Biological Warfare: First Protect Yourself

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“I don’t have anthrax.”
— President George W. Bush, October 2001, in response to reporters’ repeated questions about the emergent menace of bioterrorism within the United States.

The threat of a biological or chemical attack on American civilians has tragically moved into the realm of reality. On October 4, 2001, a 63-year-old man was hospitalized with inhalation anthrax. This was the first case in United States history of anthrax resulting from an intentional human act. As of this writing (January 8, 2002), a total of 23 cases with five known deaths from anthrax have been reported by the Centers for Disease Control and Prevention (CDC). In addition, 32,000 individuals with potential exposure to anthrax have initiated antimicrobial prophylaxis. Government agencies are predicting more frequent and more damaging future assaults.

Viewed in the context of the 20,000 deaths that occur each year in the United States because of the flu virus, the few recent anthrax deaths, although tragic, are statistically insignificant. The fear and economic disruption, however, is far from insignificant. It is important to recognize that, in this instance, an extremely inefficient system was employed to distribute the spores of Bacillus anthracis. More illustrative of the potential for harm of weapons-grade anthrax was the epidemic (including at least 66 deaths) that followed the 1979 accidental release of less than 1 gram of anthrax spores in Sverdlovsk, Russia. As a result of this experience, the world became painfully aware of the almost limitless potential for serious disease if an efficient delivery system were to be employed. In that situation, bioterrorism would become biological warfare, a once nearly unthinkable horror.

Bacillus anthracis is not the only biological warfare agent causing concern. Yersinia pestis (pneumonic plague) was the first known pathogen used for germ warfare. Soldiers in 14th century Europe were reported to have catapulted bodies of plague victims into the encampments of their enemies, and plague remains a dangerous risk today. Another highly contagious and feared pathogen that would cause widespread disease is Variola major (smallpox). In all, more than 20 different bacteria, toxins or viruses (biological agents) and countless chemical agents have been identified by CDC as potential pathogens for biological or chemical warfare.

Anesthesiologists are at risk for exposure or injury in their workplace in the case of a biological or chemical attack. Chilling examples were hypothesized by Mark J. Lema, M.D., Ph.D., in his prescient editorial in the March 2001 ASA NEWSLETTER.

A fundamental priority in any disaster protocol is for exposed caregivers to take precautions to avoid personal injury. Such precautions are clearly stated in the “10 Commandments for Medical Management of a Biological Attack” of the United States Army Medical Research Institute of Infectious Diseases. The second commandment is “Thou Shalt Protect Thyself” (preceded only by “Maintain
an Index of Suspicion”). How can we best provide optimal anesthetic care to victims of such an assault while simultaneously protecting ourselves from harm?

The first and best-established line of defense is strict adherence to the guidelines found in the Occupational Safety and Health Administration (OSHA) Bloodborne Pathogens Standard (29 CFR Part 1910.1030). These “Universal Precautions” have been redacted for the practice of anesthesiology in the ASA booklet “Recommendations for Infection Control for the Practice of Anesthesiology (Second Edition)” <www.asahq.org/ProfInfo/Infection/Infection_TOC.html>. Although these recommendations pertain largely to blood-borne pathogens, they provide educational and pragmatic guidance.

In addition to blood-borne infections, there are other important routes of occupational infection or toxin contamination. The ASA booklet referenced above provides useful guidelines for prevention of contamination of an anesthesiologist at risk of exposure via these routes. For example, the precautions detailed for patients with active tuberculosis apply equally to patients with smallpox or plague. Standard contact and inhalation precautions with gloves, gowns and masks are mandatory. Vaccination of all health care workers who might encounter smallpox patients is also optimal. Patients must be maintained in strict isolation and quarantined in negative-pressure rooms with high-efficiency particulate air filtration. Optimally, a designated hospital for such patients requiring isolation might be identified in each metropolitan area. However, any large-scale quarantine following biological terrorism has logistical and legal limits and potential consequences.

The most drastic threat is that of widespread airborne dissemination of biological or chemical toxins. In a worst-case scenario, victims of a strategic weapon-borne attack (bombing, airplane crash) would simultaneously be inoculated with a contagious biological or chemical agent. Local hospitals would be flooded with trauma victims who are in need of decontamination, respiratory and burn care and emergency surgery. The victims also would likely be carriers of deadly bacteria, viruses or toxins.

In these situations, anesthesiologists as well as all other health care providers must have immediate access to appropriate and well-fitted protective gear. Depending upon the level of exposure risk, the health care provider may require the full-body protection provided by a well-fitted, Level A protective suit and a self-contained breathing apparatus respirator. This equipment provides satisfactory protection but is cumbersome and makes performing routine medical chores difficult. Alternatively, in a less threatening environment, lower levels of protection may be appropriate. Details of protective equipment selection against biological agents can be found in the CDC Advisory of Oct 26, 2001, “Interim Recommendations for the Selection and Use of Protective Clothing and Respirators Against Biological Agents” <www.bt.cdc.gov/Documents/APP/Anthrax/Protective/10242001Protect.asp>. A more comprehensive overview of the entire process of response, investigation and cleanup of such a bioterrorist attack can be found in OSHA's Hazardous Waste Operations and Emergency Response Standard (HAZWOPER) (CFR Part 1910.120) <www.osha-slc.gov/Preamble/HAZWOPER_toc/HAZWOPER_toc_by_sect.html>.

Are anesthesiologists and our institutions currently prepared for these types of mass casualties? The answer unfortunately is a resounding NO! The only good news to emerge from recent events is that they have spurred aggressive action at all levels in medicine and government to correct these deficiencies. CDC and numerous state laboratories that have long been ignored are now getting additional funding. Emergency supplies and medications are being warehoused in CDC’s National Pharmaceutical Stockpile. Educational and training programs are increasingly available in health care facilities throughout the country and on the Internet <www.cdc.gov/mmwr/indexbt.html>.
An effective response to these previously unthinkable catastrophes will require a multidisciplinary approach involving public health systems at the city, state and federal levels. The Department of Health and Human Services (HHS) is the primary agency responsible for the nation’s health and medical response to a biological attack. Within HHS, the Office of Emergency Preparedness, CDC, the Food and Drug Administration and the National Institutes of Health all play essential roles in bioterrorism preparedness. Other federal agencies with responsibility in this area are the Federal Emergency Management Agency, the Department of Justice (acting through the Federal Bureau of Investigation) and the Department of Defense.

Anesthesiologists historically have not been active participants in the public health infrastructure. It is now important for us all, however, to become clinical epidemiologists in addition to the other hats we wear. Every anesthesiologist should read the CDC document “Biologic and Chemical Terrorism: Strategic Plan for Preparedness and Response — Recommendations of the CDC Strategic Planning Workgroup” <www.cdc.gov/mmwr/preview/mmwrhtml/rr4904a1.htm>. This document provides a comprehensive review of CDC’s strategy to control future public health threats resulting from terrorism. Additionally, anesthesiologists should visit the CDC homepage regularly for current reports and the latest developments in this rapidly changing arena <www.cdc.gov>.

There will be a steep learning curve in this area of emergency preparedness for us all. As hospital-based physicians intimately involved in the surgical arena, we would be critically important individuals in the event of a chemical or biological attack on the general public. Broadbased professional citizenship would be required unlike any experienced in times of peace. Anesthesiologists would be expected to intervene in dangerous situations by providing a broad spectrum of emergency care and even expectant care to ensure comfort measures for fatal injuries. It would also be our responsibility to conserve potentially scarce or irreplaceable resources and critical care items. Sensitivity, flexibility and adaptability would be needed in the health care foxhole because the consequences of “combat-fatigue” affect all members of the health care team. Much can be learned from our colleagues in the military who have first-hand experience with these horrors.

References: