

military or terrorist use of such agents and the employment of chemical weapons against Iran by the regime of Saddam Hussein during the Iran-Iraq war of the 1980s makes it imperative that both short- and long-term physical and psychological consequences resulting from exposure to NBC agents be evaluated and used as the basis for therapy.

Exposure to chemical warfare (CW) agents may result in substantial short and/or long-lasting effects, including behavioral and psychological disorders in exposed individuals. In recent years, CW agents have been employed against unprotected civilians in military conflicts and terrorist attacks. One of the most tragic uses of chemical weapons against civilians was the chemical bombardment of the city of Sardasht in northwestern Iran in June 1987. An estimated 4,500 people—more than a third of the city's population—were exposed to the toxic chemical, a significant proportion of whom are still chronically ill.

Method: A representative cross-section of 400 individuals, 69% male and 31% female, was selected from among residents of Sardasht, who were confirmed to have been exposed to a mustard agent as a result of the chemical attack of June 1987. Each participant was administered a standardized questionnaire that addressed individual experiences at the time of exposure to the agent and life experiences following the attack.

Results: Results of this study reveal that: (1) long-term psychological and social effects of a chemical weapon, military or terrorist attack may be worse than the acute effects of such an attack; (2) women are more vulnerable than men to both short- and long-term psychosocial effects of the attack; and (3) survivors who were under 19 years of age at the time of the attack suffer more significant long-term psychological effects than those over 19 years of age.

Conclusion: This study illustrates patterns of psychosocial effects among the mustard gas exposed civilian population of Sardasht. This study may be of use in designing both civil defense and medical management strategies in case of future chemical attacks on unprotected civilian populations (such as psychological intervention for victims and survivors). It also may assist in the prevention and mitigation of the psychosocial impact of these agents.

Keywords: agents; biological; chemical; civilians; effects; long-term; nerve; nuclear; psychosocial; short-term; terrorists; weapons

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Minimizing Health Effects of Nuclear, Biological, and Chemical Hazards in Large-Scale Disasters

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Society has had limited experience in dealing with terrorist acts involving hazardous nuclear, biological, and chemical (NBC) substances in the form of weapons or derivatives such as dirty bombs, microbial toxins, or dry, liquid contaminants. In countries outside the United States, there is

active progress at the federal government level to restructure disaster management; however, more specific and detailed efforts are required in regard to medical responsibilities in large and small communities. The local level is where possibly exposed people, sometimes in large numbers, will be dealt with even though there might not be a clearly established toxic factor and diagnosis. The NBC Hazards Task Force gathering with representatives from the world disaster community is an appropriate venue to work through and delineate responsibility for specific problems, such as: (1) preventing mass casualties and minimizing health consequences to the affected population; (2) dealing with issues centering on rapid evaluation of the toxin and other aggressive factors such as swift triage; and (3) developing potential strategies/solutions involving immediate implementation of highly effective countermeasures. In time, these goals can be accomplished with the help of the scientific knowledge and practical experience of specialists and the centers they are associated with, which have already been involved in responding to different types of disasters during the last several decades.

It is crucial to bring together an international pool of laboratories that worked covertly during the Cold War. A great deal of extremely useful knowledge for developing highly effective early responses for diagnosis and prevention still has not reached local professionals. For example, Russia's experience with natural epidemics, and the successes, difficulties, and lessons learned in evaluating field pathogens and associated medical management is unique and still valid for consideration by the international medical community. Moreover, to enhance medical management effectiveness in any type of disaster, unified methodological approaches are necessary. International guidelines must be developed in detail and in close collaboration with teams providing NBC factor estimation, from both a qualitative and quantitative perspective.

Establishing biosecurity and protection standards for different population sizes is the next serious step toward protecting the international community from terrorists' acquisition of nuclides, dangerous pathogens, and chemicals. Each country must possess and distribute to local populations standard diagnostic kits for a range of NBC agents and combinations of these agents, as well as antidotes and protective equipment. The number of kits distributed would vary according to population size. This presentation also examines additional problems associated with minimizing the health effects of NBC agents through the example of Chernobyl and other disasters, and the role of the NBC task force in influencing disaster medical organizations around the world to increase the effectiveness of health management to the same high level in both urban and rural communities.

Keywords: agents; disasters; events; nuclear, biological, chemical (NBC); preparedness

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