

The emergency workers and managers who attended the NIOSH/RAND conference provided a wealth of information on availability, use, performance, and management of personal protective equipment. Throughout the conference, a number of important, strategic policy issues also emerged. Some of these issues were explicitly addressed during the meeting; others are implicit consequences of the lessons learned. This concluding chapter draws out several of these strategic policy issues for further reflection.

GUIDELINES

One of the clear messages of the conference was that most emergency workers do not believe that they are prepared with the necessary information, training, and equipment to cope with many of the challenges associated with the response to a major disaster such as the World Trade Center attack or for threats associated with anthrax and similar agents. These challenges include the large scale of the operations, the long duration of the response, the broad range of known and potential hazards encountered, and the assumption of nonstandard tasks by emergency responders.

Lessons learned from the response to the terrorist attacks suggest that near-term efforts to develop and upgrade equipment and operating guidelines could significantly improve the safety of emergency workers.

- Guidelines are needed for designing personal protective equipment ensembles appropriate for long-term responses to a range of major disasters.¹ An obvious case would be a disaster involving the collapse of one or more large buildings and the consequent need to work on rubble in the presence

¹By an ensemble, we mean the entire list of PPE responders should carry, including respirators, clothing, eye protection, sensors, etc.

of a variety of hazards, including human remains, smoldering fires, and airborne contaminants derived from the building and its collapse.

- Recognizing that different responders have different personal protection requirements, these guidelines could also address the various professional groups working at a disaster site. Moreover, the guidelines should take into account the reality that individual responders may fulfill various tasks entailing different hazards and that hazards vary within the inner and outer perimeters of a disaster site.
- Protective equipment and safety guidelines could lead to better responses to biological incidents, not only for anthrax but for other potential biological threats.
- Well-designed guidelines and protocols could significantly improve real-time on-site hazard assessments. Essential elements include sensing equipment, measurement sites, organizational responsibilities and authorities, and data interpretation consistent with operational requirements.
- Discussions about the management of the terrorist attack sites often touched (sometimes indirectly) on sensitive and debated topics such as the appropriate time to declare an end to rescue efforts, the way off-duty and volunteer assistance should be managed, and the accommodation of VIPs and other concerned parties. Given the understandable difficulty of making such decisions in the midst of a response effort, site commanders could greatly benefit from guidelines developed in advance of an incident.
- To be useful, guidelines must be practical in the sense that they consider the capabilities of emergency-response organizations, are easy to use in the field, and do not unduly impair the ability of emergency responders to perform critical lifesaving missions.

COST

The conference participants identified many new technologies for personal protection that would be desirable, based on the lessons learned from the terrorist attacks. Some argued that many desired technologies already exist and progress may simply be a question of procuring the appropriate equipment. Participants highlighted, however, that in the case of both existing and new technology, cost can be a very serious barrier to adoption of equipment by state and local response organizations. Powered-air respirators, for example, can cost ten times as much as the simpler nonpowered variety. Providing each emergency worker with his or her own ensemble of equipment specific to a range of hazards could be prohibitively expensive for most local emergency-response organizations.

Efforts could be directed toward making these technologies more affordable or, alternatively, developing efficient ways to deliver the appropriate equipment to incident sites. In instances where a desired technology is commercially available, expanding the number of prepositioned caches of such equipment that could be moved to response sites could be a good compromise solution. The know-how in supply logistics resident in the U.S. military could be helpful for developing supply strategies for the domestic emergency-response community. Another option would be preplanned equipment-sharing with non-neighboring emergency-response units.² For smaller departments, it may be appropriate to examine alternative approaches to increasing purchasing power, such as banding together and conducting coordinated procurements.

RESEARCH, DEVELOPMENT, AND TECHNOLOGY TRANSFER

Several panels put forth recommendations for new equipment and technologies, most of which were for modest advances and incremental improvements to existing technologies. Research and development (R&D), however, may yield significant benefits to the emergency-responder community. For example, a major theme that ran through many of the panels was the apparent tradeoff between the level of protection provided by equipment and the discomfort and physical burden the equipment placed upon those using it. Directing R&D toward advanced respirators, clothing, sensors, and other safety gear may be able to reduce that tradeoff. Other areas suggested by the conference discussions include applications of information technology and communications systems for better management of worker safety at disaster sites and continued emphasis on technologies for locating responders buried or trapped under rubble.

As previously discussed, a theme that arose in several panel discussions was that the purchasing power of the emergency-response community was limited, given its relatively small size and tight budgets, especially at the local level. These factors constrain the community's ability to drive R&D on new technologies. However, much of the safety-related technology that is in use came through technology transfer from other industries, and in some cases, the military. Technology transfer is expected to continue to play an important role in providing emergency responders with improved safety equipment, for example, equipment using information technology, telecommunications, and advanced sensor systems originally developed for purposes other than emergency response.

²In the event of a major disaster, neighboring emergency-response organizations are likely to be part of the response team and unavailable to share equipment.

Technology transfer can help reduce personal protective equipment costs by spreading R&D outlays across a larger user community. It can also speed the introduction of new technologies to the emergency-response community. But the emergency-response community also has special safety needs that may not be adequately met through technology transfer alone. Many at the meeting suggested that publicly supported R&D would be appropriate for addressing the safety needs of emergency responders. The recent terrorist attacks have raised awareness of this issue.

EQUIPMENT STANDARDIZATION AND INTEROPERABILITY

Equipment standardization and interoperability, as well as the development of more uniform training, maintenance, and use protocols, were mentioned as important needs throughout the conference discussions. Although these are not new issues, the scale and complexity of the terrorist attacks and the problems encountered in the responses appear to have drawn greater attention to them and have increased their importance as policy matters for all members of the emergency-response community. The recommendations put forth by conference participants indicate that these issues may be addressed from the top down (through the promulgation of uniform federal standards) or from the bottom up (through greater interagency cooperation).

SAFETY MANAGEMENT

One of the most important lessons learned from the responders at the terrorist-attack sites is the importance of on-site safety management. Effective safety management is unlikely to be achieved if the overall site is not under a defined management structure, with clear lines of authority and responsibility. The operational side of safety management involves hazard monitoring and assessment, safety-equipment logistics and maintenance, site access control, health and safety monitoring, and medical treatment of emergency workers.

Given the magnitude of these tasks, conference participants argued that the safety officer at a disaster site should be an independent official whose sole responsibility is safety enforcement. In cases where incident sites are managed through a unified command structure, those responsible for responder safety could be part of that command.

From the federal perspective, an important issue is reassessing and clearly defining the roles and relationships of various federal agencies with health and safety responsibilities at a major disaster site.