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SPECIAL FOCUS

Social, Psychological, and Behavioral Responses to a Nuclear Detonation in a US City: Implications for Health Care Planning and Delivery

Daniel Dodgen, PhD; Ann E. Norwood, MD; Steven M. Becker, PhD; Jon T. Perez, PhD; Cynthia K. Hansen, PhD

ABSTRACT

A nuclear detonation in a US city would have profound psychological, social, and behavioral effects. This article reviews the scientific literature on human responses to radiation incidents and disasters in general, and examines potential behavioral health care provider (BHCP) contributions in the hours and days after a nuclear detonation. In the area directly affected by the blast, the immediate overarching goal of BHCP interventions is the support of lifesaving activities and the prevention of additional casualties from fallout. These interventions include 6 broad categories: promoting appropriate protective actions, discouraging dangerous behaviors, managing patient/survivor flow to facilitate the best use of scarce resources, supporting first responders, assisting with triage, and delivering palliative care when appropriate. At more distant sites, BHCP should work with medical providers to support hospitalized survivors of the detonation. Recommendations are also made on BHCP interventions later in the response phase and during recovery.

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Key Words: nuclear terrorism, emergency medical response, mass casualty, disaster mental health, behavioral health, posttraumatic stress disorder, nuclear detonation

The detonation of a 10-kiloton (kT) nuclear device in a US city would produce the "light of a thousand suns" and an explosion equivalent to 5000 Oklahoma City truck bombs.[1,2] There would be immediate and severe health consequences, and physical damage to the community would be extreme.[3] Thousands, perhaps tens of thousands, of people would be killed, and many others would be injured or become ill. In short, a nuclear detonation in a US city would be a watershed event that would pose unprecedented challenges for health care planning and delivery.[3]

This article examines the social, psychological, and behavioral effects of a nuclear detonation incident. These effects would likely be widespread and profound, with ripple effects touching even those distant from ground zero. Furthermore, key social, psychological, and behavioral issues could affect how the incident unfolds and would affect the extent of its consequences. For example, whether the population in the path of the bomb's fallout undertakes recommended protective actions and how responders react to the situation could be critical in determining the overall level of morbidity and mortality. Thus, social, psychological, and behavioral issues need to be an integral part of planning, preparedness, and response for a nuclear detonation incident.

This article considers the detonation's implications for those local systems and the health care receivers and responders caring for the injured and ill during the first 3 to 4 days after a nuclear detonation. Among the key issues considered are the mental health effects experienced by the public (including vulnerable populations), potential effects on emergency responders and other caregivers, and broader effects on communities and society. Because people's responses and actions can affect health outcomes, issues of public information, communication, and population behavior are also considered. Finally, the article includes a series of general principles and recommended actions, interventions, and other measures to prevent, reduce, and address a nuclear detonation's social, psychological, and behavioral consequences.

Although the content of this article may be read as a standalone document, it is intended to complement the entire suite of articles in this supplement dealing with the health care implications of a nuclear detonation.[3-10] The aim is to help build an integrated approach to preparedness and response for a nuclear detonation.

The threat of radiological/nuclear terrorism has grown significantly recently. One major focus of concern has been on radiological dispersal devices (RDDs), which many experts perceive to be the most likely form of terrorism involving radioactive materials. RDDs, which combine radioactive materials with conventional explosives or other means of dissemination, spread radioactive contamina-

tion but do not involve a nuclear explosion. A "dirty bomb" is an example of an RDD.

Increasingly, however, experts are focusing on a threat that is seen as less likely than a dirty bomb, but orders of magnitude more devastating: the terrorist use of an improvised nuclear device. This crude nuclear weapon produces a yield usually defined as being between 0.01 and 10 k-T. (A kiloton is the amount of energy that is released by an explosion of 1000 tons of dynamite.) Although this type of detonation is considered low in yield when compared with modern military nuclear weapons, the detonation of a 10-kT nuclear device would still have catastrophic consequences in nearby areas, as described in Knebel and colleagues elsewhere in this supplement.[8] Such a device would be only slightly smaller than the 12.5-kT bomb that destroyed Hiroshima in 1945.[11,12]

The US health care system has been fortunate in that it has never had to manage a mass casualty terrorist incident involving radioactive materials. What this means, however, is that many questions and uncertainties remain regarding how such an incident may unfold, how people may react, how emergency responders would be affected, what the magnitude of mental health effects would be, and what the broader psychosocial implications and consequences may be for society as a whole.

These questions cannot be answered in advance with certainty, particularly when considering as large and calamitous an incident as the explosion of a terrorist nuclear weapon in a US city. Not surprisingly, then, there is discussion and sometimes debate in the academic and practice communities about the ways the public and emergency personnel may be affected and how people would respond. Definitive answers and ironclad predictions are not possible because of a paucity of direct scientific evidence and experience.

Nevertheless, there is considerable information that can speak to the likely psychosocial effects of a nuclear detonation and inform preparedness and response strategies. Potentially relevant material can be gleaned from real-world experience with large-scale disasters, incidents involving the accidental or intentional release of radioactive materials, the atomic bombings of Hiroshima and Nagasaki, large-scale explosions in urban areas, conventional and unconventional terrorist events, and the extensive body of social, behavioral, and public health research on disasters and emergencies.

What is clear is that nuclear detonation would have immense social, psychological, and behavioral consequences and that authorities need to be ready to do the following:

- Undertake a coordinated series of measures to prevent, reduce, and address those effects
- Help the population take appropriate protective actions
- Provide support to emergency responders and health care providers
- Enhance individual and community resilience
- Maintain public trust and confidence

Key steps toward these ends are discussed in below. The following section examines what is known from research on and experience with the consequences of a nuclear detonation.

REACTIONS TO A NUCLEAR DETONATION

Radiation Is a Particularly Dreaded Hazard, and the Fear Associated With It Is Powerful

There are important differences between a nuclear detonation and other kinds of disasters, even most terrorist attacks. The detonation of a nuclear device involves radiation, radioactive contamination, and deadly fallout. A large body of risk perception research has demonstrated that people view radiation as among the most dreaded of all hazards.[13-16] Reports of the massive destruction of infrastructure and horrific burns, injuries, and long-term illnesses caused by atomic bombs and the specter of nuclear annihilation by thermonuclear missiles during the Cold War have contributed to perceptions of the risks posed by radiation. Radiation is not detectable using our senses. Thus, people are unable to distinguish safe areas from contaminated ones and must rely on special instruments and experts to determine whether danger is present. The increased risk of developing cancer decades after exposure is a source of concern for a period of years, as are the special risks that exposure or contamination may represent to children. Finally, worry that one's genetic material may have been altered in a way that can harm future generations further compounds the sense of dread.

The powerful fear that radiation incidents generate has been highlighted during several real-world events.[13-16] It is complicated to assess the degree to which fear of radiation alone has driven behavior because poor risk communication is often an accompanying factor. During the 1979 Three Mile Island nuclear accident, for example, a combination of fear and inadequate, ambiguous, and conflicting information resulted in a large "evacuation shadow." For every person who had been advised to evacuate, many times that number actually did. Ultimately, about 144 000 people fled.[17] Such data emphasize the critical need to disseminate timely, clear, accurate, and credible information regarding protective actions.

Fear during radiation incidents also has the potential to overwhelm health care or related facilities. The quintessential example is the 1987 radioactive contamination incident in Goiania, Brazil, in which a disused radiotherapy source was found by scavengers and broken open. Sadly, 4 people ultimately died from the incident. As fear associated with the incident rippled outward, more than 112 000 people sought screening for exposure or contamination.[18] Some people even manifested stress-induced physical symptoms that were similar to those from actual exposure to high levels of radiation. These data emphasize the need to communicate effectively with the public and have in place triage and medical surge practices that can address the physical and psychological effects of fear and anxiety, includ-

ing comorbidity.[18,19] Another behavior seen after radiological/nuclear incidents—and one that can greatly complicate recovery efforts—is discrimination and the stigmatizing of people and products from affected areas. For example, in the aforementioned incident in Brazil, people from Goiania could not lodge in neighboring hotels, airplanes and buses refused to carry them, and autos with Goiania tags were stoned.[18] This also occurred after the 1986 Chernobyl disaster, a nuclear accident in Japan in 1999, a radiological emergency in Thailand in 2000, and other, similar incidents.[11,18,19] It is possible that the level of fear related to radiation could significantly complicate behavioral responses and reactions to a nuclear detonation. This is particularly the case if emergency information is difficult to obtain, unclear, or confusing.

Fear of radiation and radioactive contamination has the potential to produce complicated behavioral responses and pose additional challenges to a coordinated response to a nuclear detonation. A thoughtful strategy will be needed to help people cope with fear, give meaning to survival, and provide hope for the future.

Although the Bombings of Hiroshima and Nagasaki Were Nuclear Incidents, They Are of Limited Usefulness in Gauging What the Public Reaction Would Be to a Modern Nuclear Detonation

The only actual experience with individual and group behavior after nuclear explosions comes from the World War II bombings of Hiroshima and Nagasaki in 1945; however, there are severe limitations in applying the lessons learned from those events to contemporary times. Although there was recognition early on that the devastation in Hiroshima was caused by a new type of weapon, it was not immediately recognized that the incident involved radiation. Therefore, people's responses in the early days were not affected by perceptions of the danger of radiation per se, although many people feared some sort of residual hazard. Similarly, the clinical presentations associated with acute radiation syndrome were puzzling and were initially attributed by some to be a consequence of poisoning or secondary infectious diseases.

How might things unfold if there were a nuclear detonation in a US city today? How long would it take people to comprehend what had happened? There would be a blinding flash of light followed by a huge explosion. Intense heat, pressure waves, and wind would herald the detonation. However, a 10-kT nuclear groundburst may not be recognized initially as being nuclear in origin, especially by those closest to the epicenter. Moreover, the characteristic mushroomshaped cloud may not form due to urban canyon effects.[20] Not long after, however, people would likely begin to speculate that a nuclear blast had occurred, and formal and informal news media around the world would begin around-the-clock coverage. As in past events such as the September 11, 2001, terror attacks, some information initially reported would be speculative or wrong, and that could contribute to public confusion. It is unclear precisely when survivors in areas near the detonation point would learn of the radiation hazard, but it would likely be within the early aftermath of the detonation. While the electromagnetic pulse effect would probably not extend far, there is concern that the nearby electrical grid and nearby communication equipment may be affected. Similarly, it is unclear how quickly emergency management personnel could begin disseminating guidance to people in specific areas to shelter in place or evacuate to minimize exposure to dangerous fallout. Nevertheless, it would certainly not take long for neighboring communities to learn that a nuclear device had been detonated in their region. Information about how people can best protect themselves from fallout would need to be disseminated as quickly as possible.

The world has changed dramatically since 1945. Information about radiation,including some that is inaccurate and some that can best be described as myth, is widespread. An act of terror using a nuclear device would now have manifold levels of meaning and associated fear that would significantly affect the way people and systems respond. Instant national and international communications, Web-based social media, knowledge of previous radiation incidents, and the anticipation that terrorists could detonate additional nuclear devices in other locations are just a few of the variables involved in this new calculus of behavioral response.

Possible Wide Variation in Immediate Behavioral Responses of People In and Around the Impact Zone

Research on disasters in general concludes that people typically rise to the occasion, providing initial lifesaving activities, rescuing survivors, and providing general assistance.[21,22] Following earthquakes, for example, the first responders who attempt to find and rescue survivors are people who happen to be at the scene of building collapses.[21,22]

Analyses of terrorist bombings reinforce the view that people react in helpful ways. People's behavior during the September 11 terrorist attacks demonstrated that even under extreme conditions, people act in a prosocial and adaptive manner. Within the World Trade Center buildings themselves, panic was rare, and people helped one another, even at personal risk. The evacuation was orderly: an estimated 13 000 to 15 000 safely exited the towers before they collapsed.[23-25] Similarly, examinations of people's responses to the July 7, 2005, bombing attacks on the London Underground transport system indicate that selfish behaviors were rare and mutual helping was common.[26] Factors that have been shown to correlate with prosocial behaviors include perception of a common fate, social norms, unambiguous need, and knowledge of an appropriate response or action.[27-29]

At the same time, research also indicates that some survivors can exhibit antisocial behavior or panic, some but not all of which can be directly related to seeking lifesaving protection and resources.[25,30-32] For disaster scientists, panic implies much more than terror: It connotes an irrational, unnecessary, or hys-

terical flight during which one operates on an "every-man-for-himself" basis. Panic in this sense is uncommon after a disaster. In general, several conditions must exist together to trigger panic[22]

- There appears to be a narrow window of opportunity to escape
- There is a threat of being trapped
- Flight seems to be the only way to survive
- Help is unavailable

In addition, although we can expect some variable but probably small cohort of "pure" panic, most manifestations of the panic process will occur somewhere less extreme on a prosocial to antisocial continuum and will still affect social responses. Even so, or perhaps especially so, identifying and addressing the critical variables involved with this process and promoting resilient, prosocial responses will be important.

There is debate about the extent to which these conditions may exist in some areas after a nuclear detonation and the degree to which there may be panic or antisocial behavior. Clearly, high levels of fear/terror will be experienced, not only in the stricken area but also throughout the nation and probably the world due to the fear of additional attacks.

Undoubtedly, better and more effective communication and information can reduce the likelihood of panic, foster helping behaviors, and encourage people to take the appropriate protective actions. This makes the development of effective communication strategies and emergency messages 1 of the most crucial components in nuclear detonation preparedness and response efforts. An interagency group of communications and technical experts has recently released messages that can be used in the immediate aftermath of a nuclear detonation.[33] It is for interim use while it undergoes public message testing and review by key stakeholders.

Emergency Responders Typically Are Heroic in Their Efforts to Save Lives, But Require Training and Ongoing Support

As noted by Hick and coauthors,[7] the discussion regarding role abandonment by first responders and other critical personnel has been considerable. After the bombings of Hiroshima and Nagasaki, responders who were still alive did their utmost to help those in need. Memoirs and interviews of health care providers reflect extraordinary efforts in the face of overwhelming need. In Hiroshima, the first city bombed, most of the city's physicians were injured or killed (numbers vary: 65/150 killed[34] vs 270/298—90% injured/killed[35]) and 93% of its registered nurses (1650/1780) were killed or wounded.[35] Narratives of surviving health care providers reveal heroic efforts to assist patients experiencing trauma, burns, and undiagnosed radiation sickness in a context of widespread devastation and extremely limited supplies.[34-36]

Research by Becker and others involving numerous types of emergency responders shows a powerful sense of duty and a deep commitment to helping others.[15,37] This ethos of service undoubtedly comes into play in the context of a nuclear detonation. At the same time, the research also shows that emergency responders of all types have deep concerns about incidents involving radiation. First, there is a sense that situations involving radiation are new and different from other threats and that they represent special risks. Second, responders also often indicate a lower level of familiarity and comfort with responding to a radiological incident than to other kinds of threats. Third, responders have serious concerns about individual and organizational readiness for responding to a radiological/nuclear terrorism event.[15,37,38] In addition, survey results suggest that there is a significantly lower level of responder willingness to be involved in dealing with radiological/nuclear incidents than with most, or sometimes even all, other types of threat.[39-42] Therefore, at least in terms of what they express in surveys, focus groups, and other research settings, emergency responders are deeply concerned about radiation incidents and are substantially less likely to want to respond than they are for other types of emergencies.

This must be balanced, however, with the findings on the strong commitment to duty and the fact that people's behavioral intentions are often not good predictors of actual behavior. As much as researchers try to approximate actual conditions, it is virtually impossible to create the context in which the usual rules of social order are quickly shifted to ones that support adaptive functioning in a much-altered environment. This is particularly the case for something as horrific as a nuclear detonation.

Again, no ironclad predictions are possible. Nevertheless, based on experiences with a range of situations, it is likely that responders in large numbers will do their best to do what they have always done: behave heroically and save lives. This response will be facilitated if responders have the radiological/nuclear training and the support and information they need. If, however, responders are forced to face a nuclear detonation without appropriate training and with poor, unclear, or inadequate information, their stress will increase dramatically, it will be markedly harder for them to carry out their missions, and this could have severe negative effects on the effectiveness of the overall response.

Factors that contribute to enhanced professional commitment include repeated training, prebriefing, having a clear plan of action, and familiarity with professional roles and responsibilities. When people recognize the duties they will perform in a disaster context, they are more likely to report to work and function well. The *Planning Guidance for Response to a Nuclear Detonation*[43] was developed to provide practical information to inform emergency responders of roles and responsibilities for all levels of government and to guide local planning efforts. The articles in this supplement[3-10,44] add to this information and in-

clude guidance and tools to help in preparedness and planning. Developing plans that address responders' family-related concerns also is important. For example, responders who have access to information about family, have confidence that schools will take appropriate care of children, have a plan in place for how to reunify, and minimize contamination risks to families (eg, a change of clothes) are likely to be able to function more effectively. Pre-event planning should also address first responders' and health care providers' families needs. Family members of emergency responders will require honest and up to date information on dangers, personal protective equipment and other safety measures, the mission assignment for their loved one(s), and any support services that they can access for updates (eg, a dedicated call center).

Another factor in how emergency responders will react is the availability of response resources. Historical experience has shown that when professionals are vastly overwhelmed and severely underresourced, they can become dysfunctional. After the bombing of Hiroshima, 10 physicians began treating injured people in a school gymnasium. They functioned well and improvised successfully in treating up to the first 1000 patients. As they began facing hundreds and hundreds of patients, however, they essentially gave up and left the gymnasium (D. Mileti, personal communication, 2009). This finding underscores the importance of moving patients as quickly as possible to locations that have sufficient resources and the need to prioritize and sequence treatment. Planning, training, and having resource information available is critical for psychologically preparing health care workers to deal with prolonged catastrophic events.

Spontaneous volunteers and citizen preparedness efforts that are supported by federal, state, local (eg, Citizen Corps, Medical Reserve Corps), nongovernmental, and other organizations such as the American Red Cross, will need to be factored into the plans for critical helpers and responders to a nuclear detonation. The preparedness planning and actions of citizen responders is 1 factor that will enhance lifesaving efforts, be protective factors for individuals, and enhance community resilience. Because people take cues from those around them, engaged citizens working toward common goals will promote effective action and reduce a shift toward panic or aggression. In fact, research on spontaneous volunteerism after September 11, 2001, in New York City confirmed that helping yielded long-term positive benefits for the volunteers' personal healing and community engagement after a disaster.[45]

Barring active interventions and a coordinated communication strategy, people bringing ill and injured individuals for treatment, people looking for loved ones, and people seeking a safe haven will converge on nearby hospitals. A major task, then, must be to help direct those without immediately life-threatening injuries elsewhere to conserve and better target resources. The functionally organized radiation triage, treatment, and transport (commonly known as RTR) system has factored in these expected behaviors in its designation of medical care sites and assembly centers.[8]

STRATEGY FOR PREVENTING, REDUCING, AND ADDRESSING NEGATIVE SOCIAL, PSYCHOLOGICAL AND BEHAVIORS IN THE AFTERMATH OF A RADIOLOGICAL INCIDENT

Behavioral Health Care Interventions

Broadly stated, the goal of early behavioral health intervention is to identify and remove impediments to the natural psychological recovery process. These interventions must take into account the differential needs of the entire community, including children, older adults, people with disabilities, and other groups with special needs. At present, scientific evidence is insufficient to determine which interventions are effective in preventing or mitigating adverse psychological outcomes. Absent this information, guidance on early behavioral interventions is based primarily on expert consensus.

Behavioral interventions are, in general, stepwise. Initially, interventions tend to be population based and address ordinary people responding to extraordinary events. Over the course of a few weeks, the behavioral health focus shifts to more individual or small-group interventions targeting psychiatric disorders and monitoring people at high risk for developing psychiatric morbidity, such as those injured by the incident. It is critical that cultural considerations be integrated into all behavioral interventions, because cultural beliefs and values will be central organizing principles for survivors.[46]

Behavioral principles and practice for intervening in the immediate aftermath of traumatic events may be useful for health care providers. For example, psychological first aid (PFA) was developed to be the psychological analogue of medical first aid. There are versions of PFA designed for the public in addition to those developed for behavioral health care providers (BHCP). PFA offers a quick review of common responses to trauma and practical tips on how to support survivors, which health care providers may find useful to incorporate into their practices.

To maximize effectiveness, standard disaster interventions such as PFA should be modified or augmented to address the unique and potent stressors of a specific incident. A primary focus of such a modification for a radiological/nuclear incident should be on guidance to help reduce the intense fear and apprehension associated with radiation.

Five empirically based principles of behavioral intervention may also be helpful for responders interacting with survivors in the minutes and hours after the detonation.[47] Actions by helpers should promote a sense of safety, calm, a sense of individual and group efficacy, connectedness with others, and hope. Health care providers may wish to explore ways in which emergency response plans can build upon and reinforce these principles.

Acute Response (First 48 Hours)

The overarching goals of BH interventions in the first 48 hours are to support lifesaving activities for those with immediate injuries and to prevent additional casualties from fallout. To the extent that channels remain functional, communication will provide guidance on protective actions to those in the affected areas. In this initial phase of confusion and limited resources, BHCPs can do the following:

- Provide input on effective communication strategies and approaches
- Promote appropriate protective behaviors (eg, adhering to guidance to shelter) and address psychological barriers to taking protective measures (eg, paralyzing anxiety)
- Discourage dangerous behaviors (eg, entering high radiation areas to search for loved ones)
- Help manage patient/survivor flow in support of crisis standards of care
- Assist with psychological management of patients in all medical care settings[8]
- Support first responders' and first receivers' ability to function
- Assist with medical triage
- Aid in caring for patients who are pregnant
- Practice "buddy care," use "buddy teams"
- Use only the staff, stuff, and space that is absolutely necessary

Communication will be important to diminish surge on hospitals and medical care sites. In the aftermath of a disaster, people converge on hospitals for a number of reasons, such as to look for missing loved ones, to receive treatment for minor injuries, and to seek a safe haven. A major task will be to encourage people without immediately lifethreatening injuries to radiation triage, treatment, and transport assembly sites and predetermined assembly centers to more effectively assist people and conserve and better target scarce medical resources. Messaging should inform people who are evacuating about where the assembly sites and centers are located and that information about injured patients will be provided at designated nonhospital settings in outlying areas. (Ideally, emergency plans will have a system for handling missing persons inquiries and prescripted messages explaining how to access it.) Fairness in the allocation of scarce resources is a strong value held by the public. It will be essential to keep people informed about the process for evaluating radiation exposure and to be transparent about why certain groups may be prioritized higher than others. BHCP may be useful in providing information and directing people to established assembly and evacuation sites. They can also help provide assistance to severely distraught or anxious individuals.

As conditions permit, BHCP, especially those with consultation/liaison or emergency department experience, can assist in triage to distinguish symptoms of physical injury from strictly stress-induced reactions and provide appropriate assistance. BHCPs can also help care for patients who are pregnant (those likely to succumb despite every available medical intervention) and support other staff with this responsibility. Health care providers unaccustomed to working with dying people may experience feelings of helplessness and hopelessness associated with not being able to prevent death. Focusing on actions that relieve suffering when unable to save lives may diminish feelings of helplessness. Ideally, this focus would include administering medications to provide symptom relief and give fluids. Even in the worst case, no available resources, patients (and their families) will likely receive some comfort knowing that they did not die alone. Similarly, health care providers may later find meaning and enhanced self-worth knowing that they stayed and did their best rather than abandon patients.

As more information becomes available about the nature of the attack, radiation concerns will become more prominent for both medical personnel and the public. Ideally, BHCPs will have participated in planning for reception centers and the screening process for radiation. Reminding planners that any protocols that rely on separating children from parents will be unsuccessful is an example of the kinds of behavioral advice that can make systems run more smoothly and better meet the needs of survivors.

The opportunity to support first responders and health care practitioners in the immediately affected area will be limited until additional resources are brought in. These groups will be exposed to many traumatic stressors. Resources that have been developed to inform the design of pre- and postevent interventions for these groups, who will be exposed to many traumatic stressors, should be consulted for developing well-informed plans.[48,49]

Consultation to medical leadership likely will be the most effective way to provide immediate assistance to health care providers. There may be limited opportunities for BHCP to support staff in making the difficult transition from customary practice to crisis standards of care. Preventing unnecessary exposure to dead and dying people diminishes traumatic stressors. Studies have suggested that pairing experienced staff with those in training or new to the field may be useful in minimizing stress in the latter group. As soon as resources become available, the initial responders and care providers should be sent off-duty and be provided with rest, food, and safe shelter. It is important to watch for staff resistance to leaving work (overdedication), especially among leaders. Guidance published by the US Department of Health and Human Services incorporates psychological factors into occupational safety for disasters.[50]

Early Response (48 Hours to 1 Month)

It will be important from this point on to coordinate or integrate medical and behavioral health care. Aside from injuries sustained during the disaster, psychological problems (not disorders) and physical symptoms (not disease) are often seen in survivors. Increasingly, there is recognition that traumatic events are associated with increased physical complaints such as fatigue, musculoskeletal pain, stomachache, and headache.[51] Indeed, physical symptoms may last longer than distress and psychiatric disorders.[51] Primary care providers must be alert not only

to acute stress disorder/posttraumatic stress disorder but also to complicated bereavement, unexplained physical symptoms, sleep disturbance, family conflict and violence, and increased use of tobacco and alcohol. The link between traumatic exposure and these presentations can be overlooked both by the patient and the primary care provider. All providers should also be vigilant for comorbid psychiatric conditions such as major depression and posttraumatic stress disorder.[52,53]

There is little scientific understanding of how physical and mental illnesses influence one another. What is clear is that medical management of patients postdisaster can be improved by better understanding and recognition of the interplay between mind and body. This is especially true in cases in which there is ambiguity about whether one has been exposed to an invisible agent like radiation or when there is uncertainty about the risk of eventually developing health effects.

Just-in-time training or refresher courses to educate health care professionals at receiving facilities about how to safely care for patients with internal and/or external radioactive contamination will be important. The rapid identification of those who have received significant radiation exposure and who could benefit from medical intervention will be a high medical and behavioral priority. Depending on the characteristics of the nuclear detonation and the success of protective actions, the numbers of people affected could vary tremendously—from thousands to hundreds of thousands. Rapid screening will be enormously important from a psychological and a medical standpoint.

Rapid screening, enrollment in registries, and the provision of appropriate treatments foster trust and confidence in survivors. Understandably, people will want to learn as much as possible about their health status, including potential long-term implications of exposure. Uncertainty and waiting are discomfiting aspects of the human condition; in general, the more quickly people learn about their exposure status, the better they will fare psychologically, even if the news is bad. Because concentration and the ability to retain information decrease under high stress, those screened should be given a record of their results, however primitive the record. Ideally, these results would also be entered into a registry.

BHCPs can support the screening process by assisting in keeping people informed and listening to people's concerns:

- Assist in keeping the public informed so that they can accurately assess their situation and choose the best course of action
- Listen to people's concerns and provide feedback to improve the screening process
- Provide support to those who need help in coping
- Provide services and assistance for those with preexisting psychiatric and substance abuse disorders
- Assist with family reunification
- Follow up with individuals at higher risk for psychiatric morbidity
- Assist leadership in quickly setting up routines and organizational supports for the diverse populations and various needs of those directly affected by the event
- Assist in staff assembly, dispensing, screening, triage, and alternate care sites

Feedback from those waiting may be helpful in modifying screening procedures if problems are identified. Having a plan to address the basic needs of those waiting (eg, challenge of standing for long periods, need to save people's places in line while they use restrooms, provision of water/food) may help queuing go more smoothly.

For those patients who learn that they have acute radiation syndrome, psychological support may help them and their families cope better with treatment. BHCPs familiar with working with patients with cancer and other life-threatening conditions may be especially useful in planning for these patients' and their families' needs. Past radiation incidents suggest that active outreach be made to women who become pregnant and those with small children because they have high levels of concern about the potential adverse health effects of radiation on children and developing embryos/fetuses.[11,54-56]

As in all settings of rapid evacuation, clinicians should be alert for signs and symptoms of substance withdrawal and intervene accordingly. Similarly, efforts should be made to provide missing medications, including psychotropic medications, to evacuees who have left them behind so as to prevent relapse or flare-ups of underlying illness.

Populations at high risk for psychiatric morbidity, particularly ill and injured people, should be monitored closely. Burn patients and those blinded and deafened by the detonation should be evaluated and supported as appropriate. Consultation/liaison psychiatry models for the management of hospitalized patients can inform an integrated care plan for this traumatized group.[57-59] Sleep disturbance is common and may be treated by the judicious use of medication once safe lodging is ensured. Outreach and consultation to primary care colleagues can help them recognize and, when possible, treat psychiatric disorders.

There will be a universal wish for information about the incident, loved ones, and ongoing danger(s). The threat of further incidents and hostilities cannot be ruled out and also must be planned for. Realistic information on the status of safety and security must be provided. At the same time, constant media exposure to dramatic and horrific events can traumatize viewers who are "glued to the TV." Media messaging that provides necessary information and resources rather than sensationalism should be encouraged as much as possible. As quickly as possible, communication should inform people about the process for reunification. As more information is learned about the nuclear detonation, the areas in which people most likely were killed will be delineated, serving essentially as death notices. Traumatic bereavement and grief should be anticipated and plans

made for addressing them. Concurrent with acute interventions, attention must turn to longer-term mental health needs and the recovery process.

Recovery Phase (1 Month Through Years)

Psychiatric disorders associated with terrorist attacks can be expected to develop over time.

The usual trajectory of psychological response is one of resilience in which initial distress responses resolve in days to several weeks from discrete traumatic events. Often, however, stressors persist after the incident has passed. This would certainly be the case for a nuclear detonation in which additional major stressors such as resettlement, contamination, and the delayed onset of illness and death would continue to affect mental and physical health for decades.

The greatest amount of work for BHCPs will occur during the recovery period, when they can play a major role in a number of activities. The recovery environment is an important determinant of people's psychological outcome, either enhancing resilience or contributing additional stressors. The recovery environment can be designed to bolster resilience. Scientific literature and consultation from disaster social scientists and disaster behavioral health experts can inform recovery activities and programs such as temporary housing and relocation. Lessons gleaned from the Chernobyl accident illustrate the potential medium- and long-term psychosocial consequences.[60] For example, the comprehensive review of lessons learned from Chernobyl found that "any traumatic accident or event can cause the incidence of stress symptoms, depression, anxiety (including posttraumatic stress symptoms), and medically unexplained physical symptoms."[60] This review also found that "exposed populations had anxiety levels that were twice as high as controls, and they were 3-4 times more likely to report multiple unexplained physical symptoms and subjective poor health than were unaffected control groups."[60] Finally, the review found that people came to be known as "Chernobyl victims," and this label "had the effect of encouraging individuals to think of themselves fatalistically as invalids . . . Thus, rather than perceiving themselves as "survivors," many of those people have come to think of themselves as helpless, weak and lacking control over their future."[60]

In contrast to prevention and mitigation activities, there are evidence-based interventions to guide treatment of these psychiatric conditions, the risk factors of which are as follows[46]:

- Severity of traumatic exposure (most robust predictor)
- Number of stressors
- Death of loved one
- Injury to self or family member
- Panic during the disaster
- Threat to life
- Financial loss
- Relocation
- Property damage
- Female gender
- Lower socioeconomic status
- Avoidance as coping mechanism
- Assignment of blame
- Parenthood
- Parental distress (predicts child's distress)
- Ethnic minority
- Predisaster psychological symptoms

Relocation, itself, is associated with a greater risk of psychiatric morbidity. The following summarizes the types of psychiatric disorders associated with disasters[46]:

- Posttraumatic stress disorder
- Depression
- Anxiety
- Dissociative responses
- Acute stress disorder
- Demoralization
- High perceived stress
- Negative affect
- Physical health problems
- Increase in use of alcohol or drugs
- Somatic concerns
- Poor sleep quality
- Physiological arousal

Collaboration between primary care providers and the mental health community optimizes patient care in both the short and long term. Most people with psychiatric disorders will present to primary care providers rather than mental health care providers. For those exposed to lower doses of radiation or for whom the level of exposure is unknown, concerns about developing cancer will likely be present. Strategies for managing this uncertainty and addressing other concerns can be facilitated by strong collaboration among health care providers and a good working relationship between health care provider and patient.[61]

The recovery and identification of human remains will be an emotionally charged process, especially given that many bodies will perish with no trace, similar to what happened in the collapse of the World Trade Center. Rituals and memorials can play an important role in assisting families and communities mourn their losses and rebuild their lives.

A great deal of art and science is involved in developing processes that are healing rather than fracturing. Lessons learned should be incorporated into planning to minimize undue secondary traumatization. Health care providers should be proactive in exploring signs and symptoms of depression and complicated bereavement in patients who have lost loved ones.

CONCLUSIONS

The social, psychological, and behavioral effects of a nuclear detonation would likely be widespread and profound and would affect how the incident unfolds and the severity of its conse-

quences. Among the key issues are the mental health effects on the public, potential effects on emergency responders and other caregivers, and broader effects on communities and society. Although the knowledge base on the immediate social, psychological, and behavioral effects of a nuclear detonation is limited, the present article has used the best available information to outline how people are likely to react and how BHCPs can assist in the response.

Given the existing knowledge, there are some reasonable assumptions that can be made about people's reactions. First, although many people will likely be to engage in the kinds of altruistic behaviors that occur in most disaster situations, fear of radiation and contamination or lack of needed information has the potential to produce other kinds of behaviors and response including some that could complicate response and recovery efforts. Effective communication will be key to fostering prosocial responses and encouraging the taking of appropriate protective actions. Second, emergency responders in large numbers will likely do their best to carry out their missions provided they have the training, information, and support they require. To the degree that these are lacking, stresses will increase, responder confidence will diminish, and risks for ineffective responses will increase.

After exposure to traumatic events (such as the September 11 attacks), people commonly experience a range of distress responses. A nuclear detonation's psychological impact may be based both on the devastation of the incident and on potentially ongoing traumatizing processes the detonation creates. In fact, it may be better to understand a nuclear detonation less as a discrete incident and more as an ongoing potentially traumatizing process lasting weeks, perhaps years. Thus, interventions would be required for a longer time.

Research on the effect of traumatic events suggests that when the aftermath of the incident is focused on coping, effective help, and healing, the outcomes for survivors are much better. Broadly stated, the goal of early behavioral health intervention is to identify and remove impediments to the natural trajectory of psychological resilience. Initial interventions tend to be population based and address ordinary people responding to extraordinary events. Actions by helpers should promote a sense of safety, calm, a sense of individual and group efficacy, connectedness with others, and hope.[47]

A few weeks after a detonation, the behavioral health focus shifts to individual or small-group interventions targeting psychiatric disorders and monitoring people at high risk for developing psychiatric morbidity. Early initiation of cognitive-behavioral therapy (at about 3 weeks postevent) with individual survivors of motor vehicle crashes and nonsexual assaults diagnosed with acute stress disorder has been shown to reduce psychopathology and distress.[59,62,63] Researchers caution that structured cognitive-behavioral interventions should not be implemented until secondary environmental stressors are under adequate control, to enable the individual to focus on the intervention.[64] Similarly, emotional processing of the traumatic events is generally contraindicated until survivors have had the opportunity to recover from the immediate period of high physiological arousal.

Beyond understanding people's reactions to the immediate incident, BHCPs have knowledge of human behavior that can inform many aspects of the response. This expertise includes several factors that affect health outcomes, such as information, communication, and population behavior. Bringing this expertise to the table when planning for and responding to a nuclear detonation could reduce negative effects on health in the near and long term, for both the local community and society at large.

Author Affiliations: Drs Dodgen and Hansen are with the Office of the Assistant Secretary for Preparedness and Response, Department of Health and Human Services; Dr Norwood is with the Center for Biosecurity, University of Pittsburgh Medical Center; Dr Becker is with the Department of Environmental Health Sciences, University of Alabama at Birmingham School of Public Health; and Dr Perez is with the Office of Clinical and Preventive Services, Indian Health Service, US Department of Health and Human Services.

Correspondence: Address correspondence and reprint requests to Dr Daniel Dodgen, 330 C Street SW, Suite 5200, Washington, DC 20447 (e-mail: daniel.dodgen@hhs.gov).

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REFERENCES

1. Buddemeier BR. *Reducing the Consequences of a Nuclear Detonation. Threats at Our Threshold: Securing and Defending the United States in the 21st Century*. Livermore, CA: Lawrence Livermore National Laboratory; 2007.
2. Mlakar PF, Corley WG, Sozen MA, et al. The Oklahoma City bombing: analysis of blast damage to the Murrah Building. *J Perform Constr Facil*. 1998;12:113-119.
3. Coleman CN, Knebel AR, Hick JL, et al. Scarce resources for nuclear detonation: project overview and challenges. *Disaster Med Public Health Prep*. 2011;5(Suppl 1):S13-S19.
4. Caro JJ, DeRenzo EG, Coleman CN, et al. Resource allocation following a nuclear detonation incident: unaltered standards of ethical decision making. *Disaster Med Public Health Prep*. 2011;5(Suppl 1):S46-S53.
5. Casagrande R, Wills N, Kramer E, et al. Using the model of resource and time-based triage (MORTT) to guide scarce resource allocation in the aftermath of a nuclear detonation. *Disaster Med Public Health Prep*. 2011; 5(Suppl 1):S98-S110.
6. DiCarlo AL, Maher C, Hick JL, et al. Radiation injury after a nuclear detonation: medical consequences and the need for scarce resources allocation. *Disaster Med Public Health Prep*. 2011;5(Suppl 1):S32-S44.
7. Hick JL, Weinstock DM, Coleman CN, et al. Health care system planning for and response to a nuclear detonation. *Disaster Med Public Health Prep*. 2011;5(Suppl 1):S73-S88.

8. Knebel AR, Coleman CN, Cliffer KD, et al. Allocation of scarce resources after a nuclear detonation: setting the context. *Disaster Med Public Health Prep*. 2011;5(Suppl 1):S20-S31.
9. Murrain-Hill P, Coleman CN, Hick JL, et al. Medical response to a nuclear detonation: creating a playbook for state and local planners and responders. *Disaster Med Public Health Prep*. 2011;5(Suppl 1):S89-S97.
10. Sherman SE. Legal considerations in a nuclear detonation. *Disaster Med Public Health Prep*. 2011;5(Suppl 1):S65-S72.
11. Management of Terrorist Events Involving Radioactive Material *(Report No. 138)*. Bethesda, MD: National Council on Radiation Protection and Measurements; 2001.
12. Key Elements of Preparing Emergency Responders for Nuclear and Radiological Terrorism (*Commentary No. 19*). Bethesda, MD: National Council on Radiation Protection and Measurements; 2005.
13. Becker SM. Emergency communication and information issues in terrorist events involving radioactive materials. *Biosecur Bioterror*. 2004;2(3):195-207.
14. Becker SM. Communicating risk to the public after radiological incidents. *BMJ*. 2007;335(7630):1106-1107.
15. Becker S. Preparing for terrorism involving radioactive materials: three lessons from recent experience and research. *J Appl Secur Res*. 2009;4:9-20.
16. Slovic P. Perception of risk from radiation. *Radiat Prot Dosimetry*. 1996;68:165-180.
17. Berry LB, Jones A, Powers T, et al. *Media Interaction With the Public in Emergency Situations: Four Case Studies. A Report*. Washington, DC: Federal Research Division, Library of Congress; 1999.
18. Petterson J. Perception vs. reality of radiological impact: the Goiania model. *Nucl News*. 1988;31:84-90.
19. Becker SM. Psychosocial effects of radiation accidents. In: Gusev IA, Guskova AK, Mettler FA, eds. *Medical Management of Radiation Accidents*. 2nd ed. Boca Raton, FL: CRC Press; 2001:519-525.
20. Buddemeier BR, Dillion M. *Key Response Planning Factors for the Aftermath of a Nuclear Detonation*. LLNL-TR-410067. Livermore, CA: Lawrence Livermore National Laboratory. http://www.remm.nlm.gov/IND_ResponsePlanning_LLNL-TR-410067.pdf. Published August 2009. Accessed June 28, 2010.
21. Perry RW, Lindell MK. Preparedness for emergency response: guidelines for the emergency planning process. *Disasters*. 2003;27(4):336-350.
22. Auf der Heide E. Common misconceptions about disasters: panic, the "disaster syndrome," and looting. In: O'Leary MR, ed. *The First 72 Hours: A Community Approach to Disaster Preparedness*. Bloomington, IN: iUniverse; 2004: 340–380.
23. Gershon RR, Qureshi KA, Rubin MS, Raveis VH. Factors associated with high-rise evacuation: qualitative results from the World Trade Center Evacuation Study. *Prehosp Disaster Med*. 2007;22(3):165-173.
24. Tierney KJ. Strength of a city: a disaster research perspective on the World Trade Center attack. http://essays.ssrc.org/sept11/essays/tierney.htm. Accessed January 18, 2010.
25. Drury J, Cocking C, Reicher S. Everyone for themselves? A comparative study of crowd solidarity among emergency survivors. *Br J Soc Psychol*. 2009;48(pt 3):487-506.
26. Drury J, Cocking C, Reicher S. The nature of collective resilience: survivor reactions to the 2005 London bombings. *Int J Mass Emerg Disasters*. 2009;27:66-95.
27. Avdeyeva TV, Burgetova K, Welch ID. To help or not to help? Factors that determined helping responses to Katrina victims. *Anal Soc Issues Public Policy*. 2006;6:159-173.
28. Drury J. Managing crowds in emergencies: psychology for business continuity. *Business Continuity J*. 2009;3:14-24.
29. Rodriguez H, Trainor J, Quarantelli EL. Rising to the challenges of a catastrophe: the emergent and prosocial behavior following Hurricane Katrina. *Ann Am Acad Pol Soc Sci*. 2006;604:82-101.
30. Barsky L, Trainor J, Torres M. Disaster realities in the aftermath of Hurricane Katrina: revisiting the looting myth. 2006. http://www.colorado.edu/hazards/qr/qr184/qr184.html. Published 2006. Accessed January 12, 2010.
31. Brezina T, Kaufman J. What really happened in New Orleans? Estimating the threat of violence during the Hurricane Katrina disaster. *Justice Q*. 2008;25:701.
32. Drury J, Winter G. Social identity as a source of strength in mass emergencies and other crowd events. *Int J Ment Health*. 2003;32:77-93.
33. *Nuclear Detonation Preparedness—Communicating in the Immediate Aftermath. Domestic Resilience Group*. Washington, DC: IND Response Sub-IPC; 2010.
34. Hersey J. *Hiroshima*. New York: Vintage Books; 1989.
35. Matsunari Y, Nozawa S, Sakata K, et al. Individual testimonies to nursing care after the atomic bombing of Hiroshima in 1945. *Int Nurs Rev*. 2008;55(1):13-19.
36. Hachiya M. *Hiroshima Diary: The Journal of a Japanese Physician, August 6–September 30, 1945*. Chapel Hill: The University of North Carolina Press; 1995.
37. Becker SM. Risk communication and radiological/nuclear terrorism: perceptions, concerns and information needs of first responders, health department personnel, and healthcare providers. In: Johnson RH, ed. *Radiation Risk Communication: Issues and Solutions*. Madison, WI: Medical Physics Publishing; 2010:271-280.
38. Becker SM, Middleton SA. Improving hospital preparedness for radiological terrorism: perspectives from emergency department physicians and nurses. *Disaster Med Public Health Prep*. 2008;2(3):174-184.
39. Cone DC, Cummings BA. Hospital disaster staffing: if you call, will they come? *Am J Disaster Med*. 2006;1(1):28-36.
40. Dimaggio C, Markenson D, T Loo G, Redlener I. The willingness of U.S. Emergency Medical Technicians to respond to terrorist incidents. *Biosecur Bioterror*. 2005;3(4):331-337.
41. Lanzilotti SS, Galanis D, Leoni N, Craig B. Hawaii medical professionals assessment. *Hawaii Med J*. 2002;61(8):162-173.
42. Qureshi K, Gershon RR, Sherman MF, et al. Health care workers' ability and willingness to report to duty during catastrophic disasters. *J Urban Health*. 2005;82(3):378-388.
43. *Planning Guidance for Response to a Nuclear Detonation*. 2nd ed. Washington, DC: Homeland Security Council, Interagency Policy Coordination Subcommittee for Preparedness and Response to Radiological and Nuclear Threats; 2010. http://hps.org/hsc/documents/Planning_Guidance_for_Response_to_a_Nuclear_Detonation-2nd_Edition_FINAL.pdf. Accessed February 7, 2011.
44. Coleman CN, Weinstock DM, Casagrande R, et al. Triage and treatment tools for use in a scarce resources-crisis standards of care setting following a nuclear detonation. *Disaster Med Public Health Prep*. 2011;5(Suppl 1):S111-S121.
45. Steffen SL, Fothergill A. 9/11 volunteerism: a pathway to personal healing and community engagement. *Soc Sci J*. 2009;46:29-46.
46. Andrulis DP, Siddiqui NJ, Gantner JL. Preparing racially and ethnically diverse communities for public health emergencies. *Health Aff (Millwood)*. 2007;26(5):1269-1279.
47. Hobfoll SE, Watson P, Bell CC, et al. Five essential elements of immediate and mid-term mass trauma intervention: empirical evidence. *Psychiatry*. 2007;70(4):283-315, discussion 316-369.
48. Hall RC, Hall RC, Chapman MJ. Medical and psychiatric casualties caused by conventional and radiological (dirty) bombs. *Gen Hosp Psychiatry*. 2006;28(3):242-248.
49. Hall RCW, Hall RCW, Chapman MJ. Emotional and psychiatric effects of weapons of mass destruction on first responders. In: Ursano RJ, Norwood AE, Fullerton CS, eds. *Bioterrorism: Psychological and Public Health Interventions*. Cambridge, UK: Cambridge University Press; 2004.
50. US Department of Health and Human Services. HHS Pandemic Influenza Plan Supplement 11: worforce support. Psychosocial consideration and information needs. http://www.hhs.gov/pandemicflu/plan/sup11.html. Accessed January 19, 2010.
51. Yzermans CJ, Berg VD, Dirkzwager AJE. Physical health problems after disasters. In: Nuria Y, Galea S, Norris FH, eds. *Mental Health and Disasters*. Cambridge, UK: Cambridge University Press; 2009:67-93.
52. Ursano RJ. Post-traumatic stress disorder. *N Engl J Med*. 2002;346(2):130-132.

53. Yehuda R. Post-traumatic stress disorder. *N Engl J Med*. 2002;346(2):108-114.
54. Bromet E, Parkinson D, Dunn L. Long-term mental health consequences of the accident at Three Mile Island. *Int J Ment Health*. 1990;19:48-60.
55. Bromet EJ, Havenaar JM. The long-term mental health impacts of the Chernobyl accident. In: Neria Y, Galea S, Norris FH, eds. *Mental Health and Disasters*. Cambridge, UK: Cambridge University Press; 2009:441-453.
56. Havenaar JM, Poelijoe NW, Kasyanenko AP, Van den Bout J, Koeter MW, Filipenko VV. Screening for psychiatric disorders in an area affected by the Chernobyl disaster: the reliability and validity of three psychiatric screening questionnaires in Belarus. *Psychol Med*. 1996;26(4):837-844.
57. Wain H, Grammer GG, Stasinos J, et al. Psychiatric intervention for medical and surgical patients following traumatic injuries. In: Ritchie EC, Watson PJ, Friedman MJ, eds. *Interventions Following Mass Violence and Disasters: Strategies for Mental Health Practice*. New York: Guilford Press; 2006:278-299.
58. Zatzick D, Roy-Byrne P. Developing high-quality interventions for post-traumatic stress disorder in the acute care medical setting. *Semin Clin Neuropsychiatry*. 2003;8(3):158-167.
59. Zatzick D, Roy-Byrne P, Russo J, et al. A randomized effectiveness trial of stepped collaborative care for acutely injured trauma survivors. *Arch Gen Psychiatry*. 2004;61(5):498-506.
60. Chernobyl's Legacy. *Health, Environmental and Socio-Economic Impacts and Recommendations to the Governments of Belarus, the Russian Federation and Ukraine*. 2nd rev. ed. Vienna: Chernobyl Forum, International Atomic Energy Agency; 2005.
61. Zatzick DF, Russo J, Rajotte E, et al. Strengthening the patient-provider relationship in the aftermath of physical trauma through an understanding of the nature and severity of posttraumatic concerns. *Psychiatry*. 2007;70(3):260-273.
62. Bryant RA, Harvey AG, Dang ST, Sackville T, Basten C. Treatment of acute stress disorder: a comparison of cognitive-behavioral therapy and supportive counseling. *J Consult Clin Psychol*. 1998;66(5):862-866.
63. Bryant RA, Sackville T, Dang ST, Moulds M, Guthrie R. Treating acute stress disorder: an evaluation of cognitive behavior therapy and supportive counseling techniques. *Am J Psychiatry*. 1999;156(11):1780-1786.
64. Watson PJ. Early intervention for trauma-related problems following mass trauma. In: Ursano RJ, Fullerton CS, Weisaeth L, eds. *Textbook of Disaster Psychiatry*. Cambridge, UK: Cambridge University Press; 2007:121-139.