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Bioterrorism: What practicing physicians can do

*"The greatest threat to the United States and its citizens in the first decade of the 21st century will not come from a military confrontation. Rather, it will come from an attack within our borders from a single individual or group that has access to weapons of mass destruction, including large conventional explosives and nuclear, chemical, or biological weapons. Of all these, biological weapons pose perhaps the threat that should concern us most."*¹

Edward Eitzen, Jr., MD
US Army Medical Research
Institute of Infectious Diseases, 1999

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May 17th: *Yersinia pestis* is surreptitiously released at the Denver Performing Arts Center. Two days later, patients begin to present to local hospitals complaining of fever and cough. By the end of the following day, 800 cases of severe pneumonia have been reported in the Denver area, and the Colorado state laboratory confirms plague in several of the affected individuals. The governor restricts travel into and out of the Denver area. By May 22nd, 3,000 cases and 800 deaths have occurred. A "push-pack" is obtained from the National Pharmaceutical Stockpile, but there is great difficulty in successfully distributing antibiotics. Local health care facilities are overwhelmed, both by the ill and the "worried well." Rioting and traffic gridlock ensue, and the Colorado borders are sealed.

December 9th: Approximately two dozen patients present to Oklahoma City hospitals with a "strange illness." Assistance is requested from the Centers for Disease Control and Prevention, which quickly confirms the clinical suspicion of smallpox. Smallpox is detect-

ed almost immediately in two other states. A decision is rapidly made to attempt containment by vaccinating a "ring" around known cases.

By day 6, however, cases have appeared in 15 states, and the nation's stockpile of smallpox vaccine is clearly inadequate. Two thousand cases and 300 deaths have been reported.

On the world stage, Iraq is massing troops on the Kuwaiti border.

By day 12, more than 15,000 cases of smallpox are reported and disease has appeared in 10 additional countries. Interstate commerce ceases and the United States descends into chaos. Experts estimate that 1 million smallpox deaths will occur worldwide by early February.

October 5th: A tabloid newspaper employee dies of inhalation anthrax, the first US case in 25 years. He has no obvious exposure to *Bacillus anthracis*. Shortly thereafter, individuals at ABC, NBC, CBS, and the New York Post develop cutaneous anthrax associated with tainted mail. An envelope containing "weapons grade" *B anthracis* is mailed to the Senate majority leader, seemingly infecting multiple postal workers along its path with inhalation anthrax. Disturbingly, infection appears to be spread through a sealed envelope or envelopes, something previously thought implausible. A nationwide run on ciprofloxacin occurs. No group immediately claims responsibility for the attack.

■ MUCH TO BE LEARNED

The first two scenarios above were recently executed simulations (called "TOPOFF" and "Dark Winter," respectively) to aid in US preparedness for a bioterrorism attack.^{2,3}

The third, of course, was not an exercise, but rather represents actual use of a biological agent to sow terror and further disrupt the nation in the wake of the September 11, 2001 attacks.

Understanding of the outbreak remains incomplete as this is written, but it is clear that our knowledge of the epidemiology of anthrax when used as a biological weapon is murkier than previously realized. The prior dogma regarding the disease (eg, the need for a break in the skin for the development of cutaneous illness; a minimum inhaled dose of spores, perhaps 10,000, necessary for inhalational disease) is now being reexamined.⁴ The seeming ability of inhalation anthrax to be transmitted by intact envelopes appears not to have been anticipated by the CDC, nor by anyone else involved in the investigation.

We believe there is much to be learned about the epidemiology and perhaps the clinical presentation not only of anthrax, but also of diseases such as smallpox, plague, and botulism, were they to be used in a bioterrorist or biowarfare capacity.

Current attempts to unravel the secrets of this anthrax outbreak seem analogous in many ways to the situation in 1981, as clinicians and epidemiologists struggled to understand a new entity, "gay-related immunodeficiency disease." The novel epidemiology of associated diseases such as *Pneumocystis carinii* pneumonia, cytomegalovirus infection, and Kaposi's sarcoma at that time are mirrored in the current confusion over the unusual ways in which *B anthracis* appears to be behaving. Now, as then, we rely on certain tools: careful observation by prepared clinicians, keeping an open mind, and a close liaison between practicing physicians and the public health system. These measures will go a long way toward understanding not only the current outbreak,

but also any future bioterrorist attacks that may take place.

■ WHAT CAN BE DONE?

Given the specter of biological terrorism, what can the medical system do to prepare?

- Education of those physicians likely to see patients early after a bioterrorist or chemical attack is crucial. We believe it is imperative that physicians possess the requisite knowledge to quickly recognize and manage such illnesses.

In this issue of the *Journal*, Dr. Thomas P. Noeller reviews the major agents likely to be employed in chemical or biological terrorism and discusses diagnosis and management of their clinical syndromes. In the world after September 11th, this is mandatory reading. Consideration of inhalation anthrax in the setting of an acutely ill, previously healthy patient with fever and a widened mediastinum is now critical. Rapid recognition and isolation of patients with smallpox or pneumonic plague will be essential if secondary cases are to be minimized.

- Hospitals need to continue to develop disaster preparedness plans that include bioterrorism as a major component, and to ensure that these are coordinated with resources at the local, state, and federal levels.

- State and other reference laboratories need to continue to upgrade their diagnostic capabilities for the detection of unusual pathogens.

- Adequate stockpiles of antibiotics and vaccines (smallpox and perhaps anthrax) need to be built up, and realistic plans must be developed for emergency mass distribution. Progress has already been made in these areas, but much remains to be done.

Education of physicians likely to see patients early after an attack is crucial

■ REFERENCES

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