EDITORIAL

Preparedness: Where is Occupational and Environmental Health?

Terror in many respects is an occupational hazard, with targets chosen for the symbolism of the work or workplace, and emergency and healthcare workers facing exposures in their attempts to treat victims. Like industrial disasters, terrorist incidents are the result of human activity; like workplace violence, they are deliberate. Lessons learned from recent events suggest that integration of occupational and environmental health into public health should lead to an all-hazards approach with better overall disaster preparedness.

Public health has been radically reshaped in the wake of the events of September 11, 2001, the subsequent anthrax attacks, and smallpox vaccination programs. Each of these events has demonstrated the importance of occupational and environmental health to the overall mission of public health, although breaking through differing world views to establish effective communications remains challenging. Meeting that challenge will enhance preparedness.

Terror in many respects is an occupational hazard. Targets chosen in groups for the symbolism of their work or workplace have suffered the brunt of terrorist attacks in the United States; after the event, first-responders, rescue and recovery workers, and healthcare workers inevitably confront all or some of these hazards in the course of their work. Like other occupational exposures, terror is manmade. Although its roots differ profoundly from those causing industrial disasters, approaches to prevention and mitigation need to make use of what has been learned at great cost in the industrial sector. Rehearsed evacuation procedures, enhanced building design and maintenance, attention to hazard identification, risk assessment and communication, personal protective equipment, and supportive counseling and other services should be thought through using the same management commitment and worker involvement that help provide answers in difficult work settings. Security and postevent procedures developed to address workplace violence can be particularly helpful.

Risk Assessment/Management/Communication

The initial diagnosis of inhalational anthrax in Florida and the ultimate protection of large numbers of exposed individuals through chemoprophylaxis were major public health successes driven by skill, dedication, and hard work. The initial failure to adequately characterize both exposure and risk were not only painful lapses; they were lessons demonstrating the need for collaborative public health practice. Environmental sampling, exposure assessment, risk characterization, risk communication, and hazard abatement are all skills that are engaged differently on the environmental/occupational end of prevention. Unfortunately, these were called into play nationally only after the death of 2 postal workers from the Brentwood postal facility. Published initial assessments that the infective dose for inhalational anthrax was "8000–50,000 spores"[1] flatly contradicted previously published reports that "Based on primate data, it has been estimated that for humans the LD 50 (lethal dose sufficient to kill 50% of persons exposed to it) is 2500 to 55,000 inhaled anthrax spores."[2] In sharp contrast, public health officials in New Jersey, one of the few states with significant occupational health capacity integrated into its health department, had rapidly intervened the preceding week. With confirmation of cutaneous anthrax in a downstream postal worker, state public health officials recognized an indicator of cross-contamination and likely significant widespread exposure, and made the decision to offer large numbers of workers chemoprophylaxis on that basis.[3] Environmental and occupational health encompasses the engineering, industrial hygiene, and toxicologic approaches needed to assess exposure, predict health outcomes, and design intervention strategies. Previous unpublished and subsequent published reports further characterized the extent to which intentionally processed spores became airborne and the inadequacy of initial sampling methods using dry cotton swabs for detecting contamination.[4,5] Environmental risk communication has long addressed the specific needs of individuals who have no perceived control over exposures, who are concerned about issues of underlying fairness of exposure distribution, and for whom adverse out-

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comes can be rare or unusual; this expertise was not adequately used in the early response.

Environmental Sampling and Mixed Exposures

The anthrax incidents imposed enormous burdens on public health laboratory capacity throughout the United States, but these were overwhelmingly environmental rather than clinical samples, both in laboratories where positive results were demonstrated[6] and in those where all specimens proved to be negative.[7,8] Of the 1496 specimens processed to rule out *B. anthracis* in Illinois in Fall 2001, all but 40 were environmental.[7] In addition to sheer numbers, laboratories encountered difficulties attempting to examine oddly shaped or large samples such as ventilation filters and furniture (particularly in NYC, where cross-contamination affected a number of offices), and problems with potentially mixed exposures. In at least one instance, a false alarm created the need to evaluate samples for which mixed chemical and biologic contamination was suspected. In October 2001, a crop duster dumped unknown contents onto commercial transportation barges in the Mississippi River. The initial inability of environmental laboratories to accept samples suspected of anthrax contamination or of Laboratory Response Network facilities to accept samples potentially contaminated with hazardous chemicals left the unfortunate workers on the barge in limbo for over 24 hours. Throughout 2001–2002, only one commercial laboratory had both LRN (level A) capabilities as well as American Industrial Hygiene Association certification. An Association of Public Health Laboratories survey conducted in January 2003 noted that "three quarters of the nation's state laboratories are unable to safely accept samples suspected of containing multiple hazards, such as toxic chemicals and infectious organisms. Only eight state public health laboratories. . . report having a chemical terrorism. . . response plan in place."[9] This represents a resource gap that requires not only financial support, but also enhanced collaboration between laboratory scientists working with infectious agents and those conducting chemical analyses.

Compensation

Attention to occupational health issues might also have improved the current smallpox immunization program. The Homeland Security Act of 2002 (Public Law 107–296) addresses security issues ranging from food safety and boarder protection to public health response and intentional smallpox release. Section 304 of the Act specifically authorizes the Secretary of the Department of Health and Human Services (HHS) to issue countermeasures in the face of a potential bioterror event, including a smallpox attack. This authority was formally invoked shortly after the Act took effect, and HHS launched a national effort to immunize teams of volunteer public health- and hospital-based healthcare workers through local public health departments. However, despite active vaccination campaigns for healthcare workers in Israel and the U.S. military, the civilian response in the United States met with very specific concerns that severely reduced participation.[10] Among other reasons, section 304 failed completely to meet the liability concerns of the workers called on to volunteer. It transferred liability from vaccine manufacturers and the healthcare institutions and healthcare personnel who administer the vaccine to the federal government. However, under the restrictive Federal Tort Claims Act, vaccine recipients who sustained adverse effects would have recovered damages only for proven negligence. Not addressed were the expected consequences of an imperfect vaccine. Studies of vaccine dilutional efficacy described common side effects, including fever, chills, satellite lesions, pain, localized swelling, headache, and regional lymphadenopathy, potentially resulting in lost work time and additional medical expenses.[11] States and several large nonprofit healthcare systems scrambled to cobble together existing health insurance and workers compensation arrangements to provide coverage. Myocarditis, although fortunately rare and self-limited, is an example of an outcome with potentially high costs to the individual, yet covering hospitalization and lost work time costs for these few would have required a minor addition to the overall program budget. Both the American Public Health Association and the American College of Occupational and Environmental Medicine (ACOEM) adopted policy statements on the pre-event smallpox vaccination program outlining liability, compensation, and operational concerns with recommended solutions.[12,13] Legislation was enacted in late April 2003 to correct this oversight; by then the program had largely failed.

Research Needs

On the other hand, the public health community also has unmet needs from its occupational and environmental health practitioners. Although research is now underway to develop appropriate protective gear for first-responders, the very real needs of healthcare workers, much less of public health workers, have not been adequately addressed. Specific questions concerning protection from biologic or chemical exposures in the act of caring for victims of terror or conducting community outreach deserve attention. Appropriate dermal protection, respiratory protection that works in healthcare settings or in broad community investigations, and the need for off-the-shelf, ready-to-use equipment when unanticipated hazards have been encountered will all require a new approach from researchers and regulators. Safety and health professionals scrambled to develop accurate messages of their own concerning the

hazards to rescue and recovery workers as well as to the inhabitants of lower Manhattan. Physical and psychologic needs of workers and community members transcend exposure category, although use of "all hazards" terminology in place of "BT" raises fears among public health practitioners that "the funding will go to the fire departments."

Occupational Medicine Practice and Surge Capacity

Perhaps in part because of the problems raised by the smallpox vaccination program, occupational health practitioners have been slow to attempt to integrate their existing infrastructure into the postevent functioning of local public health and disaster preparedness plans. Employee health clinics that are both hospital-based and located in large and/or vulnerable industries would provide badly needed surge capacity should an actual event occur; these resources have not been tapped or offered during any of the recent simulated disaster drills. The ACOEM position on smallpox vaccination, for example, further identified the operational need to provide convenient, confidential, and free testing for HIV or pregnancy for volunteers who need to be certain of their status, all services familiar to hospital-based occupational medicine.[13] The ACOEM efforts to develop occupational health response teams represent additional attempts to integrate occupational expertise into disaster response.[14] The inclusion of occupational health practitioners in the Technical Advisory Groups required for Centers for Disease Control and Prevention-funded State BT preparedness activity is another positive step. Public health and occupational health practitioners need to expand this dialogue to provide the level of preparedness our constituents deserve, whether at home, at work, or in the community.

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