Control of symptoms secondary to hyperarousal
Reassurance
Diazepamlike anxiolytics for acute relief, as indicated
Management of anger, fear, or both
Management of misattribution of somatic symptoms
Provision of respite as required
Restoration of an effective, useful social role (perhaps as worker at triage site)
<u>Return to usual sources of social supports in the community</u>

An attitude of expectation that those with hyperarousal or demoralization will soon return to normal activities should be conveyed.

Patients should be moved out of the patient role as quickly as possible. Diazepamlike anxiolytics may be helpful in reducing anxiety for patients who do not respond to reassurance. The assignment of simple work tasks that facilitate the care of other patients can help restore function to the psychological casualties. The recovery environment should be constructed to create a sense of safety and to counteract the helplessness induced by the terrorist act.¹⁰

A well-organized, effective medical response contributes to the creation of a supportive environment and accurate data for the at-risk population. Individuals can assess their risk and determine the actions that they can take to reduce the risk. Ideally, risk information should involve dialogue. Dialogue lets the at-risk population define the information that they need, and it enables the community leaders to assess their effectiveness in communicating the appropriate data. Failure to provide a public forum for information exchanges may actually increase anxiety and misunderstanding and amplify health concerns since individuals will tend to attribute autonomic symptoms to catastrophic illness. One consequence of appraisal error may be disabling somatic complaints offered in a setting where failure to find a medical or surgical disease is experienced as stigmatizing and sadistic by the patients. In this situation, the patient's life may become focused on an unending search for an "acceptable" diagnosis.^{11 12 13}

Implications Of Psychological Reactions For The Medical System

Following a biological terrorist attack, physical injury, disruption of daily communal routine, and increased use of public health facilities could place overwhelming demands on the medical systems.¹⁴ Feelings of helplessness and hopelessness could be increased if the rescue and postdisaster medical efforts appear to be failing.¹⁵ Angry, intense competition for available but limited resources can generate even more societal disruption and casualties. The belief that treatment will be provided to some but not to others will contribute to the possibility of social disruptions such as riot or panic. Panic will be a particular risk when biological agents are used to threaten or to attack a sizable civilian population.¹⁶ Demoralization can also be a response to the predicaments

presented by a biological attack. Demoralized individuals often lose their sense of social and group responsibilities and roles. If major community institutions fail to provide protection, citizens can lose faith in the ideological metaphors that bind the community together. In this way, demoralization can increase isolation and feelings of hopelessness. In this complex setting, some are likely to manifest psychiatric symptoms. Given the stigma attached to psychiatric illness and the fact that the individuals who manifest them are more likely to have been injured and to have been exposed to multiple infectious, environmental, and toxicological risks, the diagnostic and therapeutic dilemmas will be quite difficult.^{17 18}

Quarantine requires the development of a specialized environment that will limit exposure to secondary infections. The creation of such an environment may disrupt social supports that reduce the postexposure risk of stress-induced disorders. It can create a situation characterized by separation from friends and family, isolation, and a sense of stigmatization. Prior planning can ensure that modern communication technology (telephone, television, and computer Internet connection) can be used to mitigate these untoward effects by providing ongoing contact with families and others in the community outside quarantine. The maintenance of contact between parents and children is particularly important for the children. This may result in putting unexposed adult caregivers in quarantine.

Additional stressors may arise from the mundane logistical demands associated with managing mass contamination and infection. One of the difficulties in the Japanese sarin attack was undressing patients and disposing of their clothing.⁹ Obtaining the necessary shower facilities for a large number of exposed survivors may be problematic. The provision of privacy and assurance of conventional modesty may have to be sacrificed. It should not be forgotten that privacy and modesty are important to maintaining an individual's sense of control and autonomy. The imposition of special requirements such as public bathing should be accompanied by an explanation that attributes this undesirable demand to the terrorist attacker.

Disaster responders and medical personnel also will have to contend with their own psychological reactions. One of the terrorist's goals is to provoke intense emotions that interfere with the capacity of caregivers to

react in a thoughtful, organized fashion. A biological attack using a highly infectious and virulent organism (eg, anthrax), dispersed in a fine spray, poses special stressors. Medical responders may be required to work in protective clothing and masks (“moon suits”). This barrier protection will make the care of patients more difficult and increase the risk of heat, fatigue, and isolation stress for medical personnel.^{19 20} It will be important to establish work-rest schedules and to limit the exposure of medical and rescue personnel to the grotesque and the dead.

Planning And Preparation

Disaster plans for managing a biological attack must be developed and realistic training provided to ensure effective response to an actual terrorist event. These plans must assume that emotional and psychiatric problems will occur in the unexposed population as well as the exposed. The exercises should be carried out with sufficient realism, so that the process of disrobing and showering is practiced in real time. Medical responders will need training to recognize the symptoms of anxiety, depression, and dissociation. It is critical that psychological responses be managed in ways that facilitate the triage, diagnosis, and treatment of those exposed or infected.²¹ Such plans need to include strategies for prevention and mitigation of stress for survivors as well as for those responding to the crisis and its consequences. Debriefing, commonly used by emergency personnel following trauma, has been used to mitigate the effects of severe stress and can be helpful in identifying individuals who may need further assistance. Results from controlled studies of debriefing are only now beginning to become available.^{22 23} These studies will help clarify the role of intervention in the alleviation of pain, prevention of disability, return to social involvement, and the prevention of disease. Ironically, should a highly infectious agent be used, bringing people together for a debriefing may be contraindicated. Perhaps “teledebriefing” (analogous to telemedicine) is a technology that could be developed for such situations.

Communicating Risk To The Public

The communication of the risk to individuals following a bacteriologic attack will critically affect how communities and individuals respond.^{24 25 26 27 28} The media coverage and behavior of public officials can contribute to the stress and precipitate panic or demoralization, particularly if inaccurate, confusing, or contradictory information is provided to the public. Rumors must be anticipated, monitored, and corrected with accurate information.¹⁷ Any damage to public trust at the beginning of the crisis ensures that distrust will continue throughout the crisis. There are psychological and physiological costs attendant to the loss of trust.

For example, the handling of information by officials and the media during the release of nuclear radiation at Three Mile Island became a major source of anxiety and stress for people living in the vicinity of the nuclear facility. At Three Mile Island, there were no casualties or severely injured individuals. The stress was fear and uncertainty about exposure to excess radioactivity, loss of faith in local authorities and those managing operations of the reactor, and financial uncertainties.²⁹ Baum followed individuals at the Three Mile Island site and at 3 control sites for 10 years.²⁹ He found evidence of chronic arousal as indicated by elevated norepinephrine and epinephrine in some individuals.

Conclusion

Governmental and private agencies should develop detailed strategies for responding to a biological terrorist attack that include consideration of the psychological and social impact of such an attack. Inattention to the phenomenon of terror and its consequences for individuals, institutions, and society jeopardize the efficacy of disaster mitigation efforts. Leaders, scientists, and the media should develop protocols covering a broad range of scenarios that communicate accurate information about risk and diminish rumors. These primary prevention efforts will be critical in preventing panic and demoralization in the attacked community. The possible forensic responsibilities of first responders should receive

appropriate consideration when collecting data and preparing for future action that will determine responsibility for the attack.

Realistic training for biological attacks should include the probability of large numbers of psychological casualties. Training exercises should be designed to test cooperation and coordination between organizations as well as test first responders and hospital staff. Hospital accrediting bodies should encourage medical facilities to incorporate biological scenarios into their annual training.

Planning and preparation for biological attacks and their attendant psychological consequences can diminish the terrorists' ability to achieve their overall goal the induction of terror. Education of the public and institutional preparedness can mitigate the horror of terrorism. The media could play an active prevention role by realistically educating the public about the impact of terrorist attacks with biological weapons. Such preparation efforts should be given high priority.

Notes

1. US Congress, Office of Technology Assessment. *Technology Against Terrorism: The Federal Effort*. Washington, DC: Government Printing Office; 1991. Publication OTA-ISC-481.

2. Flanagan A, Lederberg J. The threat of biological weapons: prophylaxis and mitigation: call for papers. *JAMA*. 1996;276:419-420.

3. Ursano RJ, Fullerton CS, Norwood AE. Psychiatric dimensions of disaster: patient care, community consultation, and preventive medicine. *Harv Rev Psychiatry*. 1995;3:196-200.

4. Ursano RJ, Rundell JR. Psychological problems of prisoners of war: the trauma of a toxic and contained environment. In: Ursano RJ, ed. *Individual Response to Disaster*. Bethesda, Md: Uniformed Services University of the Health Sciences; 1988: 79-112. Publication DTIC: A203310.

5. Ursano RJ, Fullerton CS, McCaughey BG. Trauma and disaster. In: Ursano RJ, McCaughey BG, Fullerton CS, eds. *Individual and Community Responses to Trauma and Disaster: The Structure of Human Chaos*. Cambridge, England: Cambridge University Press; 1994:3-27.

6. Weisaeth L. War-related psychopathology in Kuwait: an assessment of war-related mental health problems. In: Fullerton CS, Ursano RJ, eds. *Posttraumatic Stress Disorder: Acute and Long-Term Responses to Trauma and Disaster*. Washington, DC: American Psychiatric Press; 1997:91-122.
7. American Psychiatric Association. *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition*. Washington, DC: American Psychiatric Association; 1994.
8. Shalev A. Posttraumatic stress disorder among injured survivors of a terrorist attack: predictive value of early intrusion and avoidance symptoms. *J Nerv Ment Dis*. 1992;180:505-509
9. Okumura T, Takasu N, Ishimatsu S, et al. Report on the 640 victims of the Tokyo subway sarin attack. *Ann Emerg Med*. 1996;28:129-135.
10. Raphael B, Wilson J, Meldrum L, Mcfarlane AC. Acute preventive interventions. In: van der Kolk B, Mcfarlane AC, Weisaeth L, eds. *Traumatic Stress: The Effects of Overwhelming Experience on Mind, Body, and Society*. New York, NY: Guilford Press; 1996:463-479.
11. Kassirer JP. Our stubborn quest for diagnostic certainty. *N Engl J Med*. 1989;320:1489-1491.
12. Schwartz SP, White PE, Hughes RF. Environmental threats, communities, and hysteria. *J Public Health Policy*. 1985;6:58-77.
13. Blackwell B, De Morgan NP. The primary care of patients who have bodily concerns. *Arch Fam Med*. 1996;5:457-463.
14. Relationship of mustard agent and lewisite exposure to psychological dysfunction. In: Pechura CM, Rall DP, eds *Veterans at Risk*. Washington, DC: National Academy Press; 1993.
15. Ursano RJ, ed, Fullerton CS, ed. *Performance and Operations in Toxic Environments*. Bethesda, Md: Uniformed Services University of the Health Sciences; 1988. Publication DTIC: A203162.
16. Russell PK. Biologic terrorism: responding to the threat. *Emerg Infect Dis*. 1997;3. Accessed June 26, 1997. Available at: <http://www.cdc.gov/ncidod/EID/eid.htm>.
17. Ursano RJ, ed, Fullerton CS, ed. *Individual and Group Behavior in Toxic and Contained Environments*. Bethesda, Md: Uniformed Services University of the Health Sciences; 1988. Publication DTIC: A203267.
18. Fullerton CS, Ursano RJ. Behavioral and psychological responses to toxic

exposure. In: Ursano RJ, ed. *Individual Response to Disaster*. Bethesda, Md: Uniformed Services University of the Health Sciences; 1988: 113-128. Publication DTIC: A203310.

19. Fullerton CS, Ursano RJ. Health care delivery in the high-stress environment of chemical and biological warfare. *Mil Med.* 1994;159:524-528.

20. Fullerton CS, Ursano RJ, Kao T, Bhartiya V. The chemical and biological warfare environment psychological responses and social support in a high-stress environment. *J Appl Soc Psychol.* 1992;22:1608-1623.

21. Fullerton CS, Brandt GT, Ursano RJ. Chemical and biological weapons: silent agents of terror. In: Ursano RJ, Norwood AE, eds. *Emotional Aftermath of the Persian Gulf War: Veterans, Families, Communities, and Nations*. Washington, DC: American Psychiatric Press; 1996:111-142.

22. Kenardy JA, Webster RA, Lewin TJ, Carr VJ, Hazell PL, Carter GL. Stress debriefing and patterns of recovery following a natural disaster. *J Trauma Stress.* 1996;9:37-49.

23. Raphael B, Meldrum L, McFarlane AC. Does debriefing after psychological trauma work? *BMJ.* 1995;310:1479-1480.

24. National Research Council. *Health Risks of Radon and Other Internally Deposited Alpha-emitters (BEIR IV)*. Washington, DC: National Academy Press; 1988.

25. National Research Council. *Improving Risk Communication*. Washington, DC: National Academy Press; 1989.

26. National Research Council. *Risk Assessment in the Federal Government: Managing the Process*. Washington, DC: National Academy Press; 1983.

27. National Research Council. *Understanding Risk: Informing Decisions in a Democratic Society*. Washington, DC: National Academy Press; 1996.

28. Presidential Advisory Committee on Gulf War Veterans' Illness. *Presidential Advisory Committee on Gulf War Veterans' Illness: Final Report*. Washington, DC: US Government Printing Office; 1996.

29. Baum A. Stress, intrusive imagery, and chronic distress. *Health Psychol.* 1990;9:653-675.

