Textbook of Disaster Psychiatry

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Assessment and management of medical-surgical disaster casualties

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Introduction

Having medical or surgical injuries or conditions following a disaster or terrorist attack increases the likelihood a psychiatric condition is also present. Fear of exposure to toxic agents can drive many times more patients to medical facilities than actual terrorism-related toxic exposures. Existing post-disaster and post-terrorism algorithms consider predominantly medical and surgical triage and patient management. There are few specific empirical data about the potential effectiveness of neuropsychiatric triage and treatment integrated into the medical-surgical triage and management processes (Burkle, 1991). This is unfortunate, since there are lines of evidence to suggest that early identification of psychiatric casualties can help decrease medical-surgical treatment burden, decrease inappropriate treatments of patients, and possibly decrease long-term psychological sequelae in some patients (Rundell, 2000). Physicians and mental health professionals involved in disaster/terrorism response planning should understand the importance of considering behavioral symptoms within the context of concurrent medical-surgical assessment and treatment (Rundell, 2003). Effective medical-psychiatric differential diagnosis and adequate attention to public risk communication lessen the risk of medical or psychiatric misdiagnoses, and decrease the odds that healthcare systems may be overwhelmed (Rundell & Christopher, 2004). This chapter will identify how postdisaster patient triage and management can incorporate behavioral/psychiatric assessment and treatment, merging behavioral and medical approaches in the differential diagnosis and early management of common psychiatric syndromes among medical-surgical disaster or terrorism casualties.

Phases of individual and community responses to terrorism and disasters: integrating psychiatric management into disaster victim medical-surgical triage and treatment

Disasters include natural disasters as well as human-made disasters such as terrorist attacks with explosives, chemicals, and biological agents. In cases of disaster or terrorism, particularly when the scope of potential casualties could overwhelm local response capabilities, the ability to separate medical-surgical casualties, psychiatric casualties, mixed casualties, and the worried well becomes crucial to targeting aid to the correct patients. The principles of differential diagnosis discussed in this chapter are aimed to be clinically useful across the range of disaster etiologies.

Following a potential terrorism or disaster-related toxic (biological, chemical or nuclear) exposure, or a possible toxic exposure, three types of patients present themselves for medical evaluation, (1) people with disease or injuries due to the toxic agent,

(2) people who have organic disease plus a concurrent psychiatric condition that may confuse the clinical picture, and (3) people who have not been exposed but fear they have. Anxiety and fear provoked by concerns about having been potentially exposed can complicate the medical picture; physiological signs of autonomic nervous system arousal, along with normal somatizing behaviors and dysphoria, can mimic symptoms and signs of diseases due to biological and chemical agents.

The numbers of people who present for healthcare in each of the three categories above are neither proportional nor linear across the life of a bioterrorism epidemic. When there is an explosive event, such as a suicide bombing or a building bombing, physical injuries are often clear, definable, and obvious. If exposure is covert, as in potential release of a chemical or biological agent, patients with organic disease will present before any wave of patients who present with fear, anxiety, or psychiatric illness. If a biological or chemical attack is announced by the perpetrators, the first wave of people presenting for health evaluation is more likely to feature behavioral manifestations, given the incubation periods of potential biological agents. Figure 8.1 summarizes the differences between these two types of individual and community responses to toxic agent exposure.

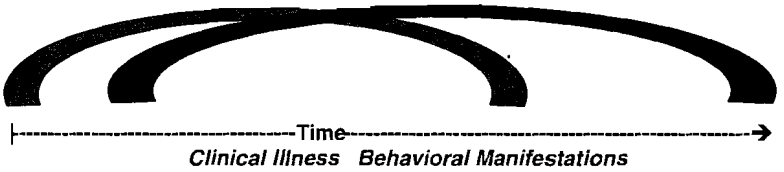
Covert exposure

If a terrorist group unleashes a biological agent covertly, organic disease will emerge before the general public is aware of the terrorist event. The duration of the period when illnesses attributable to the agent comprise all of the patients presenting or referred for medical evaluation depends on three variables: (1) the incubation period, the duration of the prodrome, and the time to definitive diagnosis, (2) the length of time it takes public health authorities to identify a bioterrorist event, and (3) the length of time it takes the public to be informed about the event. Once there is general public awareness there has been a terrorist event or disaster-related release of toxic substances, people who fear they may have been exposed will begin to present to medical facilities for evaluation – some will contract illness and some won't. The experience in the United States following the anthrax terrorism of October 2001 was that the number of people who feared exposure, or were exposed but never developed disease, was over a thousand times greater than the number of people who actually developed anthrax (CDC, 2001a). The ratio will depend on the virulence of the agent, the mode of delivery, and the effectiveness of risk communication to the general public. After the clinical illnesses have run their courses, there will continue to be patients presenting for health evaluations who fear they have been exposed and displaying anxiety, fear, or idiosyncratic manifestations of psychiatric illnesses. The principles presented in this discussion and in Figure 8.1 may occur serially or continuously if there is an ongoing bioterrorism event (e.g., anthrax-tainted letters mailed over several months), producing waves of exposures and fear.

Announced exposure

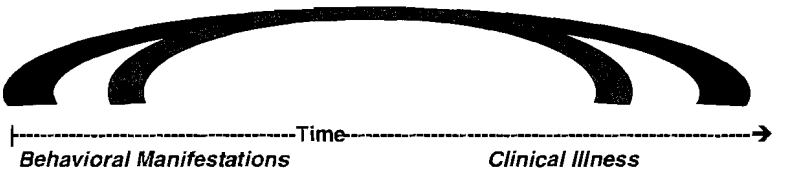
Some terrorists may estimate that the greatest impact on a population will occur if they announce they have perpetrated a bioterrorist act. An actual attack may or may not follow. If an attack does not follow, all presentations will represent behavioral and physical manifestations of fear, anxiety, and idiosyncratic presentations of psychiatric illness. If an actual exposure occurs in the context of an announcement, the length of time for actual clinical prodromes or illnesses to appear that are attributable to the agent will depend on the incubation period of the disease produced by the agent. Prior to the onset of the organic infectious disease, all patients presenting to medical facilities will be people who fear exposure and might be misinterpreting signs and symptoms of other physical illnesses, psychiatric illnesses, or autonomic hyperactivity. After patients stop presenting with clinical illnesses attributable to the biological agent there will be a period during which the worried well or the medically ill who fear their symptoms may be due to the biological agent continue to present, often with symptoms of fear,

COVERT EXPOSURE



- Clinical illness: first wave of people who present with clinical symptoms and signs of agent before the general public becomes aware of the bioterrorism event
- Behavioral symptoms and signs: as the outbreak becomes defined and publicized, patients present with a mixture of clinical illness attributable to the agent, behavioral manifestations attributable to fears of having been exposed, and psychiatric disorders. After the exposures attributable to the biological agent illnesses have run their course, fears of having been exposed remain and result in continued presentations to medical facilities

ANNOUNCED EXPOSURE



- Behavioral manifestations: initially, the latency period and clinical course of the biological agent dictate that there has not been time yet for actual illnesses attributable to the biological agent to have occurred. Behavioral manifestations will remain after clinical cases have run their course among those worried they may have been exposed
- Clinical illness: it is important to address anxiety and concurrent psychiatric disorders in the overall medical management of patients with confirmed illness due to biological agents

Figure 8.1 Phases of individual and community responses to chemical or biological agent exposure. Adapted with permission from Rundell & Christopher (2004)

anxiety, or psychiatric illness. If there are ongoing or serial bioterrorism events, the simple curves and phases presented in Figure 8.1 may become complicated, serial, and merge together into an ongoing need to attend to medical-behavioral differential diagnosis issues.

Factors determining presentations to healthcare providers and facilities

The number and types of patient presentations to healthcare providers following a bioterrorism event will be determined by a number of factors, listed in Table 8.1. These are a combination of individual medical factors (risk factors and nature of the illnesses produced by the agent as delivered) and public health/education factors. Explosive events will produce initial injuries, and then those casualties due to secondary or delayed effects of the initial injuries, such as those related to infection, blood loss, head injury, etc. The nature of various biological and chemical agents likely to be used in terrorist activities is presented later in this chapter. It is important, however, to emphasize how crucial it is

Table 8.1 Factors that determine the timing, number and types of presentations to healthcare providers following a biological or chemical terrorism event

1. Whether the event is covert or announced
2. The toxicity of the agent employed
3. The duration and magnitude of the exposure
4. The effectiveness of the delivery mechanism
5. The incubation period and duration of prodromal syndromes and illnesses caused by the agent
6. The duration of time it takes public health authorities to identify and characterize the threat
7. Effectiveness of public education and risk communication efforts
8. Individual behavioral and medical risk factors of those potentially exposed
   a. General health
   b. Concurrent medical illnesses
   c. Concurrent psychiatric illnesses
   d. Psychiatric predispositions
   e. Underlying degree of anxiety regarding terrorism threat
   f. Individual social supports and overall sense of community
   g. General sense of efficacy of and confidence in governmental and public health officials

Adapted with permission: Rundell & Christopher (2004).

for competent, credible public health authorities to provide the general public with timely, truthful, and accurate information. The degree of behavioral contagion possible in the context of a bioterrorism event is inversely associated with the efficacy of the public information campaign. Bioterrorism is a particularly challenging public health problem because of the different agents' latency periods and the large number of variables that can affect the number, nature, and severity of casualties. Figure 8.2 summarizes the phases of public understanding following a bioterrorism event that will drive the nature of presentations to healthcare providers and medical facilities.

Following a bioterrorism event, there will be an initial period during which patients present with prodromes and clinical illnesses that eventually become part of a pattern recognized and defined by public health officials. The duration of time before the epidemic is defined depends on the complexity of the presentations and how much warning there was, either through intelligence or announcement of the event by the perpetrators. For obvious reasons, there will be very little specific public fear or anxiety driving referrals to healthcare providers or facilities during the initial phases of a covert bioterrorism event. However, as the nature of the threat becomes defined and publicized, there will be a period of uncertainty that will increase public anxiety and fear, lowering individuals' thresholds for seeking medical attention for unexplained physical symptoms or physiological sensations. Fear and anxiety itself leads to autonomic arousal, which may cause people to experience signs and symptoms leading to medical referrals. This intermediate phase of uncertainty (Figure 8.2) is associated with the highest degree of public fear and anxiety. The risk of behavioral contagion overwhelming a healthcare system is greatest during this phase, and can be minimized by truthful, thoughtful, and reassuring information from governmental and public health authorities. As the illnesses attributable to the biological agent become defined, and risk communication to the general public has occurred, there is a third (consolidation) phase. As the illnesses caused by the agent decrease in frequency, and public knowledge about risks increases, public fear and anxiety decrease to more moderate and realistic levels. Multiple, serial, or ongoing bioterrorism events will result in overlapping curves of the graphs in Figures 8.1 and 8.2, which translate into the need for healthcare providers and systems to be as effective as possible with differential diagnosis and patient education.

The ATLS® primary and secondary surveys

Since 1980 the American College of Surgeons has taught Advanced Trauma Life Support®, an approach for providing care to people suffering major, life-threatening physical injury. The underlying concept of ATLS® is simple: the greatest threats to life are treated first – loss of airway, loss of breathing ability, loss of circulating blood volume,

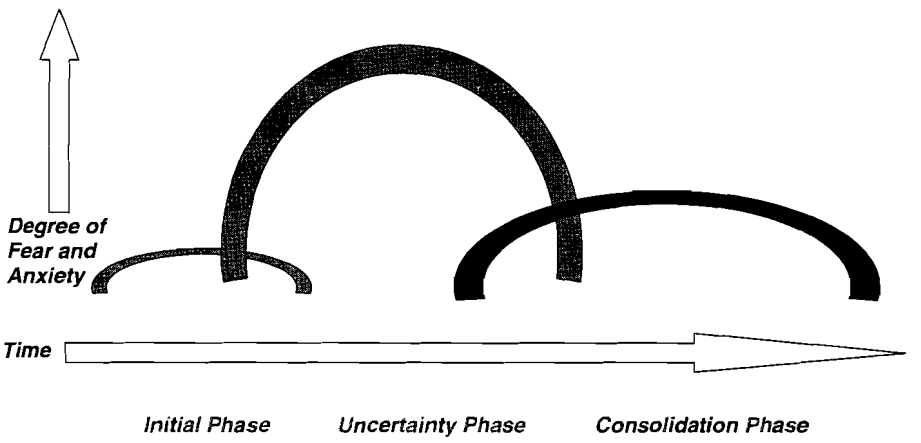


Figure 8.2 Phases of public understanding following a disaster or terrorism event that will drive nature of presentations to medical facilities. Adapted with permission from Rundell & Christopher (2004).

and effects of an expanding intracerebral mass (American College of Surgeons, 2004). ATLS® principles are sure to be applied when there are explosive injuries to large numbers of patients. The rapid, targeted examination of the patient necessary to identify these life-threatening injuries is called the "primary survey." The victim's airway is checked for obstruction, while taking care to protect the spine and spinal cord. Next, adequate air flow to the lungs is ensured, and provided to the patient by artificial means if needed. Next, blood circulation is assessed, points of hemorrhage addressed, fluids replaced, and cardiac compressions administered if indicated. A brief alertness assessment is made; the patient is described as alert/responsive to verbal stimuli, responsive to painful stimuli, or unresponsive. The more alert the patient, the more reassured the triager is that the individual is stable for the moment. The final step of the primary survey is to completely undress a patient and observe for obvious injury, taking care to prevent hypothermia.

Once the primary survey of a trauma victim is completed, resuscitative efforts are well established, and the patient has stable vital signs, the "secondary survey" is initiated. The secondary survey (American College of Surgeons, 2004) is a "head to toe" evaluation of the trauma patient – each region of the body is systematically examined. Available and relevant aspects of medical history are reviewed at this juncture as well: especially allergies, current medications, significant past illnesses, and events related to the injury.

The "tertiary" psychiatric survey: early identification of psychiatric casualties

There are many advantages if psychiatrists likely to participate in disaster or terrorism response have training, and ideally current certification, in ATLS® and Advanced Cardiac Life Support (ACLS) (American Heart Association, 2002). The history and physical examination findings collected during the primary and secondary surveys are the very data needed for the differential diagnosis of psychiatric symptoms in the medical-surgical and trauma settings. Psychiatrists who are skilled in or at least understand ATLS® and ACLS principles can be highly effective in the disaster or emergency room setting when the time comes to evaluate potential victims. First, they have credibility with medical-surgical colleagues because they speak the language inherent in ACLS and ATLS® algorithms and understand the concepts of clinical management defined by those two approaches. Credibility with disaster leaders is key to influencing their leadership behaviors (Bartone *et al.*, 1994). Second, they can apply the triage philosophies behind ATLS® and ACLS to the differential diagnosis of neuropsychiatric symptoms and to early identification of psychiatric disaster casualties.

A postdisaster or post-terrorism psychiatric screening examination to triage and identify early psychiatric casualties can be thought of as a "tertiary" survey that focuses on the most common psychiatric sequelae (Holloway *et al.*, 1997; Rundell & Ursano, 1996; Ursano & Rundell, 1994) and those most likely to adversely affect medical-surgical outcomes. There will be time for a more comprehensive mental health evaluation later, along with psychotherapy, medication evaluations, and debriefings when indicated. The screening psychiatric examination of the disaster, terrorism, or trauma victim is easy if the primary and secondary surveys are unremarkable. Psychiatric examination findings in that instance are likely to represent the warning signs of primary psychiatric disorders. However, when there are behavioral signs as well as significant primary and secondary survey findings, differential diagnosis can be difficult, and multiple disorders may be present. Table 8.2 summarizes key principles of psychiatric screening of medical-surgical disaster victims following primary and secondary surveys and medical stabilization.

The mental status examination in critically injured patients

Conducting a good mental status examination in a critically injured patient is a challenge, but it is indispensable for differential diagnosis. Following explosive and exposure events, many patients will have altered mental status examinations. First, note the patient's level of consciousness. Next, establish a method of communication. If the patient cannot communicate verbally, have him or her write answers on a tablet. Writing may show spatial disorientation, misspellings, inappropriate repetition of letters (perseveration), and linguistic errors. If a patient is unable to speak or write, use either an eye blink method of communication (one blink for yes, two blinks for no), or have the patient squeeze your finger with his or her hand (one squeeze for yes, two squeezes for no). Phrase questions to allow for a yes or no response (e.g., "are you feeling frightened?"). To determine whether a patient is confused, insert nonsense questions such as "Do catfish fly" or "Do beagles yodel?" (Wise & Rundell, 2005). If the patient looks surprised or amused and properly answers the question, a secondary psychiatric disorder (medical or toxic etiology) is less likely.

Medical-psychiatric differential diagnosis

Unique attributes of biological and chemical terrorist attacks

While there is ample recent evidence that natural disasters and explosive devices can cause considerable death and destruction, an incident of chemical or biological terrorism has the potential to generate tens of thousands of casualties requiring prompt medical attention. Chemical and biological terrorism

Table 8.2 Screening psychiatric examination of medical-surgical disaster casualties: the "tertiary" survey

Examination parameter	Finding increases likelihood of:
History	
Physical injuries during traumatic event	Secondary psychiatric disorder,[a] ASD,[b] PTSD, dissociation
Past history of psychiatric disorder	That psychiatric disorder
Patient is on routine, ongoing medication	Substance intoxication, substance withdrawal, secondary psychiatric disorder
Received ATLS® or ACLS medications	Secondary psychiatric disorder[a]
Physical findings	
Elevated heart rate, blood pressure	Substance withdrawal, generalized anxiety disorder, panic disorder ASD,[b] PTSD,[c] secondary psychiatric disorder[a]
Easy startle	ASD,[b] PTSD,[c] generalized anxiety disorder
Lateralizing neurological signs	Head or vertebral column injury, secondary psychiatric disorder[a]
Physical complaints out of proportion to objective findings	Conversion disorder, hypochondriasis, factitious disorder, malingering,[d] undiagnosed physical condition
Mental status examination	
Disoriented	Delirium, secondary psychiatric disorder[a]
Clouded consciousness	Delirium, secondary psychiatric disorder,[a] dissociation
Dysarthria	Substance intoxication, head injury
Dysgraphia, dyscalculia	Head injury, delirium
Impaired short-term memory	Head injury, substance intoxication, delirium, generalized anxiety disorder, panic attack
Hallucinations or delusions	Substance intoxication, secondary psychiatric disorder,[a] substance withdrawal, primary psychotic disorder

[a] Psychiatric disorders due to general medical conditions or due to toxins/psychoactive substances.
[b] Acute stress disorder.
[c] Post-traumatic stress disorder.
[d] Malingering is not a psychiatric disorder; it is a legal accusation.
Adapted with permission from Rundell (2003).

is of particular interest to mental health professionals because the news or rumor of a chemical or biological attack could also cause tens of thousands of people to fear they have been exposed who could rapidly overwhelm local medical resources. Biological and chemical warfare are not new. Since antiquity biological and chemical agents have been used to contaminate sources of water and food, or to cause uncontrollable diseases among populations (Christoper *et al.*, 1997). In recent years, the technical capabilities of those who would use biological or chemical agents of terror have surged (Franz *et al.*, 1997). Because of the potential impacts of large-scale exposure and psychological contagion, local- and national-level response effectiveness to chemical and biological potential threats depends as much or more on effective public education and public health efforts as on individual medical treatments. Because the signs and symptoms of chemical and biological attacks can be nonspecific and mimic neuropsychiatric syndromes, differential diagnosis by skilled clinicians is crucial to effectively triage large populations. In many cases the presence or absence of fever may be the only reliable early differentiator between those exposed to a biological agent and those not exposed but fearful they may have been.

When a patient presents to a health provider with signs or symptoms suggesting disease caused by a

chemical or biological agent, or fears he or she may have been exposed, a number of infectious diseases, psychiatric syndromes, or behavioral contagion issues may account for the presentation. There may be multiple simultaneous presentations; having an illness due to a biological agent does not exclude psychiatric disorders or fear/anxiety, it makes these behavioral manifestations more likely. In addition, patients with pre-existing medical or psychiatric illnesses are at risk for exaggerated responses to potential exposure, including idiosyncratic or unusual presentations. This is particularly true of the chronically and persistently mentally ill with severe psychiatric disorders, such as schizophrenia and bipolar disorder. Other predictors of having a maladaptive psychological response to the chemical and biological warfare or terrorist event environment include anticipatory anxiety, low perceived social support (especially when stress is high), lack of effective preparatory training, and fatigue (Fullerton *et al.*, 1996).

Table 8.3 summarizes the medical, psychiatric, and behavioral conditions important in the aftermath of a terrorist event related to possible biological or chemical agents. These will be discussed individually in the remainder of this section of the chapter.

Nerve agents

The nerve agents are derived from organophosphorus compounds related to insecticides such as diazinon and parathion. They can be very toxic; for example, 0.4 mg of agent VX or 0.8 mg of Soman can be lethal to humans (Jones, 1995). Other nerve agents, such as Sarin, can penetrate ordinary clothes with ease. Nerve agents in the liquid state can penetrate unbroken skin. Nerve agents are irreversible inhibitors of acetylcholinesterase, an enzyme present in the central nervous system, skeletal muscle, several endocrine glands, and other cholinergically innervated organs. Poisoning with these agents results in an inability to break down acetycholine, leading to a functional denervation state or subsensitivity of the postsynaptic receptor in response to overwhelming stimulation (Heath, 1961). Resulting symptoms include cholinergic signs such as lacrimation, salivation, nausea, hyperpnea, rhinorrhea, bronchoconstriction, vomiting, muscle twitching, progressive respiratory paralysis, and death. The usual cause of death is respiratory paralysis.

Nerve agents have the greatest potential among toxic agents for causing diagnostic confusion. Psychological findings may be more prevalent than physical findings, especially in early stages of exposure (DiGiovanni, 1999). Persistent long-term neuropsychiatric effects can be seen as well, including drowsiness, memory impairment, depression, fatigue, and increased irritability. These effects can last weeks to years after the exposure.

Acute treatment is atropine. As much as 10–40 mg of atropine may be necessary within 24 h, and atropinization is usually maintained for at least 24–48 h (Grob & Harvey, 1953). Treatment protocols also include pralidoxime (2-PAM chloride), which acts by removing bound agent from the enzyme, reactivating the enzyme. Atropine causes neuropsychiatric effects which may be worse than the nerve agent itself in some cases. Doses necessary for treatment may cause significant drowsiness, concentration disturbance, hyperactivity, hallucinations, and stupor or coma (DiGiovanni, 1999).

Time is of the essence in treating nerve agent poisoning, and symptoms should not be mistaken for anxiety or panic attacks. Key in the differential diagnosis is history of nerve agent use and presence of early cholinergic symptoms, such as lacrimation, salivation, and rhinorrhea. Poisoning with nerve agents at a sublethal level may cause or mimic psychiatric disturbances such as anxiety disorders, mood disorders, and delirium (Jones, 1995). Atropine itself can cause psychosis. These should not be treated with highly anticholinergic antipsychotic agents, as they may worsen the syndrome.

Cyanide

Cyanide is a nonpersistent gas, especially dangerous because it may saturate the active material in gas masks, rendering them useless (Jones, 1995).

Table 8.3 Medical-psychiatric differential diagnosis of patients in the aftermath of a chemical or biological terrorism event

	Latency to initial prodrome	Time to onset of full illness	Time for lab to identify specimen or agent	Key elements of prodrome or mild exposure	Key elements of illness	Treatment	Comments
Nerve agents	Minutes to hours	Minutes to hours	Rapid presumptive ID can be made in field	Lacrimation, salivation, nausea, hyperpnea, rhinorrhea, broncho-constriction, vomiting	Progressive respiratory paralysis, muscle twitching, and death	Atropine, pralidoxime	Avoid anticholinergic antipsychotics if treating anticholinergic psychosis due to atropine
Cyanide	Minutes to hours	Minutes to hours	No rapid lab diagnosis	Anxiety, confusion, giddiness, and hyperventilation	Anxiety, confusion, giddiness, and hyperventilation	Symptomatic	Exposure symptoms are difficult to distinguish from situational anxiety
Incapacitating agents	Instant	Instant	No lab diagnosis	Lacrimation, pain	Lacrimation, pain	Symptomatic	May be confused with nerve agent exposure; avoid premature atropine use
Mustard	Several hours	Several hours	Rapid presumptive ID can be made in field	Conjunctivitis	Higher doses burn the eyes and cause blindness, pulmonary injury if inhaled, and disfiguring facial and other skin	Symptomatic and supportive	Conjunctivitis and blindness can be permanent or last for several days or weeks
Cutaneous anthrax	2–5 days	2–5 days	1–2 days	Pruritic macules or papules	Ulcerated lesions turning into eschars	Doxycycline Penicillin Ciprofloxacin	
Inhalation anthrax	1–5 days	2–60 days	1–2 days	Malaise, fatigue, cough, headache, vomiting, fever	Hemorrhage, edema, dyspnea, stridor,	Ciprofloxacin or Doxycycline plus one or	Key differentiating feature between prodrome and depressive disorders or

					diaphoresis, cyanosis.	two additional agents	hypochondriacal concern is presence or absence of fever
Smallpox	12–14 days	13–15 days	Days–weeks	Fever, malaise, prostration, headache, backache	Maculopapular rash in mouth, pharynx, face, and forearms – spreads to trunk and legs, progresses through vesicles, pustules, and scabs	Postexposure vaccination; supportive care (cidofovir, effective in vitro)	Key differentiating feature between prodrome and depressive disorders or hypochondriacal concern is presence or absence of fever. Vaccine as postexposure prophylaxis
Tularemia	3–5 days	Days–weeks	2–10 days	Fever, chills, headache, bodyache	Pneumonitis, pharyngitis, bronchiolitis, lymphadenopathy	Streptomycin, gentamicin, doxycycline, ciprofloxacin	Key differentiating feature between prodrome and depressive disorders or hypochondriacal concern is presence or absence of fever and chills
Plague	×1–6 days	3–10 days	1–2 days	Fever, cough, chest pain, hemoptysis	Pneumonia, progressing to septic shock	Streptomycin, gentamicin, tetracycline	Droplet isolation pending negative cultures, postexposure prophylaxis
Botulism	1–3 days	1–3 days	3–5 days	Diplopia, dysphonia, dysarthria	Descending flaccid paralysis with bulbar signs and autonomic dysfunction	Antitoxin, supportive care	Key differentiating feature between prodrome and anxiety disorders or hypochondriacal concerns is presence or absence of viscous secretions, especially in throat
Delirium	Variable	Variable	No lab diagnosis	Confusion, insomnia, restlessness, irritability	Short-term memory deficit, disorientation, disorganized thinking, sleep-wake cycle disturbance, visual hallucinations, hypoactivity or hyperactivity	Symptomatic management with sedating or antipsychotic medication; remove etiology	Medications used in resuscitation or life support may cause delirium

Table 8.3 (cont.)

	Latency to initial prodrome	Time to onset of full illness	Time for lab to identify specimen or agent	Key elements of prodrome or mild exposure	Key elements of illness	Treatment	Comments
Depression and mood disorders	Variable	Variable	No lab diagnosis	Malaise, lassitude, dysphoria, low energy	Two or more weeks: sleep disturbance, loss of interest and pleasure, depressed mood, low energy, low concentration, appetite disturbance, psychomotor disturbance, guilt, suicidality	Antidepressant medications Cognitive-behavioral psychotherapy	Depressed mood or resignation in the aftermath of bioterrorism or other traumatic event may be difficult to distinguish from the malaise and lassitude common among the prodromes of infectious diseases. Look for presence of fever as a discriminator
Acute stress disorder (ASD)	1–2 days	2–28 days	No lab diagnosis	Sleep disturbance, arousal, anxiety, dissociation	Dissociation, re-experiencing phenomena, avoidance of associated stimuli, increased arousal, disrupted social/ occupational functioning	Antidepressant medication Psychotherapy	Not everyone who has re-experiencing and arousal goes on to develop ASD – focus on social and occupational functioning to guide diagnosis
Post-traumatic stress disorder (PTSD)	2–28 days	>30 days	No lab diagnosis	ASD or arousal, anxiety, or dissociation	Dissociation, re-experiencing phenomena, avoidance of associated stimuli, increased arousal, disrupted social/ occupational functioning	Antidepressant medication Psychotherapy	Half of patients with ASD go on to develop PTSD

Generalized anxiety disorder (GAD)	Variable	Variable	No lab diagnosis	Worry, restlessness, fatigue, irritability	Incessant worry, restlessness, fatigue, autonomic arousal, irritability, muscle tension, sleep disturbance	Benzodiazepine or antidepressant medication Cognitive psychotherapy	Look for mucous secretions to help differentiate botulism prodrome from GAD. Situational anxiety is differentiated from GAD by degree of worry and impact on social and occupational functioning
Panic disorder	Variable	Variable	No lab diagnosis	No prodrome	Recurrent attacks characterized by massive autonomic discharge for several minutes, followed by worry and behavior changes related to attack	Antidepressant or benzodiazepine medication Cognitive and behavioral psychotherapy techniques	
Hypochondriasis	Variable	Chronic disorder	No lab diagnosis	No prodrome	Fear and belief that one has a disease, based on misinterpretation of body symptoms. Reassurance exceedingly difficult	Reassurance, high tolerance for patients' requests for appointments and examinations	Six full months of symptoms necessary to make diagnosis. Mild hypochondriacal concerns may be common among general population following disasters or terrorist events
Conversion symptoms	Variable	Variable	No lab diagnosis	Variable	Physical symptoms without medical basis or etiology	Sometimes suggestive; reassurance, education	Prevention enhanced by effective training in prevention of exposure to chemical/biological agent
Dissociative disorder	Variable	Variable	No lab diagnosis	No prodrome	Depersonalization or environmental perception disturbance that is persistent or recurrent, and results in a feeling of detachment or unreality. Must cause social/occupational dysfunction	Psychotherapy	Dissociative disorder can resemble organic or traumatic central nervous system disorders (e.g., consequences of head trauma)

Table 8.3 (cont.)

	Latency to initial prodrome	Time to onset of full illness	Time for lab to identify specimen or agent	Key elements of prodrome or mild exposure	Key elements of illness	Treatment	Comments
Situational dissociation	Variable	Variable	No lab diagnosis	No prodrome	Depersonalization or derealization in the context of a traumatic event not rising to threshold of dissociative disorder	Do not overstimulate. May be a normal, expectable response	Can be confused with neuropsychiatric disorder secondary to disaster or terrorist event, especially head trauma or smoke inhalation. Important to recognize, and manage conservatively
Situational anxiety	Variable	Variable	No lab diagnosis	No prodrome	Worry, insomnia, restlessness, fatigue, irritability, autonomic signs	Benzodiazepine medication (short-term) Behavioral and cognitive therapies	Unrecognized anxiety symptoms can resemble prodrome of botulism and be an adverse effect of medications used in disaster/mass violence settings
Substance-related disorders	Variable	Variable	Alcohol and drug screens can take minutes to hours	Intoxication seconds to minutes. Withdrawal hours to days	Toxicity state depends on substance. Withdrawal/ abstinence states characterized by autonomic hyperactivity	Supportive management for toxicity states; standard algorithms exist for managing withdrawal states	Toxicity and withdrawal states can mimic effects of chemical/ biological agents, metabolic derangements, and medications used to treat medical-surgical conditions in the disaster/ terrorism setting

Early symptoms of cyanide exposure are anxiety, confusion, giddiness, and hyperventilation. These symptoms are difficult to distinguish from situational anxiety, sure to be common in the disaster or terror setting.

Incapacitating agents

Tear gas has long been used as a harassing agent, as it is rarely lethal. It is intended to cause temporary unconsciousness or immobilization. Tear gas may produce inappropriate responses by mimicking the early symptoms of more lethal agents. For example, tear gas effects may be confused with lacrimation produced by nerve gases and lead to inappropriate treatment with anticholinergic medication.

Blister agents

Mustard gas is insidious and several hours may pass before characteristic burns and blisters appear. Low doses of mustard produce painful conjunctivitis, and are disabling and anxiety-producing. Higher doses burn the eyes and cause blindness, pulmonary injury if inhaled, and disfiguring facial and other skin burns (Jones, 1995). Blister agents such as mustard and Lewisite have been reported to produce long-term psychological symptoms such as apathy and depression (Grinstad, 1964). Acutely, blister agents can also cause delirium, and psychological distress resulting from the disfiguring lesions, most commonly in the face and genitalia (DiGiovanni, 1999).

Cutaneous anthrax

Cutaneous anthrax occurs when spores of *Bacillus anthracis* are introduced into superficial, and often unapparent cuts or abrasions. After a brief incubation period of a few days, a small pruritic macule will develop. This lesion will evolve into a round ulcer, with a black, depressed, painless eschar that will dry and fall off within 2 weeks. Cutaneous anthrax carries a very narrow differential diagnosis, possibly including spider bites (Franz *et al.*, 1997; Inglesby *et al.*, 2000).

Inhalation anthrax

Inhalation anthrax results when aerosolized spore-bearing particles of 1–5 μm are deposited into the alveoli. Macrophages phagocytize the spores, which resist intracellular lysis due to the presence of a protective capsule. Surviving spores are transported to mediastinal lymph nodes, where germination occurs 2–60 days later. Once germination occurs, disease follows rapidly. Replicating bacteria release toxins leading to mediastinal hemorrhage, edema and necrosis, followed by bacteremia and sepsis. Inhalation anthrax features a nonspecific prodrome of malaise, fatigue, myalgia, headache, abdominal pain, nausea, vomiting, dry cough, chest tightness, and fever (Franz *et al.*, 1997; Henderson *et al.*, 1999). There may be a brief 2- to 3-day period of improvement, followed by an abrupt onset of severe respiratory distress with dyspnea, stridor, diaphoresis, and cyanosis (Franz *et al.*, 1997). Septic shock portends death within 24–36 h. During the 1979 Sverdlovsk anthrax epidemic, there were reportedly only 2 patients with cutaneous lesions among 77 cases of inhalation anthrax (Meselson *et al.*, 1994), and no cutaneous lesions reported among the 42 patients who underwent autopsy (Abramova *et al.*, 1993). Preliminary diagnosis may be made via culture within 6–24 h. Laboratory confirmation requires an additional 1–2 days of testing in laboratories with additional technical capability (Papaparaskevas *et al.*, 2004). Recommended therapy for inhalation anthrax utilizes combinations of two or three parenteral antibiotics, to include either ciprofloxacin or doxycycline (CDC, 2001b). Early treatment is important to prevent progression to septic shock, meningitis, and death.

Smallpox

A global campaign, begun in 1967 under the auspices of the World Health Organization, succeeded in eradicating smallpox in 1977. In 1980, vaccination of the general population ceased worldwide. The terrorist reintroduction of smallpox would be an unprecedented public health catastrophe, due to the lack of herd immunity, the virulence and contagiousness of the organism, and a relatively long incubation period

Table 8.3 (cont.)

	Latency to initial prodrome	Time to onset of full illness	Time for lab to identify specimen or agent	Key elements of prodrome or mild exposure	Key elements of illness	Treatment	Comments
Situational dissociation	Variable	Variable	No lab diagnosis	No prodrome	Depersonalization or derealization in the context of a traumatic event not rising to threshold of dissociative disorder	Do not overstimulate. May be a normal, expectable response	Can be confused with neuropsychiatric disorder secondary to disaster or terrorist event, especially head trauma or smoke inhalation. Important to recognize, and manage conservatively
Situational anxiety	Variable	Variable	No lab diagnosis	No prodrome	Worry, insomnia, restlessness, fatigue, irritability, autonomic signs	Benzodiazepine medication (short-term) Behavioral and cognitive therapies	Unrecognized anxiety symptoms can resemble prodrome of botulism and be an adverse effect of medications used in disaster/mass violence settings
Substance-related disorders	Variable	Variable	Alcohol and drug screens can take minutes to hours	Intoxication seconds to minutes. Withdrawal hours to days	Toxicity state depends on substance. Withdrawal/ abstinence states characterized by autonomic hyperactivity	Supportive management for toxicity states; standard algorithms exist for managing withdrawal states	Toxicity and withdrawal states can mimic effects of chemical/ biological agents, metabolic derangements, and medications used to treat medical-surgical conditions in the disaster/ terrorism setting

Early symptoms of cyanide exposure are anxiety, confusion, giddiness, and hyperventilation. These symptoms are difficult to distinguish from situational anxiety, sure to be common in the disaster or terror setting.

Incapacitating agents

Tear gas has long been used as a harassing agent, as it is rarely lethal. It is intended to cause temporary unconsciousness or immobilization. Tear gas may produce inappropriate responses by mimicking the early symptoms of more lethal agents. For example, tear gas effects may be confused with lacrimation produced by nerve gases and lead to inappropriate treatment with anticholinergic medication.

Blister agents

Mustard gas is insidious and several hours may pass before characteristic burns and blisters appear. Low doses of mustard produce painful conjunctivitis, and are disabling and anxiety-producing. Higher doses burn the eyes and cause blindness, pulmonary injury if inhaled, and disfiguring facial and other skin burns (Jones, 1995). Blister agents such as mustard and Lewisite have been reported to produce long-term psychological symptoms such as apathy and depression (Grinstad, 1964). Acutely, blister agents can also cause delirium, and psychological distress resulting from the disfiguring lesions, most commonly in the face and genitalia (DiGiovanni, 1999).

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of 7–17 days. Each index case may produce as many as 10–20 second-generation cases, raising human rights and public panic issues associated with the inevitable need for isolation or quarantine of potentially exposed populations. Postexposure vaccination within 4 days of exposure has been shown to reduce morbidity and mortality, and to potentially prevent disease (Fenner, 1988). Postexposure vaccination would be indicated for those potentially exposed during the initial release, healthcare providers treating cases, and other contacts of cases (CDC, 2001c). At this time, the mainstay of therapy of cases would be supportive care by vaccinated caregivers. Patients must be isolated, and contacts must be placed under epidemiologic surveillance (Franz *et al.*, 1997; Henderson *et al.*, 1999). In some cases quarantine will be necessary, for example when there is uncontrolled contagion or where individuals are uncooperative with isolation and surveillance procedures.

Tularemia

Francisella tularensis has long been considered a potential biological weapon. In 1969, a World Health Organization committee estimated that an aerosol dispersal of 50 kg of virulent *F. tularensis* over a metropolitan area with 500 000 people would result in 125 000 cases, including 30 000 deaths (World Health Organization, 1970). Within 3–5 days of exposure, pneumonic tularemia will begin with an acute and nonspecific febrile prodrome with chills, headache, and bodyache. Within days to weeks, a pneumonitis, pharyngitis, or bronchiolitis, possibly with hilar or mediastinal lymphadenopathy, or a prolonged typhoidal illness would follow (Dennis *et al.*, 2001; Franz *et al.*, 1997). The presence of the febrile prodrome is key to differentiating tularemia from any psychiatric conditions.

Plague

Plague, caused by *Yersinia pestis*, occurs naturally in bubonic and pneumonic forms. An aerosolized plague weapon could cause pneumonic plague, with fever, cough, chest pain, and hemoptysis due to severe pneumonia 1–6 days after exposure. Rapid evolution of disease would occur during the first 2–4 days of illness, with septic shock with high mortality without early treatment (Butler, 1995; Perry & Fetherston, 1997). There are no widely available rapid diagnostic tests for plague. Since the diagnosis may be missed with laboratory methods, case reports will be a primary source of information for public health authorities and clinicians. Prompt treatment is essential. Plague is an internationally quarantinable disease (Franz *et al.*, 1997; Inglesby *et al.*, 2000).

Botulism

Clostridium botulinum is a spore-forming, obligate anaerobe that produces botulinum toxin. Botulinum toxin binds to the neuronal cell membrane at the nerve terminus and enters the neuron by endocytosis. The toxin cleaves specific sites on neuronal proteins, preventing complete assembly of synaptic fusion complexes and thereby blocking acetylcholine release. The absence of acetylcholine results in neuromuscular paralysis and autonomic dysfunction, producing the signs of botulism. An aerosolized or foodborne botulinum weapon would cause acute, symmetric, descending flaccid paralysis with prominent bulbar palsies, manifested 12–72 h after exposure as diplopia, dysarthria, dysphonia, and dysphagia (Arnon *et al.*, 2001). Autonomic complications may include dry mouth, ileus, and urinary retention. Patients who may fear they have been exposed, but haven't, could report similar symptoms due to anxiety and worry. By the second day of clinical illness, however, difficulty moving eyes, indistinct speech, unsteady gait, and extreme weakness will leave little doubt as to the presence of a severe neurological disturbance.

Delirium

In the disaster or terrorism victim with major illness or injuries due to explosive devices, volume depletion and metabolic derangements can cause delirium: clouded consciousness, agitation or diminished responsiveness, and disorientation (American Psychiatric Association, 2000). A prodrome of confusion,

restlessness, irritability and insomnia may portend a full syndrome which includes short-term memory deficit, distractibility, difficulty abstracting, disorganized thinking, dysarthria, reduced comprehension, illusions, visual hallucinations, sleep-wake cycle disturbance ("sundowning"), and either hypoactivity or hyperactivity. While medication treatment of the delirious patient can help decrease agitation and mitigate a safety problem, this is not the ideal management. The medications used to manage agitation can further complicate both medical assessment and an already difficult clinical course. Onset of signs and symptoms can occur within hours of exposure to the offending agent. Symptomatic management of the patient's behavioral problems with sedating medication should be initially reserved to protect the life or safety of the patient and other patients or staff. Resolution of the delirium itself should be the primary goal, and requires resolving the metabolic sequelae of the injury. Common causes of delirium in disaster settings include hypovolemia, hypoxemia, central nervous system mass effect, infection, and adverse effects of ATLS® and ACLS medications.

Depression

Depressed mood or resignation in the aftermath of a disaster or terrorist event may be difficult to distinguish from the malaise and lassitude common among the prodromes of many chemical and bioterrorism exposures (Table 8.3). When depressed mood and associated depressive symptoms disrupt social and occupational functioning, major depressive disorder is diagnosed. Antidepressant medications and cognitive-behavioral psychotherapy are the mainstays of treatment for major depressive disorder, and may assist with managing subsyndromal depression.

Acute stress disorder and post-traumatic stress disorder

There can be a substantial burden of acute stress disorder (ASD), acute post-traumatic stress disorder (PTSD) and depression following a major terrorist event. Among 1008 adults interviewed in New York City between 1 and 2 months after the attacks on the World Trade Center, 7.5% reported symptoms consistent with a diagnosis of current PTSD and 9.7% reported symptoms consistent with current depression (Galea *et al.*, 2002). ASD and PTSD do not occur in vacuums. When one of these disorders exists, it is highly probable that other psychiatric conditions exist as well, especially major depressive disorder, panic disorder, substance use disorder, and generalized anxiety disorder (Ursano *et al.*, 1995). Having a physical injury increases the risk of ASD and PTSD. Treatment involves antidepressant medication and psychotherapy.

Generalized anxiety disorder

Excessive anxiety plus apprehensive expectations about events or activities (American Psychiatric Association, 2000) characterize generalized anxiety disorder (GAD). A patient's incessant worry is difficult to control and commonly evokes restlessness, fatigue, irritability, muscle tension, and sleep disturbance. Motor tension is prominent, and may include trembling and twitching. Treatment is with benzodiazepine medications, antidepressant medications, beta-blockers, and/or cognitive psychotherapy.

Panic disorder

Panic disorder (American Psychiatric Association, 2000) entails recurrent, unexpected panic attacks followed by worry, concern, and behavior changes related to the attacks. The attacks are not due to a general medical condition or the direct effects of a substance. Panic attacks are characterized by massive autonomic discharge for several minutes. Treatment is with antidepressant medication, benzodiazepines, and/or psychotherapy (behavioral, relaxation, and cognitive).

Hypochondriasis

Hypochondriasis is the fear or belief that one has a serious disease based on the misinterpretation

of bodily symptoms. Anxiety and fear about the disease persist despite normal medical evaluations and reassurance (American Psychiatric Association, 2000). In the generally anxious atmosphere and uncertainty following disasters and terrorist events, patients with hypochondriasis may have particular problems managing their anxiety and beliefs, and people without a history of hypochondriasis may present with it for the first time. There is bodily preoccupation and vigilance regarding body sensations. Concern about the feared illness is a central feature of the individual's self-image, and a topic of social discourses. Because of the generally increased anxiety following a stressful event, six full months of symptoms are required before making this diagnosis. Hypochondriasis is a chronic condition with a poor prognosis. Subsyndromal hypochondriacal fears, on the other hand, may be widespread among the general population following a bioterrorist event, and should be managed with reassurance and a degree of tolerance for patients' requests for appointments and examinations by their primary care providers.

Unexplained physical symptoms and conversion symptoms

Unexplained physical symptoms are common after terrorism and war. Not all unexplained physical symptoms are conversion symptoms, though conversion is well documented anecdotally after terrorist and combat events. Unfortunately, there is at present little scientific basis for future prevention and care of unexplained physical symptoms (Clauw *et al.*, 2003). However, it is important that persons with unexplained symptoms be identified in the triage process so that inappropriate and potentially harmful treatments are not conducted that could also draw resources away from victims needing them.

Use of biological or chemical agents presents a challenging differential diagnosis and contagion problem. People may not be easily talked out of the notion they have been exposed, even in the face of information certifying their risk to be nonexistent or exceedingly low (Stuart *et al.*, 2003). During World War I "gas hysteria" was common and threatened the integrity of entire military units (Miller, 1944). Psychological casualties in chemical and biological threat scenarios may outnumber and prove more costly in personnel losses than physical casualties, as occurred in World War I (Cadigan, 1982). Acute symptoms of gas hysteria often mimicked some of the symptoms of gas poisoning (dyspnea, coughing, aphonia, burning of the skin). The degree of exact exposure was unrelated to the symptoms presented. Patients frequently presented with air hunger and other symptoms consistent with anxiety and panic. Factors that predispose to psychiatric casualties related to psychological contagion include rates of wounding/exposure in the unit, lack of sleep, and lack of prior experience with these phenomena/attacks (Jones, 1995).

Dissociative disorders

The essential feature of dissociative disorders is a disruption in the usually integrated functions of consciousness, memory, identity, or perception of the environment. The onset may be sudden, gradual, transient, or chronic (American Psychiatric Association, 2000). There are several subtypes of dissociative disorder, including amnesia, fugue, depersonalization, and derealization. The centerpiece of the diagnosis, to discriminate it from situational dissociation, is the presence of significant distress, or significant disruption in social or occupational functioning. People who have been exposed to traumatic events are at increased risk for developing dissociative disorder. Differential diagnosis of head injury and dissociation is one of the most important roles of psychiatrists participating in large-scale triage operations following explosive terrorist events.

Situational dissociation

Dissociation which falls short of diagnostic criteria for dissociative disorder is common in the context of any traumatic or terrorist event. Dissociation is generally under-recognized in the immediate aftermath of a traumatic event or terrorist event. Among

the USS Cole casualties evacuated to Landstuhl Regional Medical Center in October 2000, dissociation was the most common behavioral response observed (author, personal communication). There was a fatal train crash in Silver Spring, Maryland, in February 1996, and the author lived nearby and was a first responder. At least 4 of the first 12 initial casualties brought to a hastily arranged medical triage area initially labeled as "urgent" casualties because of apparent unresponsiveness were later found to simply be dissociating. Their misidentification as potential head injury patients resulted in misdirected rescue resources early in a mass casualty situation with heavy demands on local rescue resources.

Dissociation may be adaptive in the immediate aftermath of a trauma – dissociating may prevent the eruption of intolerable affects or the unleashing of potentially dangerous impulses or behaviors (e.g., to flee the scene). It is easy to confuse dissociation and diminished neurological responsiveness. A key role of a psychiatrist in the immediate aftermath of a disaster, while primary and secondary surveys are occurring, can be to help identify dissociation. Gently tap the patient on the shoulder and ask if there is anything they need and do they know where they are/what day it is. Watch for a muted but appropriate response in a dissociating person; this indicates his or her level of consciousness and orientation is grossly intact. Identifying otherwise uninjured disaster victims who are simply dissociating frees up scarce evaluation and treatment resources for other emergency patients. If dissociation subsequently becomes frequent, ongoing, and disabling, it may then be formally diagnosed as a psychiatric disorder – dissociative disorder. Serial examinations of the patient can help differentiate adaptive dissociation from dissociative disorder.

Situational anxiety and worry

Sometimes anxiety associated with potential exposure to bioterrorism agents and worry that one might have been exposed can cause troublesome anxiety symptoms that cause disruption of normal functioning and can complicate the overall differential diagnosis. While not rising to the threshold for diagnosis of an anxiety disorder per se, the anxiety signs and symptoms can be managed to the benefit of the patient. A number of techniques and interventions are employed, including relaxation techniques, systematic desensitization, biofeedback, meditation, and short-term use of anti-anxiety or antidepressant medications. Behavior and cognitive psychotherapies provide an opportunity for reduction of acute anxiety, enhancement of the patient's sense of mastery, and clarification of measurable goals. Israeli studies on how terrorist victims and their families cope in the early post-terrorism period is instructive; the most prevalent coping mechanisms are active information search about loved ones and seeking out social support (Bleich *et al.*, 2003).

Substance use disorders

Following a disaster or terrorism event, people may increase their use of alcohol or drugs as a way to decrease the acute despair or anxiety associated with the event. The substance use can then evolve into a problematic condition in its own right and should be screened for. Rescue and healthcare workers are at risk because of the types of scenes they may be participating in and exposed to. Disaster response leaders must educate and model for their workers the avoidance of alcohol and drugs during the disaster management period and its aftermath. Patients who have substance-related disorders may present at a triage or patient management area intoxicated or in withdrawal. Either can be confused with toxicities associated with chemical agents, biological agents, metabolic derangements, or medications used to treat patients' medical-surgical conditions.

Effects of disaster medications

A mainstay of managing patients under ATLS® and ACLS paradigms is medication, many of which can cause neuropsychiatric or autonomic symptoms. It is important to find out what medications an injured patient has received, in what amounts, and over

what time period. Agents such as intravenous fluids (water), epinephrine, lidocaine, atropine, sedatives, nitroglycerin, and morphine are commonly used and have significant psychiatric or autonomic effects. These can resemble primary psychiatric disorders. For example, atropine causes significant anxiety and anticholinergic effects. Epinephrine causes blood pressure and heart rate elevations, and causes patients to feel anxious or panicky. Morphine causes sedation and impairs orientation and responsiveness.

It is also important to know what substances a patient has *not* been exposed to. Following a faked chemical or biological agent threat, there may be a large number of individuals who fear they have been exposed and will present with realistic symptoms based on their knowledge of the alleged agent and vital sign abnormalities produced by anxiety/fear (Fullerton *et al.*, 1996). To minimize the effects of mass hysteria, disaster leaders need accurate information from investigating authorities, as soon as it can be provided, along with a preplanned public information campaign.

Effective medical-psychiatric differential diagnosis

Initial presentation of patients in the emergency department or triage setting

A terrorist attack is psychological warfare, intended to disrupt normal societal and individual functioning. Following a terrorist attack, whether explosive, chemical, or biological, there will be patients, exposed and not exposed, who will have anxiety, tachycardia, tachypnea, shakiness, and other autonomic signs and symptoms that could be due to a toxic agent or to anxiety or fear associated with the incident. When there are not pathognomonic signs of a toxic agent, or when differential assessment is not conducted, patients may receive inappropriate treatments that could worsen their condition, or have a delay in appropriate treatment. Psychiatrists assisting with a focused mental status examination and a brief history can help identify patients who do not need medical-surgical treatments (e.g., atropine), help differentiate dissociation from delirium, and help identify patients who have mental status findings consistent with delirium instead of anxiety. Psychiatrists can also conduct brief interventions with individuals convinced they have been exposed to a toxic or biological agent but who are judged by disaster managers to be at no or extremely low risk (Stuart *et al.*, 2003; Ursano *et al.*, 2003, 2004).

Key elements in the differential diagnosis

When triage and evaluation occur for people who have potentially been exposed to a chemical or bioterrorism agent, including behavioral and psychiatric considerations in the medical differential diagnosis increases the efficacy of overall management. This is particularly important because behavioral responses to bioterrorism may exceed in number and magnitude the medical and surgical consequences. In addition, the signs of psychiatric illness and behavioral contagion can overlap with medical signs of injury, toxicity or infection. Table 8.3 summarizes the medical-psychiatric differential diagnosis of history and examination findings that may present in patients coming in for healthcare in the aftermath of a bioterrorism event. There are three critically important elements that point the examiner in the direction of a higher likelihood of underlying psychiatric disorder: past history of similar psychiatric symptoms/diagnosis, family history of similar psychiatric symptoms/diagnosis, and having a clinical presentation which is more consistent with a psychiatric disorder than with the feared injury, chemical exposure, or infectious disease.

There is a need for research on gender- and age-related differences in the aftermath of terrorist, combat, or disaster events. Data from Operation Enduring Freedom and Operation Iraqi Freedom patients seen at Landstuhl Regional Medical Center, where women are serving in danger settings in unprecedented numbers, suggest that there are gender differences in types of injuries and return to duty rates (Rundell & Baine, 2002). For children, there is a need for appropriate management protocols

unique to different age groups of children, tailored to their specific needs and abilities (Committee on Environmental Health and Committee on Infectious Diseases, 2000).

Effective community prevention and response to disasters and terrorist attacks as tools to mitigate psychiatric casualties

Government and organizational responses may play an important role in limiting psychological contagion and may help to lessen overburdening of the healthcare system after a terrorist event or disaster. A well-designed, well-coordinated and rehearsed community management strategy based on empirical evidence will do much to reduce public anxiety and increase the confidence of healthcare workers (Alexander & Klein, 2003; CDC, 2000; Everly & Mitchell, 2001; Stern, 1999; Tucker, 1997). There are mass trauma casualty predictors which can help leaders in planning community responses (CDC, 2003b). Communities must work together to coordinate the disaster response so that triage systems are consistent, clear, simple, and implementable in a short period of time (Ihlenfeld, 2003; Nocera & Garner, 1999). After a terrorist attack or disaster, communicating health information to an alarmed public is crucial to limiting psychological contagion; effective use of the internet for risk communication will be increasingly important (Hobbs *et al.*, 2004).

Training and confidence in containment procedures may be important factors in limiting psychological contagion and unexplained physical symptoms. Military experience is that the risk of psychiatric casualties such as conversion disorder is lessened when potentially exposed personnel receive good training to allow them to feel confident in their odds of survival in the chemical or biological threat scenario (Marshall, 1979). In addition to training, there is focus on vaccinating groups at highest risk of coming into contact with biological agents or with persons exposed to them, including healthcare workers (CDC, 2002, 2003a; Wharton *et al.*, 2003). Hospitals are being urged to update their infection control procedures to increase responders' confidence that the level of risk can be managed for aerosolized biological threat agents (Keim & Kaufmann, 1999).

Clinical issues in medical-surgical disaster/terrorism casualties

Clinical treatments that aim to prevent psychiatric sequelae

It is natural and proper that mental health professionals strive to prevent long-term psychiatric sequelae of exposure to traumatic events by intervening early. Unfortunately, some well-intentioned attempts prove in the end to be either not beneficial or even potentially harmful for some people (Wessely *et al.*, 1999). There are, however, anecdotal and case series that describe potentially effective interventions for well-defined groups of people (Benedek *et al.*, 2002; Bryant *et al.*, 1999; Cloak & Edwards, 2004; Holloway *et al.*, 1997; Yori, 2002). Evidence-based approaches exist to treat patients with identified psychiatric disorders. This makes psychiatric triage and case identification important in the early post-terrorism management scenario. The efficacy of group interventions aimed at preventing later sequelae needs further research.

Burns patients

During the first 24–72 h after a severe burn, there is typically a brief period of initial lucidity, during which patients usually are told their prognosis. After that, between 30% and 70% of hospitalized severe burns patients develop delirium, presumably caused by biologic stress and burn-induced metabolic disturbances (Rundell & Wise, 2000). Watch closely for substance withdrawal syndromes; unfortunately, the time courses for most withdrawal syndromes coincide with the critical periods of burns patients' medical courses. Substance withdrawal can greatly complicate medical care if not managed early and aggressively.

Strongly consider the possibility of a medically induced secondary mood syndrome when burns patients appear depressed (Raison *et al.*, 2002). Burns patients lose water at a rate several times faster than normal; hypovolemic shock is common. Following the shock phase is a period of intense catabolism and negative nitrogen balance. The usual anorexia, weight loss, exhaustion, and lassitude of this period may lead unsuspecting clinicians to diagnose primary depression.

Pain is a continuing and critical issue for burns patients; it becomes especially important during dressing changes and debridement. Narcotics are the drugs of choice for treating acute burn pains – this is not the time to worry about addiction. Dressing changes often require pre-emptive analgesia.

Agitated patients

Patients who are agitated in the emergency or triage setting can present the potential for considerable harm to self, to others, and to the effectiveness of the medical management scenario. Clinicians must balance patients' rights, rights of others to be treated or work safely, the potential for complicating an already uncertain diagnostic situation by adding another medication, the patient's degree of suffering, and the potential for drug/drug or chemical agent/drug interactions when deciding whether to control a patient's agitation with medication in the disaster or terrorism setting.

A recently developed algorithm for treating patients who present to the Emergency Department with acute psychotic agitation and require control for safety is potentially helpful in the postdisaster or post-terrorism setting since it focuses on medications less likely than in previous years to worsen or complicate the mental status examination. The algorithm was developed by experts in Emergency Medicine and Psychiatry from a number of academic centers (Currier *et al.*, 2004). An agitated patient must first of all be assessed for potentially reversible causes of agitation, using vital signs, physical examination, finger-stick glucose, history, and if indicated drug and alcohol screens, and a screen for suspected agents of exposure. If patients cannot be reassured and remain uncooperative and a risk to self or others, chemical restraint is appropriate. If the patient can take oral medication, oral risperidone (2 mg), oral lorazepam (2 mg), or orally disintegrating olanzapine (5–10 mg) are first line. Often risperidone and lorazepam are given together. If oral medications are not appropriate because the patient is uncooperative or not fully alert, the first-line parenteral medication is ziprasidone 20 mg intramuscularly, supplemented as needed with lorazepam 20 mg intramuscularly. Intramuscular or intravenous haloperidol is considered second line in these scenarios because of the higher risk for extrapyramidal symptoms, potentially disabling and confusing in the bioterrorism or chemical terrorism settings.

Losses of body parts and functions

The larger the disaster or terrorist event, the higher the probability that medical-surgical needs will outstrip available resources, particularly in the crucial "golden hour" following an event. This means that there will be a number of victims who have lost body parts and functions that might have been salvaged if the disaster had been on a smaller scale. For example, victims who might have received early comprehensive intervention at a trauma center following a car accident might be triaged into a less emergent category and attended to much later following a large train accident. This can become an important psychotherapy issue after the original survival crisis, when inevitable "what if" and "if only" thoughts emerge. When there is acute vision loss, there is a high risk for delirium, psychosis, and dissociation.

Disfigurement and body image

Facial disfigurement and facial burns usually cause more psychological difficulty than injuries and burns to other body areas. Give patients honest explanations and prognoses, but do not force a patient to view a deformity until ready; he or she may choose to wait

several days or even weeks before looking in a mirror. Longer-term individual or group psychotherapy is sometimes required to help severely injured or burned patients adjust to permanent disfigurement and changes in body image. In one study, 35.3% of burns patients met criteria for PTSD at 2 months, 40% met the criteria at 6 months, and 45.2% met the criteria at 12 months (Perry *et al.*, 1992).

Guilt and grief

It is a rare disaster or terrorist event where bereaved families are not offered grief counseling or therapy. However, survivors and their families will also have to face important grief and guilt issues – particularly over losses of body parts and functions. Having a serious injury does not make a survivor immune from the survivor guilt experienced by those disaster victims who walk away uninjured. Unassuaged survivor guilt may complicate and slow psychotherapy aimed at body image and disfigurement issues. There also may be secondary effects among surviving children of victims of terrorist events or other disasters.

The dead and dying

It is often easy in a busy postdisaster setting to ignore those individuals who are "expectant." It is a fact that people die in disasters, and sometimes not instantly – avoid avoiding them. The dead deserve a respectful transition from disaster scene to family funeral director. When resources are available, a great deal can be done to ease the suffering of disaster victims who are dying (Breitbart & Lintz 2002; Shuster *et al.*, 1999). The dying patient is generally comfortable talking about death. It is usually the family, and sometimes the disaster management team, who are reluctant to engage in such conversations. Don't underestimate the importance of religious belief and the belief in an afterlife in dying patients. Discuss "do not resuscitate" orders, wills, and comfort measures early.

In a postdisaster hospital or hospice setting, depression is common. The utility of antidepressant medications is limited by the several weeks needed for the agents to be effective. The threat of impending death can also obviously cause a great deal of anxiety. If an individual does not mention fears of dying, inquire either indirectly (e.g., "You look scared; how are you doing?") or inquire directly (e.g., "Are you worried you may die?"). If death is imminent and the patient is lucid, ask "What frightens you most about dying?" Three common fears are abandonment, uncontrollable pain, and shortness of breath (Cassem, 2004). Therapists should not be afraid to speak the unspeakable or confirm reality (Blacher, 1987). Anti-anxiety medications are very effective for dying patients if symptomatic or disabling anxiety persists after psychological support and the opportunity for abreaction is provided (Rundell & Wise, 2000).

Heroes in hospitals

Being a hero presents unique psychological challenges. Released prisoners of war, disaster victims who saved others' lives, and rescue personnel who went beyond the efforts of their peers frequently become public heroes. The hero must meet expectations of adoring audiences and communities. They must grin when they might want to cry. They must avoid or be extremely cautious in how they publicly discuss their own survivor guilt and grief. Heroes' families may insist on special treatment for themselves and their hero relatives. Medical personnel, with the best of intentions, may set up scenarios which make heroes' own postdisaster recoveries more problematic, particularly when the expressions of community support and adoration fade away. For example, heroes with relatively minor physical injuries may be offered ongoing narcotic analgesic "prn" medication even in the absence of nocioceptive pain. The hero may accept these medications because it may help temporarily relieve psychological pain, guilt, and anxiety.

Hospitalized heroes become the centers of politician, press, and community attention. Then when the public's short attention span wanders to other topics, heroes have to become regular people again.

This dizzying rise and steep fall need to be addressed in psychotherapy. Preventing post-traumatic psychiatric syndromes in these unique individuals requires that they be protected from overstimulation during the immediate postdisaster period. Jealously protect the individual's "quiet time." Hospitalized heroes' real achievements should be acknowledged and rewarded, but pampering and overinflating achievements increase the chances there will be a psychological "crash and burn."

Conclusion

Healthcare professionals should consider behavioral and psychiatric issues in the context of an overall differential diagnosis in the aftermath of a terrorism event, especially following chemical and biological attacks. When psychiatric signs and symptoms confuse or coexist with medical-surgical injuries and conditions, psychiatric consultation early in the triage and management process can ensure more timely, accurate, efficacious, and cost-effective management of disaster or terrorism victims. Psychiatrists can increase their potential effectiveness in the disaster arena by taking ACLS and ATLS® courses, and using the programs' algorithm-based concepts to guide their own assessment and management of disaster victims.

In the instance of chemical and biological terrorism, the symptoms and signs of psychiatric conditions and effects of exposure and its treatment overlap. Knowledge of the way infectious diseases, chemical agent exposures, psychiatric disorders, and behavioral contagion present can help to ensure that patients receive the right treatments for the right disorders. When there is a surgical or medical condition that presents following physical trauma or exposure to a chemical or biological agent, the risk for the psychiatric disorders described in this chapter increase and should be managed along with the effects of the chemical or primary infectious disease in order to decrease morbidity and mortality. Careful management of the public education and risk communication aspects of disaster and terrorism has multiplier effects in terms of preventing inappropriate and costly utilization of healthcare resources.

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