

A Psychosocial Risk Assessment and Management Framework to Enhance Response to CBRN Terrorism Threats and Attacks

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Evidence in the disaster mental health literature indicates that psychosocial consequences of terrorism are a critical component of chemical, biological, radiological, and nuclear (CBRN) events, both at the clinical level and the normal behavioral and emotional levels. Planning for such psychosocial aspects should be an integral part of emergency preparedness. As Canada and other countries build the capacity to prevent, mitigate, and manage CBRN threats and events, it is important to recognize the range of social, psychological, emotional, spiritual, behavioral, and cognitive factors that may affect victims and their families, communities, children, the elderly, responders, decision makers, and others at all phases of terrorism, from threat to post-impact recovery. A structured process to assist CBRN emergency planners, decision makers, and responders in identifying psychosocial risks, vulnerable populations, resources, and interventions at various phases of a CBRN event to limit negative psychosocial impacts and promote resilience and adaptive responses is the essence of our psychosocial risk assessment and management (P-RAM) framework. This article presents the evidence base and conceptual underpinnings of the framework, the principles underlying its design, its key elements, and its use in the development of decision tools for responders, planners, decision makers, and the general public to better assess and manage psychosocial aspects of CBRN threats or attacks.

GOVERNMENT AGENCIES have invested considerable resources in the development of risk assessment and management frameworks to assist planners and decision makers in managing various public health and safety issues. Jardine and colleagues documented general frameworks managing human health and ecological risks, as well as application-specific frameworks for managing contaminated sites, food safety, medical devices, or prescription drugs.¹ With the increasing perceived threat of

CBRN terrorism in Canada and other countries, the development of specific frameworks and tools to assist first responders and public health and emergency planners in managing CBRN threats and events is critical. While systems and plans exist at the community, regional, provincial, and federal levels to manage natural hazards such as fires, floods, and tornadoes, as well as other emergencies such as major accidents, CBRN terrorism presents unique features that merit focused risk management ef-

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forts. Moreover, in all of the above, psychosocial aspects tend to be overlooked, but they are pivotal and require more extensive consideration.

Case studies of traumatic incidents such as the anthrax attacks in the United States, the sarin subway attack in Tokyo, the Oklahoma City bombing, and the Goiana, Hiroshima, and Chernobyl radiation events illustrate the scope and intensity of psychosocial effects experienced by first responders, victims, families, and communities. These incidents provide valuable evidence and guidance on the types of psychosocial aspects that need to be considered in CBRN threats and attacks.² While interagency CBRN response planning efforts are underway at the local, regional, provincial, and national levels in Canada, the focus is primarily on detection, containment, and short-term consequence management related to the physical hazards. To date, the psychological, social, emotional, and behavioral aspects of terrorism have not been fully integrated into preparedness and planning efforts. Moreover, an evidence-based risk assessment and management framework to assist emergency planners and first responders in preparing for and responding to the psychosocial dimensions of terrorism currently does not exist.

To meet this need, we have developed an integrated framework to assess and manage the psychosocial aspects of CBRN threats and attacks. The framework integrates the emerging body of literature describing the mental health aspects of terrorism and disaster, including interventions to mitigate psychosocial impacts before, during, and after an event.^{3–16} We describe the framework development process, guiding principles for the framework, its core elements, and our current effort to operationalize the framework into a user-based tool for CBRN psychosocial preparedness planning. (The development process and functional characteristics of the tool are described further in a separate article.)

PSYCHOSOCIAL DIMENSIONS OF TERRORISM: EMPIRICAL EVIDENCE

Terrorism has been defined as the illegal use or threatened use of force or violence to instill fear in populations, and an intent to coerce societies or governments by inducing fear in their populations.¹⁷ Research evidence clearly demonstrates that fear and anxiety are normal protective behaviors that are part of a much broader set of psychosocial reactions to CBRN threats and attacks.^{7,18,19} Moreover, the psychosocial effects at the emotional, psychological, social, and behavioral levels have been shown to be more widespread and long-lasting than direct physical effects in terms of their impact on society and population health.^{14,20–24}

For example, the well documented sarin attack on a Tokyo subway system in 1995 and the anthrax attacks in the U.S. in 2001 provide insights into the psychosocial impacts of unprecedented chemical and biological attacks on the public and first responders, including public health and hospital emergency personnel. These two case studies illustrate how different agents, vectors, situational characteristics, and risk management responses can influence the scope (individual and communitywide) and nature (psychogenic behaviors, social disruption, mistrust in public authorities) of the psychosocial consequences of a CBRN incident.

The 1995 Tokyo Sarin Attacks

In 1995, terrorists released sarin gas, a potent nerve agent with the potential to induce significant neurotoxicity within a period of minutes, in a crowded Tokyo subway station.²⁵ Although the sarin gas attack resulted in physical casualties (12 deaths, 17 injuries, and 1,370 victims requiring treatment for mild to moderate symptoms), approximately 5,510 of those who flooded hospital emergency departments were “psychological casualties”—that is, they experienced physical symptoms without direct exposure to nerve agent.²⁶

The lack of a proactive public communications strategy by public authorities while media images portrayed suffering at the scene of the attack, coupled with the lack of follow-up care and support, had a significant influence on the public response to this incident. Long-term behavioral and emotional effects experienced by people in Tokyo included fear of commuting, absenteeism from work, lack of trust in public authorities, insomnia, depression, anxiety, and uncertainty about long-term health impacts.^{27,28} Although fewer than 3% were diagnosed 5 years after the event with posttraumatic stress disorder (PTSD) according to DSM-IV criteria, continuing medically unexplained physical symptoms suggest that these may be part of the clinical presentation of PTSD in Japan.²⁹ The difficulties faced by the emergency medical community during triage and treatment due to lack of training and preparedness for a CBRN terrorism event are well documented.^{30–32} Studies of long-term health impacts among this group, however, have focused on the physical effects of secondary contamination and have not addressed psychosocial issues.³³

The 2001 U.S. Anthrax Attacks

In 2001, a white powder determined to be anthrax was distributed through the U.S. postal system in envelopes addressed to government officials and media representatives. The attacks provided valuable insight into the psychosocial consequences resulting from conflicting information from public authorities, inconsistent infection

control and treatment protocols, and compliance issues associated with inadequate public understanding of the importance of prophylactic treatment.

In total, six letters, each containing 1 or 2 g of anthrax spores, caused 5 deaths and 22 infections. The U.S. Postal Service was disrupted, a Senate office building was shut down, and widespread psychological, behavioral, and social impacts were felt in affected communities. While exposure was confined to six epicenters on the U.S. East Coast, millions of people throughout the country were anxious about opening their daily mail. The large number of hoaxes and false alarms that followed the actual attacks further complicated the situation.³⁴ More than 30,000 individuals were offered prophylactic antibiotics, and many more are thought to have sought antibiotics on their own.³⁵

Compliance with aggressive and timely prophylactic oral antibiotics by all asymptomatic individuals in exposed areas was limited: approximately 40% declined or discontinued antibiotic use because of adverse reactions or concern about long-term side effects.³⁶ Public health officials were faced with managing an unprecedented multicenter incident, had limited access to scientific information, and lacked established channels of communication with the medical community, the media, and the public.³⁷

Public trust and confidence in government authorities was compromised by the initial reassurances from public health officials that the anthrax source was naturally occurring rather than deliberately spread, by the release of only limited information regarding the nature of the threat and the status of the response efforts, and by the difficulty in conveying the uncertainties associated with the factual information available to authorities.^{36,38} The apparent lack of consistency in testing and treatment regimes for groups exposed at different times over the 2-month duration of this incident also resulted in eroding trust in public health authorities among African American postal workers; this in turn played a role in the low rate of prophylactic vaccination among this group.³⁹ There is evidence to suggest that the lack of confidence in the ability of the public health system to respond fairly endures and has extended to ethnic minorities in other U.S. communities.⁴⁰

These two incidents emphasize the critical role that perceptions, attitudes, and emotions play in shaping public responses to CBRN threats and events, and the importance of understanding and anticipating social and psychological factors in CBRN risk management planning.⁴¹ The sarin attack illustrates the potential for psychogenic behaviors and social disruption following a chemical terrorism event and the critical role of the frontline emergency response community. The anthrax attacks highlight the importance of perceived fairness in risk management responses and public trust and confidence

in public health authorities in the management of bioterrorism threats and attacks.

PSYCHOSOCIAL ASPECTS OF CBRN TERRORISM IN A RISK MANAGEMENT PARADIGM

The goal of risk management is to provide scientifically sound, cost-effective, integrated actions that reduce or prevent risks while taking into account social, cultural, ethical, political, and legal considerations.⁴² State-of-the-art risk management frameworks, including those developed by Health Canada and the U.S. Presidential Congressional Framework for Environmental Risk Management, are typically comprised of the following interrelated elements:

- issue identification, including understanding the social, cultural, ethical, political, and legal context of the problem;
- risk assessment—that is, hazards identified, likelihood of adverse outcomes estimated, risks and benefits characterized;
- identification, selection, and implementation of risk management options; and
- ongoing monitoring of risk management interventions.^{1,42,43}

Risk communication between decision makers and stakeholders at all phases of the risk management process is essential.

CBRN terrorism risk management frameworks are still in their infancy and to date have largely focused on guiding resource planning, to manage infrastructure damage, and interagency coordination, to manage the physical and medical consequences of the event at the time of attack and rescue. One important element missing from these frameworks is a vulnerability assessment. Salter considers vulnerability assessment a crucial modifier of disaster consequences, as it helps direct interventions aiming to manage the social impacts.⁴⁴

This point also was supported by Kunreuther, who noted the need for risk assessment to be supplemented by vulnerability analyses detailing the type of physical, social, political, economic, cultural, and psychological harms to which individuals and modern societies are susceptible.⁴⁵ He further emphasized as important elements the need to incorporate study findings on public perception of terrorism risks, and to consider the impact of psychological and emotional factors on behavior when developing risk management strategies. A last important element, suggested by Deisler, is the significant contribution that literature on risk communication can make to developing effective messages to reduce fear and avoid panic in the face of a CBRN threat or attack.⁴⁶

Within the context of CBRN readiness planning to facilitate adaptive psychosocial responses, a risk management framework can provide a structured process to identify: (1) psychosocial hazards; (2) vulnerable groups; (3) situational factors that may influence psychosocial outcomes; and (4) individual and population level factors that can influence psychosocial outcomes. These factors need to be considered when identifying and selecting evidence-based psychosocial risk management intervention options to foster resilience.

The construct of resilience can be defined as a process or the attainment of positive outcomes at the individual, family, and community levels despite adversity (e.g., natural disaster, terrorist attack). The term resiliency has also been used to refer to preexisting capacities to successfully adapt to future adversity. The process of resilience is facilitated by the presence of protective factors at the individual, family, and community levels that serve to mitigate the impacts of adversity and strengthen community capacity to deal with existing and future events.⁴⁷ Adoption of a resilience perspective broadens the focus of the risk assessment process in disaster preparedness and planning from simply examining vulnerabilities, needs, and impacts to one that includes community assets, resources, and capacities.⁴⁸

over a 3-year period by an interdisciplinary research team of experts in the psychosocial aspects of terrorism, emergency preparedness, risk perception, health risk assessment, risk management decision making, risk communication, first responder mental health, crisis management, and training and performance development, in consultation with Canadian first responders, emergency preparedness planners, and the public. The project objectives were: (1) to develop an integrated psychosocial CBRN risk management framework articulating risk assessment practices with psychosocial dimensions to improve response to CBRN threats and attacks; and (2) to develop practical field-based P-RAM tools and training strategies. The P-RAM framework provides first responders, emergency planners, and decision makers with a structured approach to identify the full range of psychosocial aspects potentially associated with CBRN threats and attacks, the factors influencing vulnerability to these effects, and the options for general and targeted interventions to manage psychosocial effects across the timeline of a threat or attack for various classes of CBRN agents, vectors, and target populations.

PSYCHOSOCIAL RISK ASSESSMENT AND MANAGEMENT PROJECT OBJECTIVES

The Psychosocial Risk Assessment and Management (P-RAM) framework presented here was developed

P-RAM FRAMEWORK DEVELOPMENT METHODOLOGY AND PROCESS

The process used in the development of the psychosocial risk assessment and management framework is summarized in Figure 1. The framework development

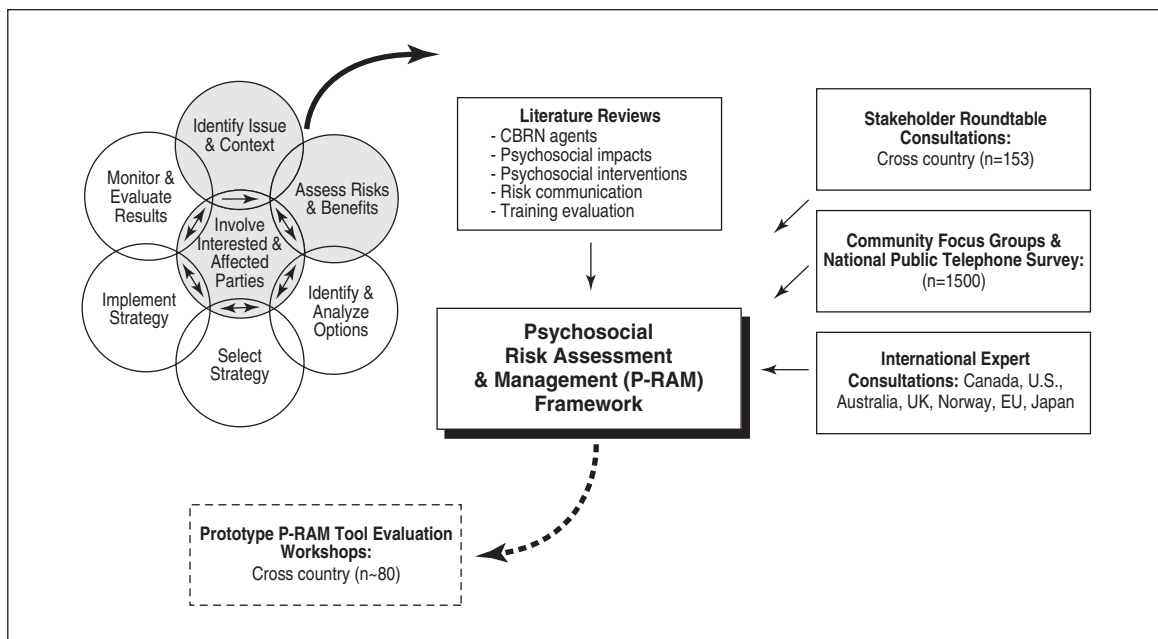


FIGURE 1. PSYCHOSOCIAL RISK ASSESSMENT AND MANAGEMENT FRAMEWORK DEVELOPMENT PROCESS. Shaded areas indicate relevant steps of the Health Canada Risk Management Framework (2000).

methodology consisted of the following steps to gather qualitative and quantitative needs assessment information:

1. *Evidence-Based Literature Reviews:* Literature reviews were conducted to summarize current information on CBRN hazards, psychosocial impacts of disasters and terrorism, psychosocial interventions, risk communication, and training of first responders.^{3,5,49-51}

2. *Responder Consultations:* Consultations across Canada were held with a broad cross-section of emergency planning and response groups to assess roles, training needs, resources, and framework development issues related to the prevention and mitigation of psychosocial impacts of CBRN terrorism. The research team solicited participants using emails and telephone calls to key organizations. A total of 153 first responders agreed to participate in one of five roundtables convened in Ottawa, Waterloo, Halifax, and Vancouver between July and August 2004. Consultation sessions followed a focus group format and involved representatives from municipal, provincial, and federal government agencies, traditional first responders (i.e., police, fire, EMS), social workers, military personnel, public health employees, hospital personnel, emergency planners and managers, and several nongovernmental organization representatives including the Salvation Army and the Canadian Red Cross.

3. *Expert Consultations:* Starting in 2003, international experts ($N = 49$) from academia, government, and nongovernmental and private sector organizations in the U.S., Europe, and Australia were consulted to obtain further perspectives on critical psychosocial issues. Information was collected either informally or through structured interviews for a small number of key informants ($N = 15$). Organizations approached included the U.S. Centers for Disease Control and Prevention, FEMA, the U.S. Department of Health and Human Services, the American Red Cross, NOVA, the Rand Corporation, Columbia University, Johns Hopkins University, Washington State University, the Uniformed Services University, the NYFD, the NYPD, the New South Wales Department of Health, WHO, and the University of Oslo.

4. *Public Consultations:* Community focus groups and a national telephone survey of 1,500 Canadians were conducted to assess public perceptions on CBRN terrorist threats and preparedness, information sources, coping strategies, trust, and stress. Focus groups were held in six locations, both rural and urban (Ottawa, Winnipeg, Toronto, Montreal, Morris, and Hawkesbury), from September to October 2004. The telephone survey contained a cross-country representative sample of adults and occurred from November to December 2004. An ad hoc nonsystematic consultation with representatives of the media was also undertaken. Journalists from the written press, television, and radio were interviewed as to their role and to identify

media communication needs in relation to the development of the psychosocial risk management framework.

The needs assessment initiatives confirmed the need for a national, consistent, coherent framework that would be understandable at the field level and provide a common perspective on psychosocial risks and interventions to facilitate intra- and interagency activities.^{52,53}

FRAMEWORK DEVELOPMENT GUIDING PRINCIPLES

The following principles, based on the needs assessment findings, guided the development of the P-RAM framework. The framework will:

1. Serve as a platform for evidence-based information to assist user groups of various disciplinary backgrounds.
2. Build on current practices and an all-hazards approach to guide emergency planners, first responders, and public officials in appropriate interventions to prevent and mitigate negative psychosocial impacts and promote compliance with CBRN countermeasures and positive psychosocial outcomes.
3. Facilitate a common understanding of CBRN psychosocial issues and enhance the translation of current research on psychosocial impacts, identification of high-risk groups, and vulnerability and protective factors into practice.
4. Identify psychosocial effects and interventions across an expanded chronological timeline with an emphasis on preevent planning and preparedness and long-term, post-event recovery and reconstruction. The time dimension and evolving phases of a CBRN threat and event are important to capture within the framework to enable users to identify effects and interventions according to the phase of the event.
5. Guide the assessment, mitigation, and management of psychosocial impacts for specific communities and subgroups within a population. Subgroups will include children, adults, the elderly, first responders, and decision makers (senior public officials).
6. Recognize that first responders to a CBRN attack include traditional first responders (police, fire, EMS) and nontraditional first responders (public health officials, the medical community, teachers, media reporters) as groups with diverse backgrounds, roles, and responsibilities.
7. Characterize the negative psychosocial effects of CBRN events most commonly experienced by victims as normal responses to abnormal situations, including behavioral, cognitive, spiritual, emotional, social, and physical effects. Psychological disorders

such as generalized anxiety disorder and posttraumatic stress disorder, while more fully documented in the disaster mental health literature, are less common and require explicit criteria for diagnosis.

8. Recognize that CBRN events can result in positive psychosocial impacts in the community, including increased social cohesion, resilience, and coping behaviors.
9. Favor preevent public engagement strategies and community-based interventions that foster resilience and other positive psychosocial outcomes.
10. Recognize effective risk communication as an important intervention in preventing negative psychosocial impacts and promoting compliance with protective behaviors.
11. Recognize education as an important intervention across the CBRN event timeline to increase confidence in preparedness, to dispel myths, and to convey accurate information on expected psychosocial reactions and steps to contain the hazards.
12. Include professional counseling interventions as well as interventions at the organizational level to enhance interagency coordination and address the special needs of the first responder community, including resource allocation guidelines, surge capacity planning, and concern for the safety and well-being of family members.

OVERVIEW OF THE FRAMEWORK CONCEPT

Generic All-Hazards Principles Articulating CBRN Specificities

The P-RAM framework uses an all-hazards approach to articulate the specificities of CBRN events. Proceeding this way allows one to take advantage of existing well-rehearsed scenarios and routines for managing emerging infectious disease outbreaks and other emer-

gencies. The framework adds the identification of situational and population risk factors and linkage to best practice interventions to better enable communities, responders, and decision makers to assess and manage the psychosocial aspects of CBRN hazards.

Multilevel Systemic Approach: Features of the Event, Individuals, Communities, Societies

The P-RAM framework for CBRN threats and events builds on Warheit’s model for assessing the impact of disasters on mental health.⁵⁴ This model emphasizes the dynamic interaction between features of the *individual, community, and society*, and characteristics of the disaster *event* itself as mediators of psychosocial stress responses to a crisis event. These event characteristics interact with preexisting individual factors, such as health status, history of psychiatric disorder, social isolation, and previous experience with similar situations, to increase or decrease the risk of negative psychosocial effects. Community and societal factors that may modulate psychosocial effects include prior experience with the disaster agent, organizational structures and resources to manage the event, and strong leadership. Table 1 identifies a number of risk factors within these three categories that can be used to assess the likelihood of negative psychosocial impacts on a population.

The P-RAM framework also recognizes established conceptualizations of human behavior during stressful events. For example, in Hobfoll’s model of conservation of resources, two key premises of the model are that people strive to retain, protect, and build resources and that what is threatening to them is the potential or actual loss of these valued resources.^{55,56} Thus, individuals seek to create and maintain personal resources (such as mastery or self-esteem) and social circumstances that will increase the likelihood of positive reinforcement. His model also suggests that individuals will seek to replace resources to offset net losses.

This has relevance in the aftermath of disasters in that active involvement of victims and families in initiatives

TABLE 1. PARADIGM FOR ASSESSMENT OF POPULATION PSYCHOSOCIAL RESPONSES TO DISASTERS

<i>Event features</i>	<i>Community/societal features</i>	<i>Individual characteristics</i>
Suddenness of impact	Lack of prior experience with event	Preexisting, predisposing factors
Salient response required	Lack of relevant community resources	Loss of interpersonal support networks
Event is unavoidable	Loss of relevant community resources	Cultural-structural integration
High risk to life/property	Community disunity/conflict	Lack of prior experience with similar situations
Persistence over time	Ambiguous/conflicting definitions	Lack of relevant resources
Pervasiveness of impact	Long-term disruption	Loss of coping resources

Adapted from Warheit.⁵⁴

to rebuild the community often encourages resilience and positive coping.⁵⁷ The work of Quarantelli on the behavior of individuals, organizations, communities, and societies adds to our knowledge of potential CBRN terrorism psychosocial effects and interventions for mitigation, preparedness, response, and recovery.^{58,59}

Integration of Bioenvironmental and Psychosocial Interventions

According to the P-RAM framework, the psychosocial effects in populations are shaped by the interaction of the characteristics of the disaster event, the individual, the community, and social context.^{54,58,59} In addition to these factors, the framework takes into consideration that the risk management response (or bioenvironmental intervention) to a CBRN threat or attack can also have an important influence on psychosocial outcomes. Linking the anticipated psychosocial effects to CBRN preparedness and response interventions may serve to mitigate or prevent negative psychosocial effects and enhance beforehand community resilience and adaptive coping strategies as protective factors.

Pre-post Timeline Perspective

The framework recognizes that disaster events vary in their temporal characteristics (including the duration of

warning, threat, and impact), magnitude, and frequency of occurrence. Various organizations have identified “phases of disasters” or “stages of a disaster life cycle” for the purpose of describing mental health responses and planning risk management interventions.^{4,12,60,61} These various classifications are summarized in Table 2. While there is no universally accepted terminology to describe the phases of a CBRN event timeline, there is considerable convergence in thinking about the key milestones in this timeline. The stages identified in the P-RAM framework build on this previous work.

KEY ELEMENTS OF THE P-RAM FRAMEWORK

The P-RAM framework is illustrated in its most basic form (Level 1) in Figure 2. At this level, there are three major elements (situation, population, and intervention) that influence the risk of positive and negative psychosocial outcomes (effect). In addition to the strong focal relationship between psychosocial effects and psychosocial interventions, a relationship between intervention and situation is depicted, as the former may change the latter, and similarly between intervention and population, as subgroups will call for specific interventions. The four key elements of the framework are defined as follows.

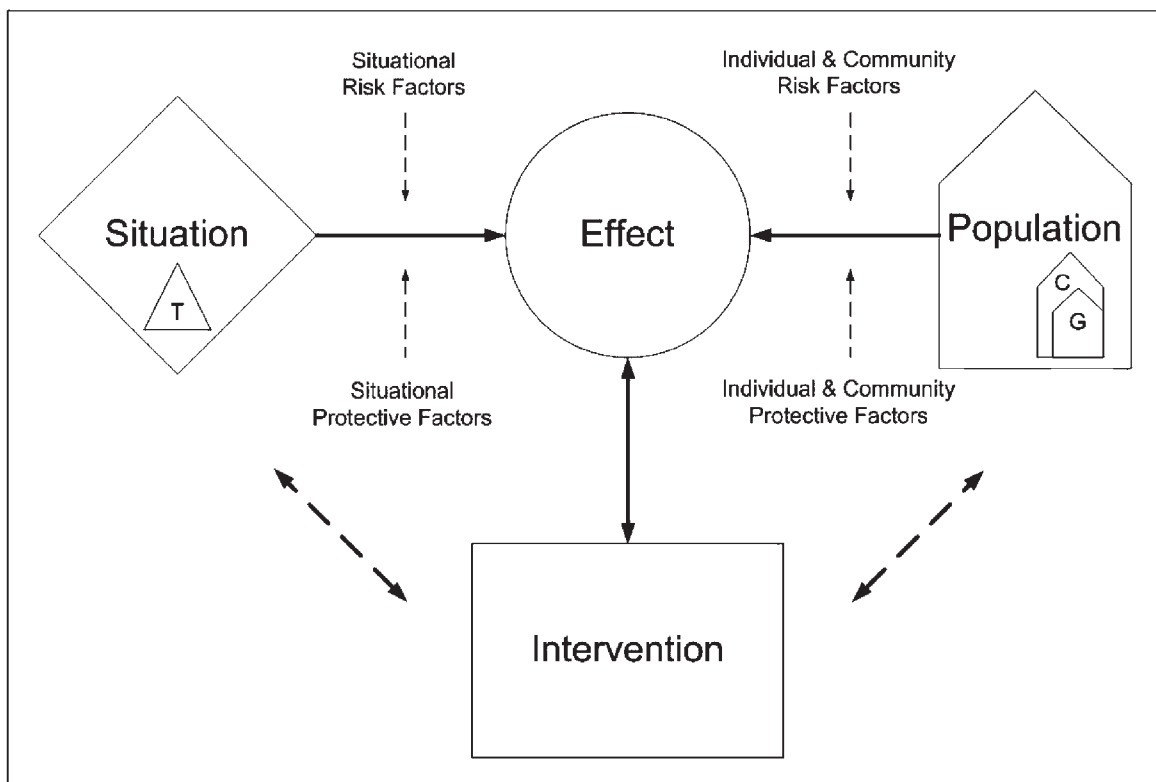


FIGURE 2. CBRN PSYCHOSOCIAL RISK ASSESSMENT AND MANAGEMENT FRAMEWORK (LEVEL 1)

TABLE 2. COMPARISON OF VARIOUS DEFINITIONS OF DISASTER LIFE CYCLE STAGES WITH STAGE CRITERIA

	<i>FEMA</i>	<i>U.S. Dept. of Homeland Security</i> ⁶³	<i>NSW</i> ¹²	<i>NOVA</i> ⁶¹	<i>Pan American Health Organization</i> ⁴	<i>Stage criteria</i>
<i>DeWolfe</i> ⁶⁰						
Warning or threat	Prevention Preparedness	Preparedness	Preparation and planning	Predisaster equilibrium	Predisaster	Anticipatory phase and possible preparation for the disaster.
Impact			Threat and warning	Warning and threat	• Awareness	
Rescue or heroic	Disaster Response	Impact Mitigation	Impact	Impact Inventory	• Preparedness	The disastrous event.
Remedy or honeymoon Inventory			Immediate post-disaster impact			The immediate response, including triage and medical care for disaster victims; the phase in which timely and appropriate action may save lives.
Disillusionment Reconstruction or recovery	Recovery	Response	Recovery phase	Rescue	• Consolidation	Longer-term management of the aftermath of the disaster, returning society to its normal state.
					• Rebuilding	Resolution of the disaster, including assessment of lasting effects.

*Element 1: The **situation** element describes the characteristics of the CBRN hazard (both actual and perceived), its vector, and the agent itself. These characteristics, such as weapon type (CBRN), predictability, attack pattern (single, repeated, continuous), speed of onset, duration of event, probability of recurrence, number of casualties (children, adults, first responders, community leaders), extent of property destruction, and availability of well-established treatment and prevention protocols, mediate the severity of expected psychosocial effects by acting as risk factors or protective factors.*

The characteristics of the situation, and therefore the type of psychosocial effects and required interventions, will evolve throughout the CBRN event timeline. As detailed in Figure 3, the event timeline is conceptualized (Level 2) as a series of continuous phases allowing the user to identify the psychosocial effects and interventions related to a point in time in the evolution of the CBRN event. The *time (T)* dimension is defined according to the eight phases that precede and follow the time at which the impact of the CBRN agent is detected. Definitions of the phases have been adapted from several sources, including NOVA, DeWolfe, the U.S. Department of Homeland Security, the Canadian Red Cross, and Public Safety and Emergency Preparedness Canada.⁶⁰⁻⁶⁴ Of

note, the duration of the phases in the event timeline are situation-specific and may overlap due to the unpredictable and variable nature of CBRN terrorism events in terms of speed of onset, time to detection, magnitude of impact, and duration of response. *Event* is unlikely to be a discrete point in time unless detection is immediate. For example, contamination by a biological agent is a case where the duration of the *event* phase will remain a fuzzy period until detection is confirmed.

T1: Preparedness and planning: This phase focuses on planning and implementing measures to reduce community vulnerability to psychosocial impacts of terrorist threats or attacks prior to the onset of a terrorist attack. Measures taken may include integrating psychosocial aspects into community emergency preparedness planning, developing a risk communication strategy, educating the community on emergency preparedness, and building social support networks to increase community resilience.

T2: Threat: This phase refers to the time prior to a terrorist event when there is a general recognition that such an event could occur. The emphasis is on intelligence gathering and verification, threat assessment, communications, education, and information dissemination.

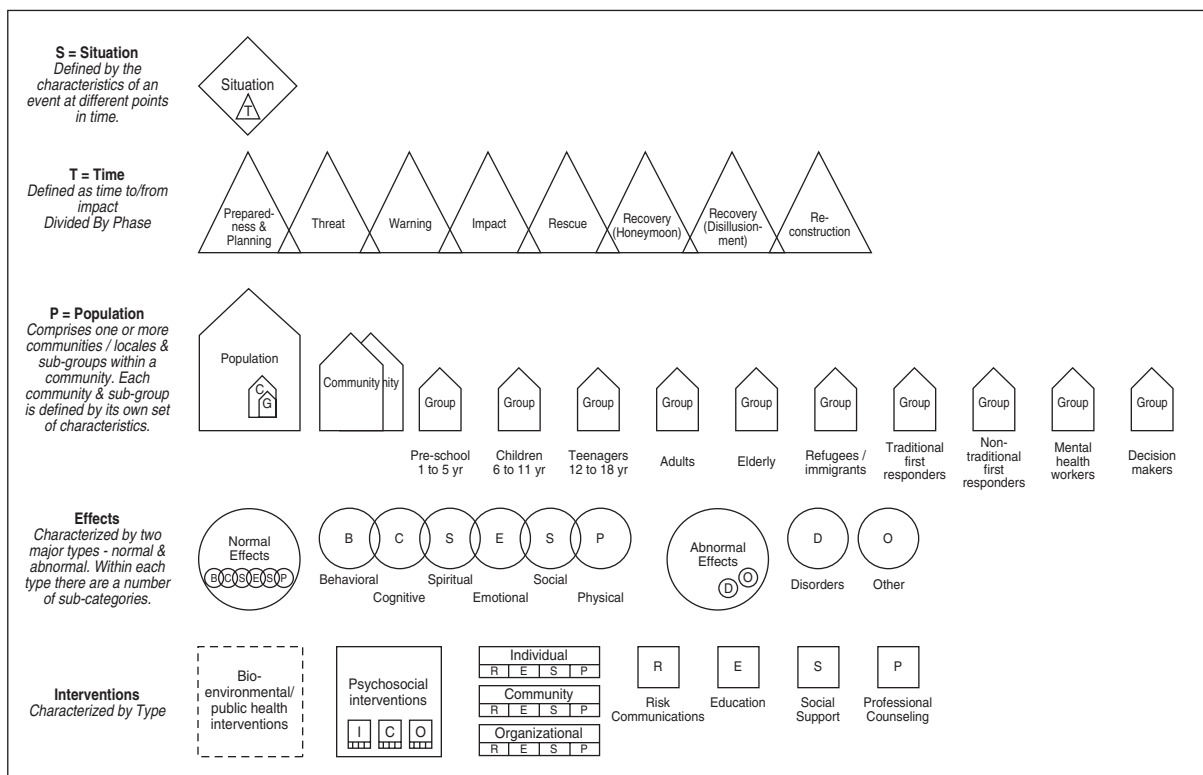


FIGURE 3. EXPANSION OF THE KEY ELEMENTS OF THE CBRN PSYCHOSOCIAL RISK ASSESSMENT AND MANAGEMENT FRAMEWORK (LEVEL 2)

- T3: Warning:** This phase refers to the time prior to a terrorist event when the threat is imminent and approaching. The emphasis continues to be on communications, education, and information dissemination. Identification of countermeasures also occurs during this phase. Reactions of survivors, particularly when no prior warning of an attack is given, include feelings of vulnerability, insecurity, fearfulness that terrorist events will recur, and distress arising from an inability to protect themselves or their loved ones. Alternatively, survivors may experience guilt and self-blame when they have ignored warnings and experienced losses as a consequence.
- T4: Impact:** Impact begins when the terrorist attack is detected. The initial reaction is one of confusion and bewilderment. Survivors' priorities are to assure their own safety and that of their family and friends. The early stage of impact may be characterized by uncertainty about the type of agent used, particularly in the case of a bioterrorism attack. Emergency responses at the community level begin to appear, and natural leaders emerge during the initial response. Impact assessment, triage, and postevent information-gathering activities are a priority at this stage.
- T5: Rescue:** Rescue begins immediately following the identification of the terrorism event or disaster. At this stage, emphasis is on rescuing victims, reestablishing contact with family and community, and promoting safety. Survivors and emergency responders often engage in acts of selflessness. Evacuation, psychological first aid, and crisis communication are priority activities. This phase can range from a few hours to several days and typically has a well-defined end point that is declared by authorities.
- T6: Recovery (honeymoon):** The first part of the recovery stage is characterized by feelings of euphoria and optimism within the community associated with surviving the event. Such feelings are supported by an influx of emergency response resources, media attention, and the presence of government officials to reassure survivors that assistance will be provided. The emphasis is on restoration of essential services and cleanup.
- T7: Recovery (disillusionment):** In the second part of the recovery stage, survivors and responders try to regain control of their lives, but they have unrealistic expectations about the length of time needed for full recovery. Victims feel betrayal and abandonment as media attention wanes and responders complete their work. PTSD symptoms intensify and hope diminishes as victims attend memorials and deal with bureaucratic issues such as insurance.
- T8: Reconstruction:** This phase of longest duration includes replacement of buildings and infrastructure.

There is usually an increased appreciation of life and human relationships during this phase, as well as confidence in the communities' ability to survive difficult circumstances. Symptoms of PTSD may be aggravated as the 1-year anniversary of the tragedy occurs. Longer-term effects may be experienced as further memorials and remembrances are held.

*Element 2: The **population** element addresses the characteristics of the communities within the area of interest and possibly of specific subgroups within a community. Populations are comprised of socially, economically, culturally, ethnically, linguistically, and geographically diverse communities (denoted in the framework as **C**), with various degrees of vulnerability to psychosocial effects. Within a community there are subgroups (denoted in the framework as **G**) who may be at greater risk due to age (such as children and the elderly), degree of exposure (first responders, those located at the target of the attack), history of trauma (refugees), psychiatric illness, concurrent medical illness, lack of social support, and lack of perceived efficacy of and confidence in government and public health officials.^{17,65} Several subgroups are identified in the framework based on the availability of evidence in the terrorism mental health literature (e.g., Oklahoma City bombing and 9/11) supporting the need for targeted interventions either due to increased vulnerability or their critical role in managing and implementing risk management interventions. These subgroups include: preschool children (ages 1–5), children (ages 6–11), teenagers (ages 12–18), adults, the elderly, refugees/immigrants, traditional first responders, nontraditional first responders, mental health workers, and decision makers.³ The current literature documenting the psychosocial effects and interventions for specific population subgroups presents large gaps in knowledge. The above list of subgroups will be expanded within the framework as further empirical evidence emerges to identify vulnerable populations and effective interventions.*

*Element 3: **Effects** refer to two categories of psychosocial effects that occur in populations as a result of terrorist threats or events: (1) normal psychosocial effects, including adverse effects, protective behaviors, psychosocial benefits, and positive reactions that have been observed following disasters, and (2) abnormal psychosocial effects. Normal psychosocial adverse effects are categorized into behavioral, cognitive, spiritual, emotional, social, and physical effects. Abnormal effects are grouped into disorders (identified by DSM-IV) and others (not identified in DSM-IV, such as family violence and burnout). Table 3 identifies specific psychosocial effects within each of these categories.*

TABLE 3. PRAM FRAMEWORK PSYCHOSOCIAL EFFECT CATEGORIES

<i>Behavioral</i>	<i>Normal psychosocial effects</i>					<i>Psychosocial benefits</i>		<i>Abnormal psychosocial effects</i>	
	<i>Emotional</i>	<i>Cognitive</i>	<i>Social</i>	<i>Physical</i>	<i>Spiritual</i>			<i>Disorders</i>	<i>Others</i>
Increased use of tobacco or alcohol	Anxiety/fear	Altered perceived safety	Alienation	Sleep disturbance	Changes in how one believes everyday life should be lived	Resilience	Posttraumatic stress disorder		
Change in travel plans	Feeling stigmatized	Decreased self-esteem	Social withdrawal	Change in appetite	Changes in one's belief in God	Adaptive coping	Acute stress disorder		Effects not listed in DSM-IV
Compliance with risk management directives	Frustration with protective equipment	Memory problems	Increased conflict within relationships	Headaches	Changes in assumptions about good and evil	Community cohesion	Major depression		Effects not listed in DSM-IV such as family violence and burnout.
	Shock	Poor concentration	Impaired capacity to work	Hyperarousal		Altruism	Generalized anxiety disorder		
	Anger	Limited attention span	School impairment	Somatic complaints		Posttraumatic growth	Substance abuse		
	Irritability	Impaired decision-making ability	Increased affiliative behaviors	Gastro-intestinal problems		Greater self-worth	Somatization disorders		
	Loss of control	Disbelief							
	Helplessness	Confusion							Bereavement complications

Adapted from NSW.

Element 4: The *interventions* element identifies options for various levels of the population, including those that aim to prevent negative psychosocial outcomes and enhance positive coping (psychosocial interventions) as well as those that seek to protect public health by minimizing exposure to CBRN hazards, preventing the spread of infectious agents, and minimizing morbidity and mortality through rapid treatment (bioenvironmental interventions).

The framework identifies three main categories of psychosocial interventions—namely, at the individual, organizational, and community levels. Each of these categories is further subdivided into interventions related to: (1) risk communication, (2) education, (3) social support, and (4) professional counseling. The same interventions may be appropriate for a particular psychosocial effect across various subgroups at a particular phase in the CBRN timeline. In addition, it is recognized that the implementation of interventions (psychosocial or bioenvironmental) may result in further psychosocial effects, which may require additional interventions to mitigate the effects. An example of this is the social stigma experienced by particular groups requiring quarantine following exposure to an intentionally released biological agent. Risk communication strategies focused on dispelling rumors, correcting misinformation, and addressing social stigma issues may be required.

While the efficacy of psychosocial interventions is not always well established and subject to controversy in many areas, there is emerging consensus on best practices based on research evidence and observations from the professional community. Two recent consensus documents addressing the efficacy of early psychological intervention for victims/survivors of mass violence are illustrative of progress toward identifying effective interventions.^{13,66} A field-based tool being developed to operationalize the framework will identify intervention options appropriate to a particular population and event timeframe and will reflect the current state of consensus on best practice guidelines for planning and implementing interventions.

IMPLEMENTATION OF THE FRAMEWORK: TOOL DEVELOPMENT

The Psychosocial Risk Assessment and Management (P-RAM) framework provides the conceptual basis for the development of a practical tool to guide emergency planners and responders in preparing for and responding to the psychosocial aspects of a CBRN threat or event. The tool, at the prototype stage, is based on the four key elements of the P-RAM framework and incor-

porates the structure provided by Health Canada's Decision-Making Framework for Identifying, Assessing, and Managing Health Risks and the U.S. Presidential Congressional Framework for Environmental Risk Management.^{42,43}

CONCLUSION

The P-RAM framework and prototype P-RAM tool incorporate findings from the disaster and terrorism mental health literature. The framework details (1) the risk and protective factors associated with the CBRN context and the community characteristics; (2) the range of expected normal (including adverse and beneficial psychosocial effects) and abnormal clinical psychosocial effects; and (3) the intervention options based on best practice guidelines when available. New research findings on strategies for best practices on risk communication, community involvement in CBRN planning, and building resilience will be incorporated into the framework and the tool as scientific evidence becomes available. The framework and the tool will provide a mechanism to enhance the integration of evidence-based best practices into CBRN planning efforts across a range of responder and planning agencies in Canada and other countries. Indeed, the framework and tool are of international relevance. The framework uses an all-hazards approach to articulate the specificities of CBRN events and accommodates within the tool differences in culture and population groupings. This flexibility in design has generated interest in European communities as they grapple with developing their own psychosocial response plans.⁶⁷

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Interested readers are invited to contact the first author to obtain a copy of the project reports detailing the research methodology used for the needs assessment, the national survey, media interviews, and first responders

consultation process. Distinct articles are in preparation to publish these research findings. The present article will be followed by four papers further detailing the most likely psychosocial outcomes from prototypical CBRN events.

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