GUEST EDITORIAL

Chemical and Biological Casualties

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This issue of *TraumaCare* is devoted to the problems faced in the management of victims following the mass release of chemical and biological (CB) agents. This subject has become one of considerable interest over the last 2 years with the menace of "weapons of mass destruction" being used by terrorists in a civil setting paralleling that of the attack in New York in September 2001. The problems of management of CB casualties affects anesthesiologists and trauma specialists alike. ITACCS first considered the problem of the management of casualties following a mass toxic release in 1996 and founded its Toxic Trauma and Hazmat Committee (TTHC) at that time. It was also the first organization to define toxic (CB) trauma as opposed to conventional physical trauma, and to take a rational approach to what has been loosely defined as chemical and biological injury. Anesthesiologists have a particularly important role to play in the management of CB casualties, a fact that has been increasingly recognized in the literature over the past 3 years.[1–3] In 1996 the TTHC also defined protocols for providing early life support in contaminated zones (TOXALS), which have now been accepted into the primary EMS response plans for toxic release in several countries.[3,4]

Two points about the extensive range of CB hazards that are thought to confront us are important. First, despite widespread public belief and political rhetoric, CB agents are not strictly weapons of mass destruction, but are weapons of mass injury. In reality they may lead to mass fatalities where medical resources are limited or nonexistent, but with properly organized and equipped medical services the picture may be quite different. Unlike nuclear weapons (which constitute genuine weapons of mass destruction), CB agents do not cause mass destruction of materiel and physical trauma. Biological and chemical agents should therefore be viewed in their own pathophysiological context, and management of casualties approached accordingly.

Secondly, it is important to realize that not all the potential hazards are equally likely to be used in event of an attack. A few have been identified and used, such as sarin and anthrax. Most, however, are still confined to the area of speculation (sometimes backed by intelligence information, although the reliability of this has been a contested issue on both sides of the Atlantic). The existence of a hazard does not necessarily imply a threat, a term that implies a means of delivery and intention on the part of the assailant, apart from possession of a hazard.

Although CB incidents are rare, deliberate terrorist releases have occurred.[5–7] However, the reality is that in civil life, populations are probably more at risk from accidental exposure from toxic substances and from naturally occurring epidemics (the natural equivalents of intentional CB release) than from deliberate CB release by terrorists or from military action. There are valuable lessons to be learned from accidental releases and epidemics for the management of deliberate CB release.

Accidental civil toxic releases are managed according to the United Nations hazardous materials control system (HAZMAT), which provides detailed information to emergency services about the qualities and management of toxic substances at their place of use or in transit.[8-10] HAZMAT databases provide information for protection, decontamination, and clinical management protocols.[8,11] The system is designed to manage accidental releases but gives valuable training for the management of casualties from deliberate releases. The difference between accidental and deliberate releases is that the identity of the toxic agent may not be known with certainty in the latter case and so measures must be put into place that cover the worst-case scenario of the agent being highly toxic, persistent, and transmissible.

Although CB releases are usually considered as being essentially similar in practice, there are considerable differences that affect incident and casualty management. Classic chemical agents and toxins have short periods of latency before specific signs and symptoms appear and may exhibit high toxicity in the short term. In contrast, classic biological weapons agents have extended latency periods (usually familiar as incubation periods) before the effects of the induced disease begin to appear. There are also differences in persistency, a characteristic that describes the ability of a toxic agent to remain in the environment into which it had been released and that is a function of the physicochemical properties of the agent. For chemical agents, the persistency may be variable but for most biological weapons agents, with the exception of spore-forming agents such as anthrax, persistency is usually very short. However, transmission of the agent may take place as a result of the physical contamination of the victim due to a persistent chemical agent or as a result of infection, in the case of an airborne agent. Transmissibility is therefore a potential menace in the case of biological warfare agents due to infection further down the casualty management line.

Any effective emergency medical and hospital response to CB release depends on good planning and training. In France, special plans were put in place for the management of terrorist toxic release following the Japanese sarin attacks in 1995,[3] which have been recently modified as Plan Biotox. The plans provide special mobile medical response teams (with training and protective suits) as well as protected medical teams to receive casualties who escape the HAZMAT cordon. Anesthetists are involved at both these points and must have a good understanding of the importance of casualty decontamination. In the hospital, anesthesiologists must be aware of the effects of certain toxic agents on the conduct of general anesthesia for the management of accompanying physical trauma. CB agents have effects on the preoperative status of the patient and on anesthetic agents themselves, a point that is discussed in this issue. The possible use of pharmacological agents related to established anesthetic agents being used as toxic agents (as was possibly the case in the Moscow Theater incident) is an emerging hazard that is also considered later.

Many toxic hazards have long latency effects, which lead to the necessary management of patients in the intensive care unit, and the specialty must be appropriately prepared. Long-term ventilation may be required for neuromuscular problems, toxic pulmonary edema, and associated adult respiratory distress syndrome. Mass toxic casualties will place a heavy burden on emergency and intensive care services as a result of short-term and longer term actions of toxic agents.

In conclusion, close integration of anesthetists into toxic emergency response teams is essential, but finding time for training in protection and detection and the primary management of CB casualties may be difficult. Nevertheless, it is vital that anesthetists, and particularly emergency and trauma specialists, understand the real risks from CB and HAZMAT procedures to provide a clear lead and to avoid becoming the next casualty. The contents of this issue will hopefully help to raise awareness in this important area of practice.

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Preparedness for Bioterrorism

Introduction

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There is nothing that captures the imagination and generates fear like the threat of a massive biologic or chemical weapon attack. This issue of *TraumaCare* explores the concerns surrounding these weapons of mass destruction. Articles detail the signs and symptoms to look for in patients being assessed. Treatment options are also discussed, as well as a primer for preparedness. Finally, the history of biologic and chemical weapons is covered going back to ancient times.

The key to treatment of biologic and chemical weapons victims is to realize that the patient has suffered such an attack. Since these agents are not routinely treated in the United States, recognition is the key to successful outcome. While mortality for patients is high, health care workers must take adequate protection to avoid becoming victims themselves. Agents to treat these diseases need to be readily at hand – yet there is expense involved as many pharmaceuticals may never be used in the massive doses needed to treat a biologic or chemical weapons attack.

Read carefully the articles in this issue, for knowledge and preparedness are the best defenses against an attack. Take comfort in the history of the use of these weapons, for although deadly viruses and bacteria have been produced, they are rarely used. Chemical weapons, outside of the massive campaigns of the First World War have not been used – another reassuring historical sign.

Be prepared, be suspicious of these agents especially when several patients with similar symptoms present, and be careful to protect yourself and other health care workers. Only then will we be able to lessen the fear chemical and biologic weapons evoke in the general population and ourselves.

A History of Biological Warfare

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Learning Objective:
To help the reader to begin to understand important aspects of the history of biological weapons.

Abstract
The use of biological weapons can be traced to the ancient Greeks. Through time, most biological weapons have been used as a contaminate, rather than as a primary weapon. It is only in the 18th century that an agent, smallpox, was first used, as a biological weapon. Much of the history of biological weapons is a potential history, dealing with the development of weapons of mass destruction, rather than their use. However, when used, there is often a cultural overtone, whereby a group that feels culturally superior to another, will test or use biological weapons to eliminate the "inferior."

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