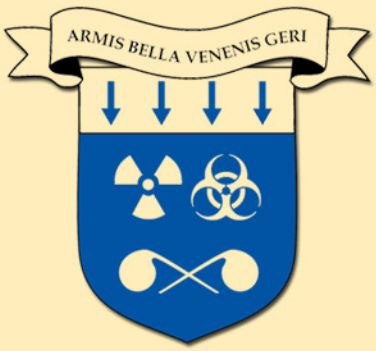
Avoiding Panic and Keeping the Ports Open in a Chemical and Biological Threat Environment

A Literature Review

Tanja M. Korpi and Christopher Hemmer



US Air Force
Counterproliferation Center
Future Warfare Series
No. 30

30

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A LITERATURE REVIEW

by

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The Counterproliferation Papers
Future Warfare Series No. 30
USAF Counterproliferation Center

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June 2005

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Counterproliferation Paper No. 30

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I. Introduction

The purpose of this study is to offer a literature review on the causes and prevention of panic designed to help develop a program that could reduce panic among seaport workers in a chemical and biological threat environment. As a starting point for such a program, this study examines the extant literature on the psychology of risk assessment, warnings, sociological studies of reactions to disasters (both natural and man-made), studies of battlefield stress, reports on civilian reaction to air bombardment, as well as analyses of reactions to acts of terrorism and weapons of mass destruction (WMD) events. Rather than a complete literature review of the growing field of "disaster studies,"[1] the focus here is explicitly on what can be gleaned from this literature that is relevant to the particular problem of keeping the port workforce at work in a chemical and biological threat environment.

The good news is that contrary to popular belief, panic during disasters is not the norm.[2] Hysteria and the abandonment of social roles are fortunately rare and occur only in certain extreme and rather specific contexts. During the extreme stress of a flight emergency, flight attendants still assist passengers and direct appropriate behaviors. During the catastrophic events of September 11, 2001, employees evacuating the Twin Towers did not engage in wild "every man for himself" behavior. Instead, reports indicate that the escape down the stairways was not only orderly, but also characterized by numerous incidents of altruism and even heroism.[3] Even in the extreme case of the atomic bombings of Hiroshima and Nagasaki, there is little evidence of mass panic on the part of Japanese

civilians.[4] Overall, instead of panic, people generally exhibit positive patterns of behaviors during disaster.

The news, however, is not all good. While the finding that widespread chaos and hysteria rarely occur during disasters is heartening, it does not mean that response professionals should apply any less forethought or be any less vigilant in their planning for possible chemical or biological attacks. While mass panic may be rare, students of disaster studies have identified a number of maladaptive behaviors that can "decrease the motivation or capacity for coping with the threatening danger."[5]

Maladaptive behaviors like denial, hyperactivity, or fatalism, for example, can all increase the costs and dangers associated with crises rather than lessen them. Moreover, most literature on the psychological and behavioral responses to disaster focuses on natural or man-made accidents rather than terrorist events. There are good reasons to suspect, however, that psychological responses to terrorist attacks, especially those employing chemical and biological weapons, may be particularly severe given the malicious intent of the terrorists, the unfamiliar nature of the threat, and a perceived lack of control on the part of the victims.[6] In addition, because port work is designed to expedite the quick movement of people and personnel, the danger that maladaptive behaviors can spread quickly is particularly acute.

While dangerous, these maladaptive responses can be minimized with proper planning and execution before and during a disaster. This paper, with specific reference to alleviating panic in port workers during chemical and biological warfare threats, will indicate how this minimization of maladaptations may best be accomplished.

The following section will expand upon this discussion of typical behavior during disasters to argue that the task of the disaster planner is not to ward off an unlikely state of mass panic, but instead to minimize costs associated with more specific maladaptive responses. This general discussion will be followed by more specific recommendations regarding what can be done to achieve this goal in three stages: while the feared threat is still hypothetical (the planning stage), when the threat of a chemical or biological strike on a port becomes imminent (the pre-impact stage), and if and when such a strike should occur (the impact and immediate post-impact phase).

II. Behavior During Disasters

> *Mental breakdown, panic and mass demoralization—the triple psychological threat that dominated so much of the thinking in official quarters—rarely materialized during World War II.*[7]

Whether the studies focus on natural disasters, man-made disasters, terrorist strikes, civilian bombardment, or use of weapons of mass destruction, the overwhelming conclusion of those who examine human reaction during disasters is the panic is fortunately rare.[8] As Quarantelli views the evidence, the belief that people panic, tend of freeze up in shock, or become anti-social during disasters are among the most prevalent myths regarding disaster behavior.[9] The stereotypical panic reaction tends to occur only in very limited circumstances, usually when large numbers of people are crowded into an enclosed place and where escape routes are limited.[10] For example, in his study of Japanese reactions to the atomic bombings of Hiroshima and Nagasaki, Janis discovered only two cases of group panic, both of which occurred when large numbers of people where tightly confined in a small area.[11]

Instead of frantic and anti-social behavior, people tend to react far more productively to disaster situations. Rather than abandon the norms of usual behavior and precipitate social chaos, people tend to stick with their predefined social roles.[12] Rather than become atomized, people tend to band together into groups.[13] Rather than selfish, "every man for himself" behavior, far more common are acts of altruism and heroism.[14] Perhaps most important of all, for the purposes of this study, is that even in the midst of disaster, workers tend to go to work. For example, although the massive civilian bombing campaigns during World War II did increase absenteeism at certain times, on the whole, most of the workers continued to go to work.[15]

If panic is unlikely, however, this does not mean there is nothing to worry about. Although students of disaster studies have been adamant that mass hysteria during a crisis of more of a myth than a reality, they have identified a number of typical responses that can exacerbate rather than alleviate crises. Wallenius terms such behaviors, "maladaptive reactions," which he defines as any "reaction that decreases the motivation or

capacity for coping with the threatening danger in the present situation."[16] A number of maladaptive reactions have been identified and should be kept in mind for those interested in keeping ports operating in a chemical and biological warfare threat environment. These include:

Denial and the "Normalcy Bias": A typical and dangerous reaction to threat information is denial. Because major disasters are emotionally painful to think about and potentially costly to plan for, one tendency is for people to simply deny that a threat exists. Denial, it should be recognized "often performs important psychological functions. Ignoring the prospect of disasters may be more comfortable for many people than having to face a realistic appraisal of their (lack of) preparedness. Being consciously ignorant about disasters and what to do about them may provide a convenient excuse for letting such matters rest in the hands of officials or experts."[17] The danger is that such denial can severely limit the preparation activity that individuals or organizations pursue to minimize the chances or costs of a disaster.[18]

Within this concept of denial lies another maladaptive phenomenon known as the "normalcy bias." Defined as "the tendency for people to continue to believe that things are proceeding normally and unproblematically, even when obvious environmental cues and warning messages suggest the contrary,"[19] this reaction discourages individuals from acting promptly and effectively during disaster. The "normalcy bias" may prevent the danger from becoming salient in the minds of individuals.

Social Amplification of Risk: Another danger to guard against is the social amplification of risk, where a single adverse event can have wide and costly ripple effects. In the case under consideration here, a report of a chemical or biological attack on one airfield or port could cause work stoppages at other ports within the theater or throughout the world.[20] This process is also sometimes called an availability or information cascade, where "some people's alarmist reactions instill fear in others, whose own reactions then sow fears in still more individuals."[21] Individual ports are also vulnerable to social amplification of risk; the disaster literature suggests that while panic reactions are rare, fear reactions are not only common, but also contagious.[22] In short, these dangerous ripple effects may also occur within the seaports themselves.

Sociogenic Illness:[23] The American Psychiatric Association defines a sociogenic illness as "the rapid spread of illness signs and symptoms affecting members of a cohesive group…whereby physical complaints have no corresponding organic aetiology."[24] In short, sociogenic illnesses occur when people experience symptoms of illnesses, usually attributed to exposure to a noxious substance, when no physical exposure has taken place. For example, during Iraqi missile attacks during the Gulf War, many Israeli civilians reported symptoms consistent with chemical exposure when, in fact, chemical weapons had not been used; the National Center for Disaster Psychology and Terrorism reports the astonishing statistic that, in this case, for every one death from missile attack, there were 272 hospitalizations for "psychological emergencies."[25] Similar reports of illnesses occurred in unexposed populations during the Aum Shinrikyo sarin gas attacks on the Japanese subway and the post September 11, 2001, anthrax scares in the United States.[26] Sociogenic illnesses present a special worry in a chemical and biological weapon threat environment. Threats of attacks can precipitate such illnesses, whose symptoms are often hard to separate from those resulting from a genuine attack.[27]

Hyperactivity and Perceptual Narrowness: When warned that a particular threat is imminent, another common reaction is hyperactivity in making preparations designed to help protect oneself. The danger to avoid here is unfocused activity that, in fact, facilitates little protection. Related to hyperactivity is the danger during a crisis that when conflicting, ambiguous, and threatening stimuli threaten to become overwhelming, people will tend to fixate on one small part of their surroundings and ignore all others. This could leave people vulnerable to all the dangers not associated with their particular fixation as well as distract them from the tasks they need to accomplish.[28]

Fatalism/Lethargy: Another maladaptive reaction to an imminent threat is a depressed motivational state where people in danger take little or no protective actions, resigning themselves to their fate.[29] Consider the case of villager reaction to devastating landslides that occurred in a remote section of north India in the fall and spring of 1989 and 1990. Foreign researchers interviewed numerous inhabitants and concluded that: "individuals in Sapni…would discuss quite accurately the nature of the

sandy soils and heavy rainfall that made the surrounding slopes susceptible to landslides, but collectively the village had attributed just such a landslide to [a local deity]."[30] By placing their fate within the hands of a local deity, the villagers themselves saw no purpose in initiating protective activities on their own.

Acute Stress Disorder/Shock: Acute Stress Disorder (ASD), often popularly referred to as "shock," represents another potential category of maladaptive behaviors during disasters. Immediately after experiencing a severe trauma individuals can experience a certain emotional numbness and a reduced awareness of environmental stimuli, both of which can impair their ability to respond positively in the face of a disaster. (To clarify matters of terminology, Acute Stress Disorder refers to immediate responses to a traumatic event, whereas the better-known Post-Traumatic Stress Disorder refers to the longer-term psychological effects of trauma.)[31]

Stigmatization: Stigmatization occurs when certain people or items are socially branded as contaminated and thus to be avoided. For example, in 1987 a number of the residents of Goiania, Brazil, were exposed to radiation from caesium chloride. As news of the exposure spread "Hotels in other parts of the country refused to allow Goiania residents to register, airline pilots refused to fly with Goiania residents on board, automobiles driven by Goianians were stoned" and sales of Goianian products dropped significantly.[32] Should a chemical or biological attack occur on a port facility, all the workers, equipment, vessels, and cargo in that port risk becoming stigmatized as dangerously contaminated. The danger of such stigmatization for the normal conduct of commerce is significant.

Familism: Familism is the degree to which an individual's life is governed by his/her role in the family unit.[33] While such an attachment may serve as a point of strength in times of disaster, it may also serve to *pull* workers from the port. When a port employee feels the tug of their family unit "organizations are ignored, considered irrelevant, and resisted in their attempts to cope with the disaster event."[34] Such a reaction and tendency towards flight would have obvious negative effects on port productivity.

One item that is noticeable absent from this list of maladaptive behaviors is fear. Fear is, by definition, high levels of stress and anxiety often resulting from uncertainty. While it is commonly assumed that disaster planning should focus on minimizing fear, a certain level of fear is actually normal, unavoidable, and probably helpful.[35] With due respect to Franklin Roosevelt, it is not fear itself that we need to fear. As S.L.A. Marshall noted long ago in his classic study of combat, fear is not the problem; uncontrolled fear is the problem.[36]

If fear leads to increased planning and protective measures, then its impact is beneficial. Fear only becomes maladaptive when it leads to some of the behaviors listed above. With this in mind, consider some sources of "normal" fear or uncertainty in disaster: when will the event strike, how will it proceed, what do I do, what about my safety and the safety of others? Since ignorance, in the form of both misinformation and lack-of information, clearly plays a key role in these questions, it would stand to reason that efforts in education, training, and information-sharing would eliminate many ambiguities during disaster that could lead to maladaptive responses. This is true, in many ways, ignorance and lack of planning lie at the heart of many of these maladaptive behaviors.[37]

Accordingly, even in the high-risk areas of chemical and biological warfare, vigilance on the part of response planners and endangered individuals can mitigate the occurrence of these maladaptive responses. For example, the first use of chlorine gas in combat in World War I resulted in far more casualties than did subsequent uses during the war, because the first attacks "taught" survivors about how to best respond to chemical attacks and precautions were taken.[38]

The following sections focus on what the existing literature has to say about how maladaptive behaviors can be minimized in the case of a chemical and biological warfare threat directed at port facilities. For presentation purposes, the lessons learned from this literature will be divided into three stages of disaster response: in the planning and preparation phase, in the period in which an attack is believed to be imminent, and during the occurrence and immediate aftermath of attack.

III. Planning and Preparation Phase

The first phase in any disaster response effort is the planning and preparation phase. In this period planners acknowledge that disaster, in this case chemical or biological weapons attack, is possible and that they must take steps to prepare. The purpose of this section is to explore what the existing literature has to offer regarding how best to take advantage of the time before any chemical or biological weapons attack is threatened or occurs to ensure port workers are prepared to react effectively if and when the hypothetical becomes a reality.

The primary maladaptive responses to guard against during the planning and preparation phase are denial, complacency, inactivity,[39] and even feelings of "personal invulnerability."[40] Because vigorous defensive planning efforts can raise unpleasant feelings of anxiety, many individuals, in times of calm, will prefer simply to avoid this internal turmoil by denying that a disaster is likely. As a result, the disaster response planners face an uphill problem because many people will prefer to avoid taking part in planning for an event they would prefer not to think about at all. In short, without a strong outside stimulus, individuals will often prefer to remain uninformed and unprepared. Unfortunate examples of the costs of denial and apathy abound. Even though White County, Arkansas, is squarely within the center of "Tornado Alley," by 1952, only approximately "7% of the people in the area had storm cellars, and less than 40% had any knowledge of the appropriate precautionary or protective actions to take in the event of a tornado."[41] This lack of preparation increased the devastation when, on the evening of March 21, 1952, fifty died and over three hundred were injured as tornados ripped through the area.[42] Similarly, between 1970 and 1979, over 380 tornados were documented in the state of Nebraska, costing more than $93 million dollars worth of damage.[43] Yet by 1980, for example, trailer parks in Grand Island, Nebraska, still lacked group storm cellars; this contributed to the later deaths of five people and the hospitalization of 36 others when storms hit.[44]

One way to encourage planning efforts in case of a disaster is to use vivid, recent, and costly events to argue for the need for more extensive preparation.[45] The attacks of September 11, 2001, and the subsequent

anthrax scare have served that purpose for many organizations. For these efforts to bear fruit however, the leadership in any organization must remain committed to sticking with a long range planning process, including the expenditures of time and money that such planning will require. The good news is that, although difficult and costly, such efforts can bear fruit.

The best defense against denial and inactivity is information – being forewarned encourages people to be forearmed. Both the psychological and sociological literatures on disasters agree that "in many cases, there appears to be an extraordinary impact made upon people simply by new information…New information makes contact with amorphous fears…The menace one has known, but kept hidden comes into the open. And there is a beginning sense that one might, just possibly, be able to do something about it."[46] In short, knowledge empowers individuals with a sense of control, a sense that gives them confidence to effectively cope with an uncertain future. This will not only help workers cope during the threat phases, in making the enemy less unknown, but also during the attack phase, in making the proper reaction more apparent.

To those concerned with port security and preparedness under chemical and biological threat scenarios, the lesson is clear: the sooner defense planning and preparations measures can be taken and the more complete these efforts can be, the more likely the costs of any attack are to be minimized. It would be a mistake, however, to assume that informing people of the potential dangers that they face and creating disaster response drills and plans is an uncomplicated endeavor. To the contrary, disaster response planning and preparations must constantly strive to strike a delicate balance between underplaying risks and thus encouraging denial and unpreparedness and overplaying risks thus increasing the chances of maladaptations stemming from an over-stimulated sense of fear. The rest of this section will discuss how the extant literature thinks this balancing act can best be performed, utilizing what is known as the all hazards approach.

The All Hazards Approach

In thinking about how to best prepare an at-risk population for disaster response, the general consensus is that an "All Hazards/Generalized

Approach" is best.[47] The core of this approach is to prepare one, generalized disaster response rather than plan different response plans tailored to each individual type of threat. This model is especially appropriate for thinking about port security in a chemical and biological threat environment.

An all hazard/general disaster response plan offers a number of advantages. First, generalized approaches are both easier for planners to design and simpler for the target population to learn. It is less complicated to design and carry out a response plan that does not attempt to assign different behaviors for a litany of contingency possibilities. Second, generalized plans save resources; generic plans are cost-efficient with regard to time, effort needed, personnel resources, and money. Third, this methodology minimizes overlaps, redundancies, gaps, and confusion between plans. Where these occur, it could jeopardize the effectiveness of an entire disaster response by creating uncertainly as to proper reactions expected and sources of aid available. Finally, and perhaps most importantly, all hazards planning allows for high degrees of flexibility.[48]

The central drawback of the all hazards approach is that it means the disaster plans are not specifically tailored to fit any particular threat. In essence, what is produced is a generally satisfactory plan rather than the perfect plan for any specific threat. This drawback, however, is more theoretical than real. In a dynamic event with high levels of uncertainly, like one produced by the possibility of chemical or biological attacks, it is impossible to plan for all the contingencies: what type of weapon(s) will be used, in what quantity, via what delivery mechanism, in what environment? The answers to these and other questions produce so many permutations in reactions that designing specific response protocols for each would be unfeasible. Further, the world, fortunately, has little experience with large-scale chemical and biological weapons attacks. This lack of information means the number of unknowns involved in attacks even with specific weapons is likely to be high. The all hazards approach is the best to use in dealing with these unknowns because such plans stress training and education with regard to generally adaptive behaviors that can be applied in novel and unprepared for scenarios.[49]

Sound planning must take into consideration at least three levels of training needs: the organization (the port), the individuals (the seaport workers), and integration between the port and the community.

Organizational Level Planning: One key element of any disaster response plan at the organizational level must focus on having the proper infrastructure. A well built and maintained structure will not only be physically resistant to disaster, but it will also promote feelings of security among the workers.[50] Although the importance of such infrastructure is seemingly obvious, significant investments in infrastructure are often costly and tend to get delayed. For example, Janis noted that the civilian workforce tended not to flee a heavily bombed area if shelters were available. Janis also noted the importance of having a working public address system in order to disseminate crucial information quickly.[51] In thinking about how to plan for a chemical or biological weapons attack a key requirement will be getting the needed infrastructure built and on-hand before the attack occurs. One of the key lessons learned from the response to the Nairobi terrorist bombing is that the needed equipment was not physically on-hand at the time of the crisis.[52]

Just as vital as issues of equipment are issues organizational relationships. Particularly important is that any disaster response plan offer clear lines of communication. Because people need and desire information most when a disaster strikes, disaster response plans should be clear about where individuals can go to get more information. In attempting to explain why soldiers fled a battlefield in large numbers, Marshall noted lack of information was the chief culprit. Seeing others run and having no information on why or what to do, other soldiers decided to flee as well.[53] To prevent fear from leading to flight, information must be provided to individuals. To prevent rumors from dominating reactions, the information vacuum needs to be filled.[54] Moreover, just as soldiers benefit from the presence of comrades in the field, it is important to keep in mind that individuals will respond to disasters as members of groups and that disaster response plans should work with these group dynamics rather than against them.[55]

One particular organizational challenge in terms of dealing with a chemical or biological threat environment will be having the right medical assets and knowledge on hand. Even organizations that are likely to have high interest in exact medical knowledge about the nature of chemical and biological weapons, their effects, and the proper courses of response, find this challenging. For example, in 2002 RAND performed a study to gauge levels of preparedness against chemical and biological threats in key

response institutions, such as hospitals, offices of emergency management, public health institutions, law enforcement agencies, emergency medical services, and fire response. While the study concluded that highly specific inferences on preparedness were impossible because the U.S. lacks a precise, consistently applied national readiness program, the authors did point out that even after the events of September 11, 2001, and subsequent anthrax incidents in October 2001, less than 50% of U.S. hospitals had chemical weapons response plans (the figure was 30% for biological weapons plans). This percentage fell for the other interested parties.[56] Any acceptable disaster response plan must ensure that medical responders are on hand, are educated for chemical and biological weapons treatment, and have the needed supplies (vaccines, etc.). When an attack is imminent or occurring is too late to start worrying about the adequacy of prophylactic stockpile levels. A final major lesson for port-preparedness is the need for high levels of integration into the community; the literatures on disaster planning are in strict agreement that a coordinated community is essential for disaster response.

Individual Level Planning: In thinking about how individuals are likely to react to a chemical or biological weapons attack and what is the best way to prepare to mitigate maladaptive behaviors on their part, it is important to keep in mind the characteristics of the community that is of concern. For the purposes of this report, we have made certain assumptions about the demographics of the port worker community. While specifics will of course vary on a port-by-port basis, the following assumptions underlie the analysis offered here. First, port workers in the area of concern for this report are likely to consist of many third country nationals. These third country nationals are unlikely to have their families nearby and often live in port-owned barracks with transportation to and from work being provided for by the dock. Finally, while port work is highly compartmentalized, there is already in existence a good mix of horizontal and vertical information flow between workers.[57]

These assumptions have important consequences for disaster planning. Since the goal of planning and preparation is to inform and prepare individuals for an uncertain and dangerous contingency, the message should be tailored in an appropriate manner to the employees. For instance, techniques for providing information to an at-risk population may include community outreach efforts (meetings, focus groups, door to

door, etc.), written media (newspapers, magazines, etc.), electronic media (radio, TV, announcements, etc.), special publications (pamphlets, handbooks, flyers, newsletters, etc.), and specialized prompts (signs, banners, etc.).[58] All of these methods may be applicable to port scenarios and must thereby be customized based on worker demographics. For example, with regard to informative pamphlets and flyers, it may be necessary to distribute multilingual versions in ports with significant numbers of third country nationals. The same goes for public address announcements.[59]

Another factor in the individual level of planning is consideration for the influence a worker's family may have in times of crisis. Referencing the concept of familism, described in the first section as the degree to which a person's life is subordinated in his or her familial role which varies in intensity between cultures,[60] the desire to secure the well-being of the primary social unit may mean "organizations are ignored, considered irrelevant, and resisted in their attempts to cope with the disaster event. The tendency is for the community members to seek to cope with the disaster in terms of the pre-existing kin structure. If a disaster event is large enough to necessitate the intervention of extra-community agencies which tend to be more formally organized, the effectiveness of such agencies is reduced, and their efforts are frustrated."[61] When dockworkers have family in the vicinity, their first concern will be the well-being of their family, which could encourage flight from the dock. For this reason, it behooves disaster planners worried about keeping the ports open to include within their plans mechanisms for ensuring the security of the families of the port workers and of communicating their status to the worker. Such a move would certainly make employees more likely to remain on the job at a moment of crisis.

Another individual level maladaptive behavior that disaster response planners should be on guard against is fatalism. Defined informally as the tendency to believe one's fate is already determined, fatalism discourages individuals from planning or taking protective action. Psychologists refer to this as "locus of control." Does an individual believe that he has control over his destiny and much of what happens to him, or is he largely at the mercy of the situation in which he finds himself? The extent to which individuals believe they can control what happens to them is

positively correlated with the likelihood that they will take protective responses.[62] Though the disaster literature has yet to conduct extensive empirical research on this issue, consider the following anecdote: in 1947, a study preformed by the U.S. Strategic Bombing Survey discovered, "In Germany [during WWII], many people in the bombed cities were in a condition of 'absolute fatalism,'…The dominant feeling, we are told, was that 'one cannot change what's going on, therefore there is no point in worrying about it'...among the bombed populace of Frankfurt there was a sizeable group who were neither optimistic or pessimistic, but rather 'take absolutely no position and in a sort of fatalism await what will happen.' "[63] Although this may impact disaster planning in a number of ways, perhaps the most important is that it suggests the need for planning phase questions targeted to judge fatalistic attitudes; high degrees of fatalism could negatively influence the population's proclivity toward maladaptive responses. More generally, however, the central lesson regarding fatalism in a port scenario is the following: a major focus of planning and preparation efforts should be to convince the workers that they do have more control over what happens to them. While individual port workers certainly have no control over whether their workplace is struck with a biological or chemical weapon, for planning purposes it is important to separate the uncontrollability of the event from the controllability of its effect by focusing on what people can do to increase their chance of surviving.[64]

In discussing what soldiers needed in terms of preparation for combat and increasing survivability, Marshall concluded that what is most needed is "simple details of common human experience on the field of battle."[65] The same holds true for disaster training. What people need is training focused on what they can expect and what they can and should do in response to protect themselves. In keeping with an all hazards approach, these actions should be simple, ordered, and manageable.[66]

Planning for a crisis should, however, go beyond simply informing the workers and telling them what to do, especially since individuals are generally less controllable during disaster.[67] Efforts should also be undertaken to incorporate them into all stages of the preparedness process. Contrary to the popular conception that average individuals are incapable of being productive during contingencies, the literature is in agreement that nonprofessionals can and should play an active role in emergency

response.[68] Not only does this mean planners should consult with workers for their suggestions in design development, it also means that workers should be assigned active roles in contingency training (like fire-fighting teams, designations as "go to" points for medical care, or teams designated to shut down vulnerable infrastructure). In addition to decreasing the load placed on professional response planners, integrating and training workers can help ensure a more prompt, flexible on-the-ground response. After all, workers are inherently the first ones on the scene.

The importance, in terms of disaster management, of treating the port work force as partners and not as a constituency to be handled, as adults and not as children, cannot be overemphasized. For example, Dr. Lee Clarke stresses that the "key implication" that comes out of disasters studies is that "there needs to be a devolution of authority."[69] While understandable, the desire of leadership to assume tighter levels of command and control during an emergency should be avoided. A command and control model that focuses on concentrating authority and operating in a top-down fashion during an emergency is a mistake. Emergency planning should not be seen as a set of orders to be given. As Lee Clarke explains:

> *Another myth, a really big one is that in a crisis people will automatically follow orders handed down by authorities. That's a key problem in most disaster planning. Very tight command and control may work well in the military, where all the tasks are contained within the organization. In a disaster, that can't work because ordinary people are not part of the formal organization.*[70]

First, as mentioned above, people are not inherently more controllable during crisis.[71] On par with the panic myth, is also the misconception that during a disaster people will automatically turn toward officials for guidance or assistance. While expertise and leadership are invaluable during a crisis, the primary social unit will still remain the locus of all initial reactions. Second, even the most efficient command and control system may be too slow in a quickly developing crisis. In a contingency where seconds count, primary decision-making will rest in the hands of each individual on the scene.[72] For example, one of the problems with the Soviet reaction to the Chernobyl disaster was the failure to bring local

farmers into a dialogue with the scientists; this too discouraged two-way exchange of information and frustrated the scientific response.[73]

For plans to be useful, they must also be continually reinforced via training and drills. These drills will produce a number of positive effects. First, they will periodically remind the worker that contingencies are possible and that vigilance is essential. Second, in addition to being alert, drilling will also help ensure that employees will know and be able to execute proper adaptive reactions. Again, in keeping with an all hazards approach, training and exercises should be preformed under a variety of contingencies and conditions. Third, exercises function to promote group solidarity. The literature on disaster response continually stresses that "social bonds have been shown to foster adaptive behavior both before and after disasters."[74] Drills and training not only provide individuals self-assurance that they can behave effectively in a disaster, but they also contribute to group cohesion by fostering notions that fellow co-workers are equally as capable. Fourth, and finally, exercises provide a way to refine contingency plans; through repeated trials and subsequent effectiveness studies, the port will be able to amend their reaction protocols to ensure the highest levels of efficiency.

Community Level Planning: When disasters strike, they strike entire communities, rather than isolated units. As a result, in thinking about port security in response to a chemical or biological weapons attack, response planners must think beyond the port toward the larger community in which a port is embedded.[75] This has a number of implications for disaster planning. First, disaster response workers at the port must have adequate contacts in the community. This will provide avenues not only for information and intelligence dispersal between the port and the greater community, but also ensure that there are effective external points of contact should the port need additional operational help during a contingency. This contact should provide for two-way communications and a bi-directional flow of ideas and assets in times of disaster when a disaster strike is too late to try to develop these contacts. Instead, the port and its surrounding community organizations should develop a legacy of cooperation well before the contacts are needed. An antagonistic relationship, stemming from questions over jurisdiction, resources, etc., would undoubtedly handicap any disaster response.

Planning an effective inter-port response to chemical and biological weapons threats must include extra-port measures.

This need for community cooperation extends to planning and drilling as well. The best method to encourage a seamless response in times of actual disaster is to ensure that all levels of the port, from the individual to the community, have taken part in coordinated response drills. Large-scale exercises involving both micro (port specific) and macro (port to community) level responses can mean the difference between success and failure.[76] The more experience people have in responding to disaster situations, the more likely they are to respond appropriately.[77]

Concluding Thoughts on the Planning and Preparation Phase

In the period when a potential disaster scenario is merely hypothetical, the main danger to guard against is the denial and complacency that results. The battle against complacency in the face of uncertain danger is an ongoing one. Simply developing a disaster response plan is not good enough. Psychologists have also identified what they term the single action bias. This is the tendency for individuals, when faced with an uncertain threatening event, to take one action to guard against it, and then consider the entire task completed.[78] It is important that planning documents not be seen as the goal of the planning process. The result of doing so is often the creation of "fantasy documents" that include promises of action that cannot be kept.[79] Disaster planning is a process, not a document.[80]

IV. The Pre-Impact Phase

Even after all preparation efforts have been undertaken and response plans defined, there is still potential for significant maladaptive reactions in the pre-impact phase, when it is believed that an attack may be imminent. The dangerous behaviors to guard against in this phase are much the same as in the planning and preparation phase, denial and the danger of uncontrolled fear. The major difference is that because the anxiety level of the pre-impact phase is greater than the previous stage (because the threat information is now more immediate), these maladaptive reactions can be experienced with a greater level of acuteness. Again, the disaster response planner has to perform the delicate balancing act of alarming people enough so that they take the proper protective measures without alarming them so much that their fear becomes uncontrollable and they adopt maladaptive responses like fatalism, flight, or the rise of sociogenic illnesses. After briefly discussing these maladaptive responses, this section will examine lessons learned from the disaster literature regarding how both denial and uncontrollable fear can be minimized.

Denial

After a warning of attack has been issued, but physical signs of imminent assault are not yet visible, a likely reaction among threatened population will be denial. Dubbed by sociologists as a "normalcy bias,"[81] many individuals will simply continue their regular activities, at perhaps less than optimal levels of performance, and fail to take constructive measures to protect themselves.[82] The danger here is not that they act improperly, it is that they do not act at all. Dr. Kathleen Tierney, Director of the Disaster Research Center at the University of Delaware, reports that inside 'The Station,' the Rhode Island nightclub that caught fire and killed ninety-eight people on February 23, 2003, the immediate problem was inactivity. People watched, immobilized, as the pyrotechnics ignited the stage drapes and ceiling and did not attempt to exit until the fire had become raging. Survivors recall asking one another if the growing fire was "just part of the show" with many replying that they thought it was; in

fact, in some cases it wasn't until club employees began encouraging evacuation that individuals were moved to leave.[83]

The tendency toward denial may be especially strong following a false alarm. For example, during World War II those who had experienced what Janis calls "remote-misses" during bombing campaigns often experienced greater denial about the danger they were facing:

> *When the [warning] siren sounded I took my children to our dugout in the garden and I was quite certain we were all going to be killed. Then the all-clear went without anything having happened. Ever since we came out of the dugout I have felt sure nothing would ever hurt us.*[84]

Consider also the more recent cases of reactions to the terrorist strikes on the World Trade Center. At the time of the 1993 bombing, many workers "didn't leave their offices until firefighters climbed all the way up to their floor, as much as two hours [after the bomb exploded]."[85] This complacency also existed on September 11, 2001. Survivors report countless cases of meetings proceeding as planned or individuals standing immobile near windows in the second building after the first had been attacked.

> *We were from a Wall Street mentality…you're a trader. You're tough. You don't leave until the firemen order you to go. You don't leave the floor for anything, not even to go to the bathroom…The clear skies and the way the jet appeared to be under control [as it hit the first tower] convinced [an employee] that the crash was a terrorist attack. But the fire was in the other tower, and he decided the south tower wasn't in danger."*[86]

Uncontrollable Fear

A second danger to work against during the period when an attack is declared imminent is the spread of uncontrollable fear. In the case of port workers, this is most likely to take the form of workers simply fleeing the ports. This could have devastating results on commerce or any military

build-up if the mere threat of a terrorist attack could shut down the ports by causing worker flight.

This consideration is especially important for the purposes of this study, because the threat of a biological or chemical attack may be especially likely to encourage fear driven flight. Psychologists have spent extensive time studying what people fear and how individuals typically engage in the risk assessment process; two major clusters of risk characteristics have been identified as creating the most fear in individuals. The first cluster includes what are known as dread factors. A perceived lack of control, the potential for a large scale catastrophe, the sense death is possible, and the sense that their danger exposure is involuntary and inequitable, are all likely to lead people to experience a heightened sense of risk.

The second cluster includes what are known as unknown factors. Dangers that are unobservable, have delayed effects, or are novel, are also especially likely to create a heightened sense of risk. The possibility of a chemical and biological weapons attack score highly on the dread and the unknown scales. Where an attack is seen as outside of any individual target's control, there is a potential for mass casualties, many fatalities, and the target's exposure to the danger are largely involuntary and its effects inequitably distributed. In addition, attacks may be initially unobservable, may cause delayed and largely unknown effects.[87]

For all these reasons, guarding against the social spread of uncontrollable fear during the time when an attack is seen as imminent will be a vital consideration with those concerned with keeping the ports operating in a time of war. It may also be possible and helpful to use some of these "risk assessment biases" to help sustain productive behavior in the face of a chemical or biological threat to a port. For instance, another finding from this literature is that the more valuable, important, and necessary people judge any activity to be, the less risky they perceive it to be.[88] Thus, the more vital the port workers see their work, the more likely they are to stay on the job in face of a threat.

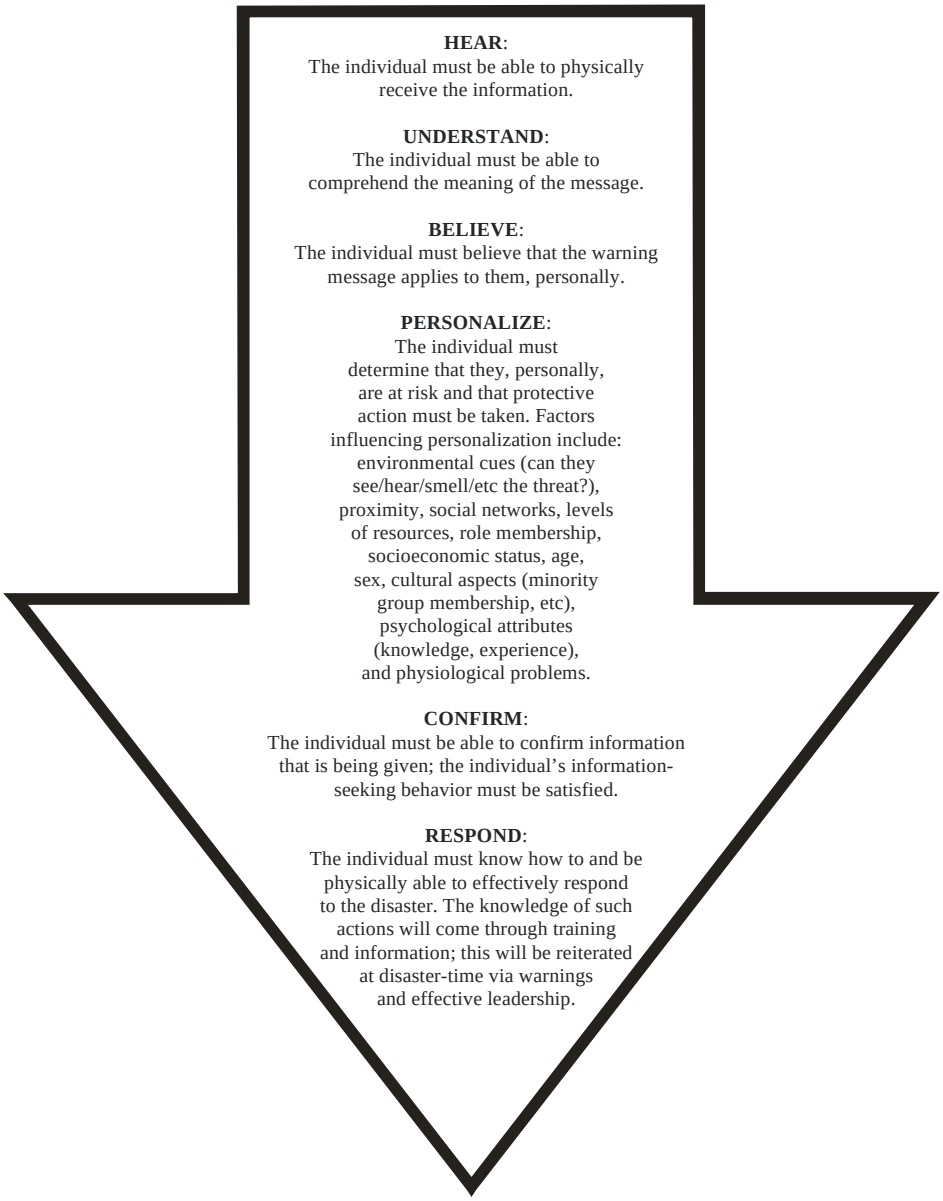
The existence of both of these potential maladaptive tendencies means that the disaster response professionals must be concerned with overcoming denial without spurring uncontrolled fear. This is an especially delicate balancing act when dealing with an issue like the threat of a chemical or biological attack. Fortunately, the disaster literature

offers a number of recommendations regarding how this can best be accomplished in the pre-impact stage. Information can be provided to ward off denial, but in a way that also decreases the likelihood of uncontrolled fear. The following sections detail those suggestions with regard to warnings, responding to false and misleading information, and role of leadership. When combined, these suggestions can strongly promote continued safety and worker effectiveness in the port at a time when an attack may be imminent.

Warnings

Designing an effective warning system is a key part of any disaster response plan. The goal is to give the target population, in this case port workers, sufficient notice so that they can take any necessary protective measures. While seemingly straightforward, warning systems must be designed carefully if they are to elicit appropriate responses. For instance, on March 27, 1994, a category four tornado devastated St. Clair, Calhoun, and Cherokee counties in Alabama. Twenty-three people died and 144 sustained injuries requiring hospital visits.[89] According to the Disaster Research Center, "88% of the residents in the geographic area [of Calhoun County] heard the sirens, but only 31% sought shelter."[90] Why? Although the alarm system was physically effective (it was heard), its overall effectiveness was limited because at-risk individuals had limited training on how to properly respond to the warning and a lack of follow-up directions meant that many did not know how or did not see the need to respond to the warning. The path from hearing a warning to taking proper protective measures is a long and complicated mental route, a route that can be easily interrupted or blocked. To be effective, any warning must be (1) heard by the intended recipients, (2) understood by the intended recipients, (3) believed to be applicable to the intended recipients, (4) be personalized in the sense of having each individual realize that they themselves are at risk, (5) be confirmed, usually from another source of information, and finally (6) recipients must know how to respond in an adaptive manner (see Figure 1).[91]

Figure 1: The Warning Response Pathway



Understanding each of these stages is critical to designing an effective warning system. Warning messages must be designed to mitigate the likelihood that an individual's response will be blocked along any of the steps of this pathway. To achieve this, and to do so without eliciting uncontrollable fear, any warning system should have the following seven characteristics: the warning should be credible, timely, appropriately worded, concise, precise, unsensationalized, and suggestive of adaptive strategies.

1. **Credible**: Credibility in warnings encompasses both the source and the message. In order for the message to affect a response, the warning's origin must be perceived as a reliable source. Further, the message itself must be presented in a way that is credible to the targeted population.[92] In this regard, existing lines of authority in the port may be the best avenues of warning dispersal because their daily practice makes them not only efficient, but also familiar and thus more likely to be respected. Creating and sustaining credibility is a long-term project because creating a level of trust takes time to develop, but can be destroyed in an instant.[93]

   One often neglected, but important, aspect of maintaining credibility is a willingness to say "I don't know." Rather than evade or give potentially misleading answers, admitting the limitations of your knowledge can often increase your credibility as a source.[94] Fear and anger from the at-risk population will derive from being lied to or the sense that there is a cover-up, rather than a frank admission of a lack of knowledge.[95] People in a dangerous situation will want information, even if this information can increase worries, so it is important not to deny that danger exists when there is a genuine threat.[96] This is part of treating the at-risk population as adults and as partners, rather than as problems to be worked around. In this regard, port leaders should not fear their credibility is jeopardized if they appropriately admit to having imperfect information.

   A credible warning system also has to deal with the issues of false alarms and the danger of "crying wolf." Do individuals lose faith in a message source and/or future warnings when the warnings turn out to be false or inaccurate? The existing literature is somewhat divided on this issue. Certain theorists maintain that

empirical evidence points to a false-alarm effect, while others maintain such a "cry wolf" phenomenon is a "fable and does not occur except in the basement of psychology buildings."[97] Part of the explanation for this discrepancy may come from the different focuses of various studies. False alarms may have negative impacts on the populace's perception of warnings, but that does not necessarily mean that false alarms need lead to maladaptive reactions. Indeed there could be positive aspects to false alarms in increasing training. For example, emergency planners and professionals in Mexico City consider "a possible false alarm as simply another opportunity to drill."[98]

Fortunately, while the extent of the "cry wolf" danger is debated, there is more consensus regarding how negative responses to false alarms can be minimized. The mitigation strategies most applicable to a port scenario include:

a. Maintaining a high threshold for message issuance. This inclines individuals to accept that when an alarm does sound, a serious incident is imminent.

b. Have stages in alerts, rather than all or nothing alerts.

c. Stress from the start, even in training, that warning systems are not perfect.

d. Training will also encourage responding to safety alerts, even if they are not one hundred percent consistent. In other words, training makes the importance of warnings salient in the minds of workers.

e. Make reaction mandatory. In a port situation, leaders maintain the power to order individuals to react to every alarm. If workers understand there is no option of "not acting," the false alarm effect becomes moot.[99]

2. **Timely**: Effective warnings must also be timely, meaning that they must allow the at-risk population time to take protective measures, without being so early that people begin to doubt the validity of the warning. Here the basic question is: does the port have mechanisms that can quickly and effectively compile and disseminate a warning

message to its workers? There are five main warning dispersal mechanisms: community outreach efforts (meetings, focus groups, door-to-door, etc.), written media (newspapers, magazines, etc.), electronic media (radio, TV, public speeches, etc.), special publications (pamphlets, handbooks, flyers, newsletters, etc.), and specialized prompts (signs, banners, etc.).[100] While all of these tactics should be considered as part of an overall disaster training and education program, it is the latter three that are most applicable in the attack-imminent stage. While the physical costs of such systems vary as does the likelihood that an individual will misinterpret or distort any particular message, one conclusive finding has been about the importance of utilizing a combination of these warning mechanisms to achieve effective message dispersal. In addition, in thinking about a warning system and how people are likely to respond, port leaders should also recognize the significance of informal dissemination networks, like word-of-mouth between friends and coworkers.[101]

Developing a timely warning system is especially challenging given the nature of chemical and biological warfare threats. First, chemical and biological attacks are very difficult to detect.[102] While different types of sensing equipment exists, the vast number of potentially threatening agents means that adequate diagnostic mechanisms for large areas is currently beyond the scope of existing technology. In the case of biological warfare, not only are there countless strains of potential toxins and numerous methods of delivery, but climate (wind direction, etc.) and structural factors (building design, etc.) will also affect the rates of potential causalities. With regard to chemical weapons, while the capability to detect a wide array of compounds exists, current detection technology is less reliable for sensing low levels of chemicals and prone to giving false positives. If keeping the port operating is a primary concern, false positives can significantly degrade productivity, in some cases, to an equal or greater extent than an actual attack would. For example, a study of the Gulf War indicates that between 1990 and 1991, there were 4,500 false chemical and biological alerts.[103] Finally, chemical and biological agents are also relatively easy to deploy and may have delayed effects; the

possibility of having a no-warning attack is a real one. The bottom line is that the port should be prepared to deliver warnings as promptly as possible, but also plan for the contingency where no warning is delivered.

3. **Appropriately worded**: Warning messages must also be appropriately worded. Cautions given to workers must be expressed in a way that takes into consideration not only their linguistic needs, but also their ability to accurately assimilate data. Though one should avoid "dumbing down" any messages, disaster professionals agree that warnings are most effective if delivered in simple, non-technical language understandable to the average 10th to 12th grader.[104] For example, one consistent finding in the literature on risk assessment is that people are often unmoved to action simply by the presentation of expert statistics.[105] In offering statistics, it has also been found that comparisons between risks are usually seen as more meaningful than absolutes, but such comparisons must be careful not to trivialize people's fear.[106]

4. **Concise**: Regarding message length, disaster professionals agree that "shorter is sweeter." Brief, succinct warnings have been shown empirically to have greater efficacy than longer messages. Returning to the radiation accident in Goiania, Brazil, mentioned earlier, studies after the event showed that "short notes" had a greater influence on the populace than longer ones.[107] It is important to note that the need to remain concise in messaging does not imply that many accurate details must be omitted. To the contrary, the disaster literature reports that individuals are able to handle detailed information and instructions as long as they are worded in an appropriate manner. In fact, omitting some important details for the sake of brevity may encourage the population to look elsewhere, to perhaps less informed, credible sources to fill an "information vacuum."[108] If longer messages are needed, they should be broken down into ordered and manageable chunks.[109]

   How often should messages be repeated? Here the evidence is mixed. Some maintain that high repetition will breed hypersensitivity and that "repeated reassurance can be counter-productive, increasing sensitivity and anxiety, and impeding rather

than promoting habituation."[110] Other experts maintain that confusion from too much information is a myth and that people, in actuality, "want detailed information… [and] want to hear it often."[111] Part of the job of port leadership and part of the goals of training drill and exercises should be directed to finding the right balance in any particular situation.

5. **Precise**: Precision is also crucial in effective warnings. Asking people to increase vigilance with regard to a specific set of behaviors is far more productive than simply asking them to go on a heightened state of alert.[112] The most effective of warnings will unambiguously describe: (a) the nature of the threat, (b) the threat's timetable and threat location, (c) what actions to take and when to take them, and (d) the sources of information.[113] This does not mean offering falsely precise figures (exact pinpoint figures that likely only represent the median in a range of possible values) for the sake of specificity, but that the goal should be a warning as specific as the information allows. Michael Smithson warns against the allure of "false precision," where the demand for information leads individuals to offer falsely precise statistics that in the end only serve to increase uncertainty.[114]

6. **Not sensationalized**: Sensationalism is responsible for many maladaptive behaviors that occur during disaster. Often blamed on dramatic reports in the media, sensational warnings can increase the costs of responding to a disaster. For example, in the Goiania, Brazil, (1987) incident, about 249 individuals were potentially exposed to dangerous levels of radiation, but in response to media reports, over 112,000 people voluntarily submitting themselves to government radiation monitoring.[115] This exacted a large cost in both resources and manpower. A similar example of the danger of the social amplification of risk occurred in the October 2001 anthrax scare, where warnings, according to Dr. Christine Rodrigue of California State University, served the negative purpose of "amplifying public concern far above the actual numbers of people exposed, sickened, and killed, and leading to pressure on physicians for wanton prescription of Cipro."[116] Thousands were tested for anthrax exposure with upwards of 10,000 people receiving

prescriptions for two-month courses of antibiotics as prophylatic following possible contact with the anthrax toxin. Further, "hundreds or thousands of unexposed persons acquired the antibiotic Cipro through their doctors or over the Internet."[117] Information about chemical and biological weapons is alarming enough; warning messages should not be designed to excite fears in order to spur a response.[118]

7. **Suggestive of adaptive strategies**: Warnings should also give direct information to the at-risk individual on what he should do.[119] This can also be tricky in practice. For instance, former U.S. Surgeon General David Satcher (1998-2002) has pointed out the difficulties he observed in communicating effective messages regarding what to do during the October 2001 anthrax scare. In this case, individuals mistakenly assumed that the highly reported nasal swab testing for anthrax was definitive, "and so when people came back and said, even though your test was positive, when we did further tests at CDC [the Centers for Disease Control] it was negative, so you don't have to continue Cipro…Those are not easy messages to communicate." Any warning system should provide the individual with the answer to the basic questions of "what should I do?" and "when should I do it?"[120]

   A final point to stress on warnings is that the system should also be seen as an ongoing process, not a one-shot event. When a crisis is imminent, the initial warning is only the start of the process of information dispersal, rather than the end of communication. Warnings must be followed-up with continual efforts at informational dispersal.[121]

Countering Misinformation

Part of the reason why informational dispersal through a warning system is an ongoing project is that even if appropriate warnings have been issued, it is still common for rumors and myths to spread. For example, during the 1918-1919 influenza pandemic that killed over 675,000 Americans, rumors spread that the disease was caused by "the foul atmosphere conjured by the war's rotting corpses, mustard gas, and explosions; a covert German biological weapon; spiritual malaise due to

the sins of war and materialism; and conditions fostered by the European conflict and overall impoverishment." These rumors persisted in spite of scientific agreement that the cause was the development a highly infectious, lethal version of a then unknown strain of flu.[122] More recently, after TWA Flight 800 crashed in the summer of 1996, rumors as to the cause proliferated. Respected media sources remarked they were "totally sure"[123] the flight was downed by an errant Navy missile, while other sources claimed the crash was an act of terrorism by Muslim extremists.[124] All of these reports proved to be pure rumor when the National Transportation Safety Board ruled the explosion's most likely cause was an explosion in a center wing fuel tank.[125]

The lesson from this is that one of the central concerns of disaster response professionals should be continuous informational dispersal activities that actively seeks out and responds to inappropriate information that is being spread. This will be especially important following a chemical or biological attack, because during and after a terrorist strike it is likely that the perpetrators as well as copycat organizations will also be releasing a steady stream of information designed to increase the level of fear. In addition, pressure to fill the news cycle in this era of 24-hour a day news coverage can easily lead to the rapid spread of false or alarming information. Thus, in a port facing a chemical and biological weapons threat, major efforts should be made to ensure not only the adequate issuance of warnings, but also the appropriate quelling of rumors and myths as they develop on-the-ground and in the media. This supplementary information should ideally be given via the same dispersal mechanisms that issued the initial warnings. This also indicates the importance of including the media in any disaster communication plan, treating the media as a potential solution rather than just a problem, and including media considerations in all disaster exercises. While misinformation can spread quickly in a crisis, evidence also indicates that rumors can be shattered quickly if people are presented with information from trusted experts.[126]

Leadership

Even though individuals tend to react better in crises than conventional wisdom allows, this does not mean that leadership is

irrelevant. Individuals in leadership positions can play a critical role in warding off maladaptive behaviors and encouraging effective responses. The bottom line suggestion with regard to leadership that comes out of the disaster studies literature is: it is best if people in leadership positions are well-known before a crisis and that these same leaders are present, seen, and heard during a crisis. Leadership at times of crisis is much more like leadership by example and leadership by providing information, than it is leadership by edict.[127]

Effective leadership can provide a number of benefits in disaster response. First, leaders can act as stabilizing forces in a time of crisis. Workers are more likely to remain at their posts if their leader does so. Workers are far more willing to believe official risk assessments if they see the leadership sharing the same risks they are being asked to confront.[128] For example, at the World Trade Center during the 9/11 attacks "people lived and died in groups…if the boss left or told people to evacuate, workers usually got out. If the boss stayed, people were more likely to stay."[129] As Stephen Hyman, the former Director of the National Institutes for Health put it, regarding possible maladaptive behaviors from potential terrorist strike with chemical or biological weapons, "Fear is contagious from person to person even if anthrax is not."[130] While fear may be contagious, however, so is courage and calm.[131] Moreover, according to studies of emotional contagion, leadership is especially important because it is easier to transmit emotions from leaders to followers than the other way around.[132]

In addition to presence, a leader brings authority that can help spur continued operation in the face of a crisis. An individual who does not respond to the sheer example, may respond to overt directions. Finally, because leaders have ongoing contact with their workforce, they offer a convenient, familiar, and credible information source to issue warnings, give directions, and quell rumors.

Training is also important for developing the leadership skills needed when disaster strikes. An often-noted occurrence at a time of crisis is the appearance of what has been termed "emergent leaders." These are people who although they have no formal leadership positions, step forward during a crisis to help guide the behavior of others. One of the striking findings regarding the nature of the "emergent" leaders is they typically have prior experience with disasters or disaster training.[133]

Concluding Thoughts on the Pre-Impact Phase

Maladaptations seen in the pre-impact phase of disaster will be similar to those experienced in the planning or preparation phase; denial may be common and could be compounded by the normalcy bias and fear of the unknown. To counter these maladaptations, the disaster literature suggests offering the population appropriate warnings. While this may seem easily achieved, port disaster professionals must actually bear in mind two main caveats, which, if left unconsidered, could derail the dock warning process. First, professionals must remember workers will react to a warning in a series of distinct steps from hearing to response. Second, a "good" warning is comprised of seven main attributes: credible, timely, appropriately worded, concise, precise, not sensationalized, and suggestive of adaptive strategies. If both of these caveats are combined with effective port planning in the planning and preparation phase, the dock stands to experience a minimum of maladaptive strategies in the pre-impact phase.

V. The Impact Phase

The nature of emergency preparedness and response changes significantly in the impact phase. After all, in previous stages an attack was merely a possibility. In the impact phase however, that possibility has become real and the danger is now physically present. What is the likely reaction of individuals to a chemical or biological weapons attack? How can disaster response professionals help ensure that people react as adaptively as possible? Answering these questions is the purpose of this part of the paper. The principal maladaptive behaviors to worry about during the impact phase are shock, sociogenic illness, and stigmatization. In addition, disaster response professionals are also going to have to worry about the physical effects of the biological or chemical strike. The following sections will discuss these challenges in greater depth as well as offer strategies for combating them.

Acute Stress Disorder/Shock

One potential maladaptation at the time of an attack will be for individuals to go into shock, or to use its relatively new clinical name, to experience Acute Stress Disorder. The stress associated with a severe trauma can cause some individuals to experience severe emotional detachment and a lack of responsiveness to environmental stimuli. The proportion of people that can be expected to go into shock in the face of an attack is a subject of much debate. For example, some scholars argue that shock is a very common reaction of individuals exposed to extreme physical manifestation of dangers. In terms of proportions, these analysts estimate that when a disaster strikes, 75% of the affected population will enter a transitory state of being "stunned and bewildered" while the remaining 25% will be comprised of a mix of individuals either "cool and calm" or "hysterical."[134] Other experts reject these figures as unrealistically high and instead believe that on the whole "people generally behave in an active and adaptive fashion during and after disaster." While some individuals may enter a state of acute distress and confusion, sometimes known as "Disaster Syndrome," according to this

school of thought, this is in fact a very small percentage of the population (around 14%).[135]

While a literature review like this one is in no position to resolve this debate, it is important to note two significant areas where these schools of thought agree. First, regardless of the number of people who go into shock, there is a consensus that the bulk of the "stunned and bewildered" will return to a fully productive state in minutes to hours. Moreover, there is also agreement regarding what can be done to minimize the extent of shock and speed recovery. (These techniques will be discussed below.) A cautionary note should be added however, because unlike transitory disasters such as tornadoes or earthquakes, chemical or biological attacks are likely to result in protracted periods of danger, thus increasing the amount of time that Acute Stress Disorder/shock may persist.

Sociogenic Illness

Sociogenic illnesses occur when large numbers of people report suffering physical symptoms, which have no identifiable physical cause. In the typical case, individuals who believe they have been exposed to some sort of toxin soon begin manifesting the physical symptoms of a particular illness, even if they have not been exposed to any toxin.[136] For example, in January 1999 a tank of animal feed in Belgium was contaminated with PCB/dioxin. The contamination made national headlines, sensitizing the population to the general risks associated with food security. This helped lead to a Coca-Cola scare about five months later when over half of the calls to the Belgian Poison Control Center were for reports of illness associated with the ingestion of Coca-Cola with an "off" odor. A study conducted by the Belgian Scientific Institute of Public Health reported that while the question of contamination could not be ruled out in all cases, a significant percentage of individuals reporting sickness were in fact experiencing mass sociogenic illness.[137] In another instance, perceived exposure to an airborne toxin at a military recruit training center in San Diego California led to 8 recruits being hospitalized, 375 taken in for medical evaluation, and 1,000 reporting at least one symptom. Sociogenic illness was the ultimate conclusion of the

investigation because "very few objective findings were observed, and no toxins were discovered by air sampling."[138]

A third and much more devastating case of mass sociogenic illness occurred in Israel during the 1990-1991 Persian Gulf War. Israeli citizens in the face of Iraqi bombing mistakenly believed that they had been attacked with chemical or biological weapons. While the warheads turned out to be conventional, that did not prevent many people from experiencing the symptoms of chemical exposure, which led to the hospitalization of 332 individuals. Ironically, in this case preparedness measures ended up making things worse, when combined with sociogenic illnesses. When numerous Israeli citizens perceived that they had been exposed to a chemical attack, they proceeded to inject themselves with the nerve agent anti-toxin, atropine. Atropine can prove harmful if used inappropriately and side effects of its use include drowsiness, hyperactivity, hallucinations, and even coma. In this case, 209 Israelis needed medical treatment related to complications stemming from atropine self-injection. Looking at all the hospitalizations that resulted from the SCUD attacks, only 30% of them came from the physical effects of the attack and 70% can be attributed to sociogenic casualties.[139]

Chemical and biological weapons threats and attacks may be the perfect candidates for spurring the spread of sociogenic illnesses. Chemical and biological threats are novel, mysterious, and in many ways invisible. As a result, they have the potential to "wreak destruction via psychological means – by inducing fear, confusion, and uncertainty in everyday life."[140] This is what makes these weapons better weapons of terror than of mass destruction. Thus, in thinking about disaster response in the case of a chemical or biological attack, the sociogenic casualties may be a more important concern than the physical ones. Indeed, by far the major casualties of terrorist strikes have been psychological and behavioral casualties; individuals were not physically injured but nevertheless sustained psychological injury that was damaging or incapacitating.

It would be a huge mistake to dismiss these worries or these symptoms as simply "all in their heads" and therefore not of importance to the disaster response professional. The spread of sociogenic symptoms can inflict huge costs on an organization. Dealing with sociogenically ill patients costs time, money, and supplies as their symptoms are

investigated and treated. First, if the object of the port is to remain productive in times of threat, workers down with sociogenic illnesses will damage productivity as much as those down with illnesses stemming from physical exposure to a toxin. Similarly, at a time of an attack, medical personnel are likely to be stretched quite thin and dealing with, identifying, and treating sociogenic illness is likely to further strain the already stressed triage system.[141] Sociogenic illnesses can also eat away at limited medical supplies. In the Israeli case of unjustified atropine injections, costly reverse atropine medications had to be delivered in order to counteract the effects of the drug.[142]

Given that terrorist threats and terrorist attacks with chemical and biological weapons are likely to spur massive press coverage, there is also the danger of sociogenic illness spreading through media exposure. Prolonged and intense exposure to threatening information, including graphic images on television of those injured in attacks, can create psychological stress similar to direct exposure and thus spread sociogenic illnesses far beyond immediately threatened areas. For example, because of massive media coverage, the psychological impact of the terrorist attacks of September 11, 2001, was felt well beyond New York, Washington D.C., and rural Pennsylvania.[143]

What happens at a port that is under threat of an attack or has already been attacked and the workers start reporting "strange" smells? Having an answer to this question will be a vital part of effectively managing any disaster response efforts at a port. Techniques of dealing with sociogenic illnesses will be discussed below.

Stigmatization

Another concern likely to arise at the time of a chemical or biological attack is the danger of stigmatization. This is an especially important concern when dealing, as this paper does, with issues like ports and airfields. Ports and airfields are designed specifically for the efficient transportation of people and equipment, thus making them perfect vehicles for spreading contamination and particularly vulnerable to shut down as a result of fears of contamination. The danger here then is that even a limited attack may have huge ramifications as fear of contamination spreads.

As with sociogenic illnesses, chemical and biological weapons attacks are perfect candidates for inducing problems stemming from stigmatization. In dealing with issues of chemical, radiological, or biological exposure, people tend to treat exposure as a yes or no question and pay little attention to exposure amounts.[144] If an attack is made on one part of a port, does that mean that the whole port is contaminated? If the port as a whole is seen as contaminated, does that mean the people working there and the cargo are also contaminated? As the cargo moves on through the transportation system, does the whole network become contaminated? Stemming the spread of this stigmatization will be crucial to keeping a transportation system operating in the face of chemical and biological attacks.

Physical Effects

Chemical and biological weapon attacks are also going to cause physical effects that are going to impact worker behavior. Drs. Carol Fullerton and Robert Ursano write that even light exposure to certain agents will have significant negative effects on an individual's behavior. Individuals exposed to agents during chemical warfare training exhibited symptoms including shortness of breath, loss of peripheral vision, rapid breathing, sweating, anxiety, and visual disturbances – all symptoms which compromised the troops' ability to perform in the field.[145] In November 2002, the Society for Neuroscience agreed with Fullerton and Ursano's findings; reporting the results of an Army study, finding that "low dose sarin exposure may lead to persistent neurochemical or pathological changes that influence behavior."[146] In short, even minimal exposure to toxins can have significantly adverse effects on individuals which can increase the likelihood of maladaptive reactions and accidents.

While the proper medical treatment for those physically exposed to a chemical and biological attack is well beyond the scope of this paper, it is necessary for disaster response planners to plan for these effects. What is within the scope of this paper, however, is discussing how principally psychological problems like sociogenic illness or stigmatization can be distinguished from problems related directly to physical exposure. How to make those distinctions and what that will mean for emergency response efforts will be discussed below.

Mitigating Maladaptations in the Impact Phase

Although the potential for maladaptive behaviors like shock, sociogenic illnesses, and stigmatization to appear at the time a crisis hits is serious, these problems can be ameliorated. Even in the face of significant physical destruction, it is possible to minimize the costs that can result from these behaviors. The rest of this section will discuss a number of strategies offered in the literature regarding how potential problems can be mitigated by: 1) offering immediate aid, 2) demonstrating robust leadership, 3) encouraging group cohesion, and 4) identifying and dealing with sociogenic illnesses and stigmatization. As with all the techniques and strategies discussed in this paper, none provides a "silver bullet" solution. Instead, problems have to be continually attacked on all fronts and the best that can be hoped is that costs will be minimized rather than eliminated.

1. **Offering Immediate Aid**: The first step in an effective response during crisis is taking care of the worker's immediate physical needs. A chemical or biological weapons attack is going to result in fatalities, injuries, and anxiety (especially anxiety relating to worries about family members). Each must be quickly and appropriately dealt with in order to decrease the occurrence of maladaptive behavior.

   The appropriate treatment and removal of the dead and the seriously injured should be one of the chief priorities of immediate disaster response. The primary reason for this is that the presence of dead bodies or seriously injured people is perhaps the most anxiety-producing facet of any disaster. For example, when the atomic bomb was dropped on Hiroshima, what disturbed people the most was the sight of human casualties. As Janis reports:

   > *Approximately two-thirds of the A-bombed survivors mentioned having perceived the dead and injured…Only 5 percent or less asserted that they experienced fear or some other form of emotional disturbance in connection with each of the following: the flash of the explosion, the noise, the blast and concussion effects, the widespread*

> *devastation, and the fires. In marked contrast, almost one-third of the respondents spoke of having been emotionally upset because of the casualties witnessed.*[147]

In a more contemporary illustration, survivors queried after the events of 9/11 reported that it was the sight of people jumping from the first, north tower of the World Trade Center that helped hasten their evacuation. One individual who escaped from the south tower remembered, "I turned around, I couldn't look…I saw what I saw. I knew what I saw. And I said, 'I'm getting out of here.' "[148]

In a port scenario, especially since individuals will be very familiar to one another from working in close proximity, effectively dealing with casualties is essential for mitigating levels of stress and tension. Thus, having a system in place for the expeditious removal of the dead and seriously injured from the immediate work area is a key part of minimizing the anxiety felt by those left alive. Quick treatment for the injured will also help minimize emotional disturbances.

As chemical and biological weapon threats will pose unique medical challenges, the port must be prepared to address health issues in all phases of the emergency including pretreatment/prophylaxis application, diagnosis, treatment, and infection control.[149] While going into the specifics of medical treatment is beyond the scope of this paper, one key finding in the literature is that proper triage techniques may be the key to an effective medical response.

During an attack, medical resources, both with regard to skilled personnel and proper equipment, are going to be stretched to the limit. Thus, the proper allocation of limited resources is pivotal. This is also an area where the medical community may be largely under-prepared, because exercising triage judgment is something many medical professionals are rarely asked to do. Given the relative plentitude of resources in everyday working environments, "physicians have largely forgotten the principles of triage. All injured patients are brought to hospitals, and extensive resources are applied to every injury…" In the face of a chemical or biological attack, neither doctors nor patients will have that luxury and poor

decisions regarding the allocation of resources can increase fatalities. Estimates are 10% of the deaths in the Oklahoma City bombing and 37% of the deaths from the Beirut barracks bombing in 1983 could have been prevented if triage decisions had been better.[150] Improving triage may mean having to turn to the military's past for lessons on how to best handle mass casualty situations. For example, during the Battle of the Somme in World War I, one British casualty clearing station was able to triage 5,346 casualties in a single twenty-four hour period.[151]

As discussed earlier, disaster response planners must think beyond the port and this includes the issue of immediate medical assistance. In ports where the employees have their families nearby, an attack could pull workers away from the dock and to their families. Worries about family members can become a problem for the port because "dysfunctional behavior may be expected from persons physically removed from the disaster scene, but who are at the same time uncertain about the welfare and safety of their families."[152] For example:

> *In a study of a tornado incident in Oklahoma, it happened that the police chief was enroute between a neighboring town and his home town at the time the tornado struck. He could see the tornado as it passed through the town and could see that a great deal of damage had been done. Although he had an important role as police chief in such a disaster, his first act as he came into town was to drive to his home and establish that his family had not been affected. Only after this was done did he go to the scene of the disaster and take charge.*[153]

There are two main ways to mitigate dangers stemming from this natural reaction. First, families must take part in the education and training efforts associated with disaster preparations. Second, during the impact phase, efforts must be made to receive and provide information to the workers about the status of their families. If the attack is at a scale that warrants evacuation of the surrounding areas, port employees must know their families are being taken care of if

they are going to be expected to stay at work and perform their duties.

2. **Providing Leadership**: Robust leadership can also play an important role in mitigating maladaptive behaviors in a time of crisis. While the tendency is for individuals to react pro-socially during a crisis, effective leadership can maximize those positive reactions, direct it towards productive behavior, and minimize the occurrence and costs of maladaptive behavior.

In many ways the role of leadership is similar to its role during the pre-impact stage discussed above. Workers are more willing to accept putting themselves in risky situations if they believe their leaders are willing to share the same risks.[154] Leadership in a crisis cannot be provided from a distance. As an example, during World War I, a French officer faced the unenviable task of choosing a soldier to cross a heavily shelled area.

> *The poilu looked at the officer and said "Sir, do you realize what it means to go out there?"…[The officer] turned to the poilu: "I suppose you will risk it if I accompany you out over that hill." The French soldier protested against his officer going to certain death, but the officer insisted…The journey was made without mishap…from that day on he never had to select another man for a perilous task, for men in the company willingly volunteered whenever occasion arose.*[155]

In addition to setting an example, leaders can also help to focus the reaction of the workers. To prevent aimless hyperactivity and dangerous perceptual narrowness, leaders can help direct behavior into positive directions. As a case in point, to ward off combat fear, officers are encouraged to direct their troops' attention toward something they can control, to the trouble that their fellow troops may be in, and toward what actions they can take against the enemy.[156]

The disaster literature stresses that action, doing something, is a great steadying force in the midst of a crisis. Even as seemingly

simple a task as having people identifying themselves and others in the immediate vicinity can help move people from the shock of the initial attack and onto the path of effectively responding to the crisis. Giving people responsibility for certain actions can also push them in the right direction.[157]

Given this, leaders can and should remind and direct individuals to start carrying out the responses that they have been trained for during the preparation phase. If flames are sighted, area managers can ensure members of the trained fire-fighting teams are assembled and directed toward the blaze.

It is tempting to discount the importance of leadership in such a response; after all, if someone is assigned and prepared to perform a task during contingencies, he/she should be conditioned in such a way that there is no delay. In the confusion of an attack, however, individuals are almost certain to experience some form of "role conflict" stemming from uncertainty regarding what is the best of various alternative actions.[158]

For instance, a port-worker, while assigned to a fire-fighting unit, may question, "In light of the nature of the attack, is it more important for me to remain at my post?" or "Should I stay and help my injured friend or go join the firefighting team?" It is at this juncture the effective leaders become critical by making sure essential tasks are performed. The importance of leadership can be seen in this example from worker response to refinery fires in the early 1900s:

> *[A]t the time of the first ship explosion, many men were working in oil refineries, where failure to remain on the job until units were shut down could result in additional fires and explosions. In all the communities studied, failure of community functionaries, such as foreman and policemen, to perform the duties appropriate to their positions could result in the absence of expected and badly needed leadership…Preoccupation of large numbers of able survivors with their own small primary groups could result in the atomization of*

> *the community into small, uncoordinated groups…*[159]

Although panicked and hysterical individuals are not the norm, that behavior may still occur, and as a result, leaders must also be prepared to deal with them. One important point to keep in mind is that many people who initially demonstrate symptoms of shock may be able to recover quickly if given an action to complete. In addition, strong demonstrations of fear should not be seen as indicative of a disability. For example, an instructor at the Marine Corps Infantry Officer Corps, explains how part of their training is designed to teach officers that:

> *Fear is common and that the symptoms shouldn't be considered abnormal. Troops who urinate on themselves, defecate or vomit in the face of the horrors of combat shouldn't be set aside as combat stress casualties…but cleaned up and sent on their way.*[160]

As part of this permissive attitude toward fear, psychological casualties should be treated as casualties and not cowards. Evidence from combat also indicates that providing treatment to these psychological casualties near the front lines can also help many of them return quickly to their jobs.[161] Given all this, however, it will also be the job of leaders during a crisis to see that the small number of truly panicked individuals is removed from the scene so as not to spread this uncontrolled fear to others.[162]

Finally, leadership can also play an important role as a conduit of information regarding the nature of the attack, overall response, and status of families in the community.

3. **Encouraging Group Cohesion**: Another way of mitigating maladaptive behavior is to create and sustain group ties. Group cohesion has long been seen as one of the key attributes of successful combat groups. During war, where individuals operate together for extended periods of time under dangerous conditions, it is inevitable that close ties develop. These can develop to such an extent that a near familial spirit emerges; people may then turn to this primary

unit as a source of comfort and confidence.[163] While it is obviously impossible to create as strong a sense of group cohesion amongst port-workers as among a small combat unit under fire, it is not impossible to increase the amount of group cohesion in any particular group. For example, stability in the teams that work together day in and day out at the port can encourage the development of group cohesion. Similarly, keeping these groups together at a time of crisis will also be important. For example, when subjected to bombing during World War II, civilians much preferred social shelters rather than private ones.[164]

4. **Dealing With Sociogenic Illness and Stigmatization**: The first step in warding off the costs associated with sociogenic illnesses is identifying them. Given the unknowns involved in chemical and biological warfare, it is going to be no easy task differentiating sociogenic illnesses from sicknesses due to exposure to unidentified agents. Bartholomew and Wessely have identified eight characteristics that may help identify sociogenic illnesses. Sociogenic illnesses tend to:

   a. Include symptoms with no plausible organic basis (this will be hard to utilize in the scenario under examination here, because the use of chemical or biological weapons will almost certainly pose a plausible organic basis).

   b. Include symptoms that are transient or benign.

   c. Include symptoms with rapid onsets and recovery.

   d. Occur in segregated groups.

   e. Appear when anxiety is very high (again, this will be a hard one to utilize for diagnoses in the case under consideration here because a chemical or a biological attack is always going to produce a high anxiety situation).

   f. Include symptoms that spread by sight, sound or oral communication.

   g. Include symptoms that spread down the age and status scale.

   h. Include a preponderance of female participants.[165]

Using these as guidelines may help differentiate sociogenic illnesses from those stemming from direct physical exposure. Identifying a sociogenic illness is only a small part of the battle however, and treating it is probably more of a challenge. Perhaps the most important lesson that derives from attempts to respond to sociogenic illnesses is not to dismiss them as "all in their heads." As Wessely stresses, victims of sociogenic illnesses are experiencing genuine symptoms. "That the cause of these symptoms was probably anxiety…rather than any exposure itself, does not detract from their reality." Indeed, dismissal of such behavior as hysterical can simply reinforce the needs of the victimized individuals to remain sick to prove themselves. The challenge is to "convey the scientific reality without being seen as blaming or demeaning the victims." The difficulty, as Wessely notes, is that we know far too little about how to do that.[166] This, along with figuring out how to prevent stigmatization, of which little is known at this time, are probably the two areas that stand out in this literature review where more research needs to be done.

The literature does point to two potential, if partial, solutions. First, quick action to close off any contaminated area is useful in heading off sociogenic illness[167] and probably stigmatization as well. Second, one interesting finding is that individuals who reported a belief that they really needed to keep their job and could not afford to risk missing work were far less susceptible to sociogenic illness.[168] This suggests the possibility that encouraging people to see their jobs as vital and valued may help discourage the spread of sociogenic illnesses and stigmatization. While certainly a challenge, the task is not insurmountable. As Janis reports, within days of the atomic bombings of Hiroshima and Nagasaki, even in the face of fear of radiation or subsequent attacks, thousands of residents came streaming back to the cities.[169]

Concluding Thoughts on the Impact Stage

Maladaptations in the impact phase are significantly different than those in the other disaster stages. The most dangerous reactions to guard against will be Acute Stress Disorder/shock (which can result in hyperactivity as well as non-activity), sociogenic illness, and the spread of stigmatization. All this will of course be occurring in the context of injuries stemming from physical exposure to biological or chemical

agents. While there is a large amount of literature discussing the best way to deal with and mitigate shock effects, the literature is disappointingly thin when it comes to warding off sociogenic illnesses and stigmatization, which are likely to be particularly grave problems in dealing with chemical or biological attacks on port facilities. Offering immediate psychological as well as medical assistance, leadership, and fostering group cohesion, should significantly enhance the ability of dockworkers to adapt to disaster and lay the groundwork for continued productivity in the port. Sociogenic illnesses and the spread of stigmatization remain, at this point, a principal danger about which too little is known.

VI. Conclusion

The purpose of this project was to examine the existing work in a number of related fields that could be of use in understanding what type of behavior could be expected from port workers in a chemical and biological weapons threat environment, as well as what those studies offered in ways of suggestions for mitigating disruption and keeping the ports productive. Literature examined included psychological work on risk assessment, the increasingly robust field of disaster studies (both natural and man-made) stemming mostly from a sociological perspective, and studies of combat stress, paying particular attention to responses to terrorist and weapons of mass destruction events.

There were also large related fields of studies that were beyond the scope of this paper. For example, the medical work on the physical effects of chemical or biological agents is undoubtedly crucial as part of an overall emergency response plan, but this review focuses more on behavioral, rather than physical effects. Similarly, the immense literature on post-traumatic stress disorder will be important in considering the long-term effects of any large-scale chemical and biological weapons attack, but is beyond the timeline considered in this paper, which focuses mostly on the immediate to short-term problem of keeping the ports open. On the other hand, acute stress disorders can and will have significant immediate effects and may indeed be the predominant short-term disabling reaction to an attack.

The central findings of review can be summarized as follows:

Overall Findings

- Panic, chaos, and hysteria are fortunately rare in responses to disaster, but given the unusual nature of chemical or biological terrorist attacks, the likelihood of such behaviors can not be entirely dismissed. The most likely casualties in such attacks will be psychological ones,[170] resulting in a series of specific maladaptive behaviors that can decrease the ability of individuals to respond in a positive manner to a disaster event.

- While potentially costly, these maladaptive behaviors can be minimized with proper planning and execution before and during a disaster. Although a generalized "all hazards" approach to disaster planning is recommended for each individual organization, these organizations should tailor their plans to the specific situation of the endangered workers. (Are workplace groups stable or variable, do workers have families nearby, etc.?)

Planning and Preparation Phase

- When a contingency is purely hypothetical, the likely maladaptive responses in port workers are denial, complacency, inactivity, and feelings of invulnerability.
- The most promising overall approach to disaster response planning is an "all hazards" approach that stresses generally adaptive responses to a wide range of disaster scenarios rather than a number of specific plans tailored to particular emergencies.
- Plans must take into account the needs of the organization as a whole, the individual port workers, as well as the larger community in which the port is embedded.
- Rather than increasing the level of command and control exercised during a crisis, plans should focus on decentralizing decision-making and treating the port workers as partners rather than problems that need to be controlled.

Pre-Impact Phase

- In the pre-impact phase, when a threat becomes more pressing, the principles maladaptations to guard against are the opposite reactions of denial or uncontrollable fear.
- The key balancing act of the disaster response planner is to raise concerns enough that the proper protective measures are taken, without producing so much anxiety that overwhelming fear detracts from preparations or halts productivity.

- In issuing warnings, disaster response professionals should strive to ensure that their warnings are credible, timely, appropriately worded, concise, precise, not sensationalized, and direct individuals toward specific protective behaviors.
- Communication must not only be focused on getting out good information and directly countering misinformation, but also accurately providing the full range of information, both good and bad, or else the information will be viewed as false reassurance and lose credibility.
- Proximate leadership by example and by providing needed information is crucial to sustaining efficient responses to crises.

Impact Phase

- Dealing promptly with individuals who have been physically exposed to chemical and biological weapons must have the highest priority, but the predominant casualties will be behavioral/psychological. Well organized behavioral response plans will be critical both to reduce behavioral casualties and to minimize the response to mild exposure.
- Maladaptive behaviors may include Acute Stress Disorder/shock, which will be transitory in many individuals and longer lasting in a smaller percentage of people, mass sociogenic illness, and the spread of stigmatization.
- The use or reported use of chemical and biological weapons represents in many ways a perfect breeding ground for sociogenic illnesses and stigmatization.
- Offering immediate aid, demonstrating robust leadership, and fostering and sustaining group cohesion will all help to mitigate maladaptations.
- Too little is currently known about how to best prevent and respond to sociogenic illnesses and stigmatization, although the quick containment of exposed areas and fostering a positive attitude in the workforce toward the importance of their work can help somewhat.

In terms of the need for future research, this study points to two main areas where more work needs to be done. First, the nature of chemical and biological weapons (mysterious, novel, invisible, etc.), plus the nature of port work (designed specifically for the efficient transport of goods) means that sociogenic illnesses and stigmatization are likely to be huge, perhaps the most important problem to deal with in terms of keeping the ports operating in a time of crisis. These mechanisms, more than any other, have the potential for significantly increasing the costs of any attack beyond its immediate physical effects. Sociogenic illnesses and stigmatization remain, however, among the least understood of disaster reactions. Particularly lacking is a solid understanding of how to best ward off and respond to such outbreaks. Here is the most important area where more basic research work needs to be done in terms of thinking about how to mitigate the effects of chemical and biological attacks.

Second, in terms of the other areas of disaster response behavior, the logical next step is to take each of the individual component parts of the disaster response system discussed above and study how to apply it in an actual port environment. This review offers a number of suggestions in that direction; the next step is to confront these suggestions with the reality of a particular port environment and see how they may or may not be applicable in the case of a specific endangered port.

Notes

1. For a quick summary of the field of disaster research, see Enrico L. Quarantelli, "Disaster Research" in Edgar F. Borgatta and Marie L. Borgatta eds., *Encyclopedia of Sociology*, Volume 1, (New York: MacMillan Publishing Company 1992).

2. Lee Clarke, "Panic Myth or Reality," *Contexts*, Fall 2002, 21-26.

3. Martha T. Moore, "Delay Meant Death on 9/11," *USA Today*, 2 September 2002.

4. See Irving Janis's classic, *Air War and Emotional Stress: Psychological Studies of Bombing and Civilian Defense*, (New York: McGraw Hill, 1951), 37-38.

5. Claes Wallenius, "Why do People Sometimes Fail When Adapting to Danger?" *International Journal of Mass Emergencies and Disasters*, 19 August 2001, 146.

6. Adrienne Stith Butler, Allison M. Panzer, and Lewis R. Goldfrank, eds., *Preparing For the Psychological Consequences of Terrorism: A Public Health Strategy*, Committee on Responding to the Psychological Consequences of Terrorism, Board of Neuroscience and Behavioral Health, Institute of Medicine, (Washington DC: The National Academies Press, 2003), 4, 44-45, 60-61.

7. Janis, *Air War and Emotional Stress*, 153.

8. For general overviews focusing on reactions to natural disasters see Beverley Raphael, *When Disaster Strikes: How Individuals and Communities Cope with Catastrophe*, (New York, Basic Books: 1986), 30-72; and Verta Taylor, "Good News About Disasters" *Psychology Today*, October 1977, 93-94 and 124-126.

9. E.L. Quarantelli, "How Individuals and Groups React During Disasters: Planning And Managing Implications For EMS Delivery," University of Delaware Disaster Research Center Preliminary Paper #138, 3-9.

10. See John Leach, *Survival Psychology*, (New York: New York University Press, 1994), 30-34 and Neil J. Smelser, "Chapter VI, The Panic" in *Theory of Collective Behavior*, (New York: The Free Press of Glencoe, 1963), 131-169.

11. Janis, *Air War and Emotional Stress*, 37-38.

12. Thomas A. Glass and Monica Schoch-Spana, "Bioterrorism and the People: How To Vaccinate a City Against Panic," *Clinical Infectious Diseases*, 2002, 219.

13. Clarke, "Panic: Myth or Reality," 21-22; Benjamin Cornwell, "Panic or Situational Constraints? The Case of the M/V Estonia," *International Journal of Mass Emergencies and Disasters,* March 2001, 8-11; William E. Feinberg and Norris Johnson, "The Ties That Bind: A Macro-Level Approach to Panic" *International Journal of Mass Emergencies and Disasters,* 19 March 2001, 269-295; and Janis, *Air War and Emotional Stress,* 26-41.

14. Kathleen J. Tierney, Michael K. Lindell, and Ronald W. Perry, *Facing The Unexpected: Disaster Preparedness and Response in the United States* (Washington DC: Joseph Henry Press, 2001), 106-118; and Russell Dynes, *Organized Behavior in Disaster* (Lexington: DC Heath and Company, 1970), 84-108.

15. Stephen T. Hosmer, *Psychological Effects of U. S. Air Operations in Four Wars, 1941-1991: Lessons for U.S. Commanders,* (California: RAND, 1996), 10-15 and G. Andrew Mickley, "Psychological Factors in Nuclear Warfare" in R.I. Walker and T.J. Cerveny, eds. *Textbook of Military Medicine: Medical Consequences of Nuclear Warfare,* (Virginia: TMM Publishers, 1989), 175. Janis notes that the level of absenteeism varied in proportion to which worker housing was damaged, *Air War and Emotional Stress,* 147. Quarantelli warns, however, that most of the studies done and people going to work focuses on the upper echelons of the workforce, see "How Individuals and Groups React During Disasters," 22.

16. Wallenius, "Why do People Sometimes Fail When Adapting to Danger?," 146. Earlier, Irving Janis used the term "maladaptive fear responses" to describe a certain class of these types of behavior. See "Problems Related to the Role of Fear in Combat" in Samuel Stouffer et al., *Studies in Social Psychology in World War II, Volume II, The American Soldier: Combat and It's Aftermath* (Princeton: Princeton University Press, 1949), 194-195.

17. Michael Smithson, "Ignorance and Disasters" *International Journal of Mass Emergencies and Disasters,* 8 November 1990, 224.

18. Leach, *Survival Psychology,* 12-17.

19. Dr. Kathleen Tierney, "Implementing a Seismic Computerized Alert Network (SCAN) for Southern California: Lessons and Guidance from the Literature on Warning Response and Warning Systems," Report for *Task 2, Trinet Studies and Planning Activities in Real-Time Earthquake Early Warnings,* 30 November 2000, 40, On-line, Internet, available from http://www.udel.edu/DRC/projectreport45.pdf.

20. Paul Slovic and Elke U. Weber, "Perception of Risk Posed By Extreme Events," unpublished paper prepared for the conference on "Risk Management strategies in an uncertain world," Palisades, New York, April 12-13 2002, 12-13; and Roger E. Kasperson, Ortwin Renn, Paul Slovic, Halina S. Brown, Jacque Emel, Robert Goble,

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22. Dr. Harrison Wein, "Coping with Terrorism," *The National Institutes of Health: Word on Health*, December 2001, 1, On-line, Internet, available from http://www.nih.gov/news/WordonHealth/dec2001/story01.htm.

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25. National Center on Disaster Psychology and Terrorism, 19 June 2003, On-line, Internet, available from http://www.ncdpt.org/research.htm.

26. For the anthrax attacks see, Butler et al., *Preparing for the Psychological Consequences of Terrorism*, 53. For these and many other examples, see Bartholomew and Wessely, "Protean nature of mass sociogenic illness," 300-306.

27. See also Timothy F. Jones, Allen S. Craig, Debby Hoy, Elaine W. Gunter, David L. Ashley, Dana B. Barr, John W. Brock and William Schaffner, "Mass Psychogenic Illness Attributed to Toxic Exposure At A High School," *The New England Journal of Medicine*, 13 January 2000, 96-100; Simon Wessely, "Responding To Mass Psychogenic Illness" in the same volume, 129-130 and Ross H. Pastel, "Collective Behaviors: Mass Panic and Outbreaks of Multiple Unexplained Symptoms," *Military Medicine* October 2001, 44-46.

28. For both hyperactivity and perceptual narrowness, see Leach, *Survival Psychology*, 11-25.

29. Janis, *Air War and Emotional Stress*, 165-166 and Mickley, "Psychological Factors in Nuclear Warfare," 175.

30. Nicholas Kumli Pilgrim, "Landslides, Risk and Decision-Making in Kinnaur District: Bridging the Gap between Science and Public Opinion," *Disasters*, 1999, 61.

31. On Acute Stress Disorder, see Randall D. Marshall, Robert Spitzer, and Michael R. Liebowitz, "Review and Critique of the New DSM-IV Diagnosis of Acute Stress Disorder," *The American Journal of Psychiatry*, November 1999, 1677-1685.

32. Paul Slovic, "Perception of Risk from Radiation" in *The Perception of Risk* (London: Earthscan, 2000), 270.

33. Dynes, *Organized Behavior in Disaster*, 102.

34. Ibid., 103.

35. See Christian Lowe, "Facing Fear: How to break its grip and survive combat," *Air Force Times*, 10 March 2003, 29-30.

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37. Glass and Schoch Spana, "Bioterrorism and the People;" Quarantelli, "How Individuals and Groups React During Disasters, 8-9; and Janis, *Air War and Emotional Stress*, 99-100.

38. Pastel, "Collective Behaviors," 44.

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47. Quarantelli, "How Individuals and Groups React During Disasters," 11-12.

48. E.L. Quarantelli, "Major Criteria for Judging Disaster Planning and Managing and Their Applicability in Developing Societies," 9-11.

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