As shown in Chapter Two, the United States has seen a long-term rise in the number of emergency medical calls. Discussion participants expected this trend to continue as health care costs increase and the nation’s population ages. Moreover, as with firefighting responses, participants observed that the complexity of emergency medical incidents is increasing. Given these trends, emergency medical service response personnel pointed out that they are experiencing a concurrent increase in the dangers they confront while lacking the appropriate personal protection to safeguard against those dangers.\(^1\)

Among the concerns voiced by emergency medical service responders during their discussions with RAND, uppermost was limiting their exposure to infectious diseases. As with all emergency responder services, terrorism was also a major concern among EMS responders. Many participants, especially in the larger departments, also expressed concern over the increasing threat of assault. EMS personnel also noted that addressing the protection needs in their service is hindered by the multiple types of agencies engaged in EMS response. Participants felt that this heterogeneity in EMS agencies tends to reduce the visibility of the emergency medical service and limit the amount of guidance and support it receives from government and professional organizations.\(^2\)

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1. The term *emergency medical responder* refers to both emergency medical technicians (EMTs) and paramedics.
2. The findings for EMS responders must be qualified by noting some sampling limitations. Nearly all of the fire departments RAND contacted are the primary EMS providers for their jurisdictions, and representatives specializing in EMS were present in most fire department discussions. Three independent emergency medical service providers were also included. However, nationwide, only about 40 percent of EMS response is provided by fire departments (Karter, 2001), with independent agencies and, to a smaller extent, hospitals, private firms, and law enforcement agencies making up the remaining 60 percent. The input in this study is thus biased toward the fire service. The potential implications of this bias for the findings are unclear. The integration with firefighters and associated emphasis on safety and access to quality equipment may lead to fire-based EMS systems experiencing fewer shortcomings in their PPT options.
LACK OF SPECIALIZED PERSONAL PROTECTION TECHNOLOGY FOR
EMERGENCY MEDICAL SERVICE RESPONDERS

According to the personnel with whom we spoke, few emergency medical ser­vice teams have an adequate supply of personal protective technology on hand and ready for use. Like law enforcement personnel, emergency medical re­sponders often are the first on the scene of an emergency and, therefore, must use whatever PPT is on their vehicles. “Medical responders don’t have any­thing,” one participant pointedly said. PPT training reportedly is also in short supply among EMS personnel. For example, one agency provides its personnel with only 12 hours of PPT training. “How we are going to follow up on this, I don’t know,” said a representative of that agency. “All of our training is done on overtime. It’s an expensive proposition. We gave up a lot of other things [for training].”

To remedy the situation, some organizations are adopting PPT, such as SCBAs, bunker gear, armored vests, and practice standards, from the fire service and from law enforcement. Two independent (third-service) emergency medical re­sponse organizations reported issuing all medical response personnel standard fire-rated bunker gear. One reason they cited for doing this was that EMS per­sonnel often are trained for and serve in the fire service and therefore were already issued gear. Also, emergency medical service personnel, regardless of their organizational affiliation, often participate in technical rescues and play an integral role at fire scenes. Finally, the cost differential between fire garments and EMS garments was not seen as being substantial. “We went for the opti­mum protection factor,” said a representative from one service. “We wanted to make sure we exceeded the NFPA standard for thermal protection.” Biological contamination of bunker gear was not seen as being a problem, claimed one participant, because emergency medical responders “have a better understanding of blood-borne pathogens” than firefighters, and could therefore manage such contamination with proper cleaning and care of the gear.

EMS has been very underequipped for a very long time . . . [PPT] has not been a high priority in our industry.

—Emergency medical service leader

More fundamentally, protective gear used by emergency medical responders is often not developed specifically for their jobs and the hazards they face. One participant, for example, noted that the protective gear that is currently avail-

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3Technical rescue is a class of emergency response that typically involves special-access capabilities, such as searching, climbing, repelling, or moving heavy objects.
able creates “plastic bag syndrome,” meaning that it made responders feel like they were working inside a plastic bag. “We aren’t going to wear this stuff on a regular basis,” he claimed. Another representative noted that even though his agency was seeking to provide a high level of respiratory protection for its medical personnel, WMD exercise scenarios had indicated that “there is no way we are effective in SCBAs.”

One reason cited for these protection shortcomings is that no federal agency is dedicated to addressing the hazards and protection needs of the emergency medical responder community, and little funding is dedicated to address these issues. Two participants cited efforts by the U.S. Department of Transportation in the 1960s as important first steps in improving equipment for emergency medical responders, but those efforts were seen as now being outdated.

A second reason for these shortcomings is that despite the fact that emergency medical service response in many medium-size and large jurisdictions is provided by fire departments, and that three out of four fire service responses are for medical aid, the National Fire Protection Association’s substantial efforts and influence regarding protection and safe practices have been focused primarily on organizations and personnel whose primary training, operations, and institutional culture are focused on structural firefighting. For example, while the National Fire Protection Association (NFPA) maintains a standard for protective clothing for emergency medical operations (National Fire Protection Association, 1997), protective clothing meeting this standard reportedly is not in widespread use. The reason for this may be because, as some participants claimed, the clothing does not adequately meet the needs of emergency medical responders. In addition, participants claimed that the standards for emergency medical response operations (NFPA 1710 and 1720) and technical rescue operations (NFPA 1670), while providing a good basis for service provision, were not being implemented evenly, in part because the standards do not fully address the organizational needs, practices, and priorities of emergency medical services. To illustrate this point, a big-city fire department representative who spoke with RAND argued that these standards were too rigorous and too expensive to implement.

Complicating the problem of inconsistent application of standards for protective technologies are the diverse types of organizations that provide emergency medical service response and the inevitable variations in practices and procedures that they follow. In addition to local fire departments, many communities have independent municipal, private, or hospital-based emergency medical services. “There are so many flavors of EMS out there,” observed one community member. As a result of this structural heterogeneity, service practices vary significantly within the emergency medical response community. Unlike firefighters, who are expected to arrive at a fire scene wearing bunker gear, medical
personnel have much greater latitude in the personal protective equipment and practices they use, depending on local policy, the nature of the event, and individual discretion. For example, according to representatives with whom RAND spoke, the acquisition and use of ballistic vests often is left to the discretion of individual responders.

Finally, when compared with the fire service, emergency medical service responders operate more autonomously and typically do not have chiefs or other safety personnel on the scene enforcing PPT use. One department issued its medical responders fanny packs containing a particulate mask, goggles, gown, gloves, and scissors. But, he added, “It has taken a long time to get people to wear them on the majority of calls.” Another fire-based service issued particulate masks to its personnel, but one representative of that service noted, “You’ll see some crews religiously wearing them on their shoulders.”

HAZARDS AND TECHNOLOGY PRIORITIES FOR EMERGENCY MEDICAL PERSONNEL

The wide variation in the organization of and management within the emergency medical services makes characterizing the service’s practices and priority technology needs more difficult than characterizing those of other services. In this section, we outline several key issues related to health and safety risks and the technology needed to address those risks that were raised by emergency medical responder representatives.

Protecting Against Pathogens

Although a substantial fraction of emergency medical service responders are exposed to potentially infectious bodily fluids, surveillance data indicate that fluid-borne pathogens are not a major cause of injury or death among emergency medical service responders (see Chapter Two). Nonetheless, exposure to liquid-borne and airborne pathogens is the principal concern among emergency medical service responders, according to medical personnel that RAND contacted. Participants mentioned their concerns about increasing threats of exposure to hepatitis C, human immunodeficiency virus (HIV), tuberculosis, meningitis, West Nile virus, and childhood diseases. Some departments noted that the air inside ambulances can become particularly hazardous during transport of some patients. These concerns were not just confined to major urban services: Representatives from affluent, suburban, and rural communities also spoke of these issues.

Emergency medical response services have long had basic protective gear at their disposal, such as latex gloves, particulate filter masks, eye protection, and
gowns. Most respondents maintained that the level of protection this equipment provides is adequate, when it is used. In line with the concerns mentioned in the previous section, such gear largely is designed for hospital-based care and is not specially developed for use in the field. For example, providing splash protection for the forearms of responders wearing short-sleeved shirts in warm weather conditions was seen as a particularly intractable problem. “I just don’t know how you protect yourself,” said one representative. Hands and forearms were seen as the most critical points of exposure, with exposures to broken skin, puncture wounds, and bites that penetrate gloves being common risks. The representative just quoted reported that his agency provides its personnel with a day of self-defense training to reduce the likelihood of exposure to risks and injury.

Addressing Increasing Concerns About Assaults

Attacks on emergency responders are increasing.

—Emergency medical service responder

Another concern voiced by EMS responders in their discussions with RAND was their increasing concern over being physically assaulted while on the job. Emergency medical responders noted that they must operate in numerous types of situations and under unpredictable circumstances. Unanticipated criminal activity, domestic violence, hostage situations, and abusive or mentally ill patients are just some of the ancillary hazards they may encounter at incident scenes. A representative of a third-service department said that protection from assaults was his greatest concern. To address this concern, personnel in his department were given self-defense and situation-management training.

Although emergency medical service responders in several larger departments reported that they have been issued ballistic vests and jackets, use of such gear is estimated to be rare. A representative from one large urban department estimated that responders wore armored garments on less than 1 percent of medical calls. In all cases, use of body armor was left to the discretion of the individual; when it is worn, respondents noted, it is often on nighttime calls only. One department noted that it used to provide ballistic vests to emergency responders, but could no longer do so for cost reasons. Standards had changed such that the vests had to be issued and fit to specific individuals, requiring the purchase of more vests than the department could afford.
Seeking Greater Protection from Weapons of Mass Destruction and Chemical Threats

Exposure to anthrax and other biological and chemical agents has also become a primary concern of medical responders in this post-9/11 period. In the words of one representative, “This is a whole new ball game.” In the event of a chemical disaster response or terrorism response, emergency medical responders are expected to enter the affected area, tend to victims, assist with their extrication and decontamination, and manage their care until they are delivered to a medical facility. Emergency medical service personnel play an additional critical role in rendering medical assistance to injured emergency responders. With this in mind, responders raised concerns about their potential direct exposure to chemical and biological agents and secondary exposure to these agents through contact with contaminated individuals and materials. At the World Trade Center site in 2001, for example, responders repeatedly were coming into contact with body parts during the recovery stage. “Prior to 9/11,” said one participant, “public health had never been a priority in these incidents.”

In response to increased concern about such threats, emergency medical service responders reported that their organizations have sought to enhance personal protection capabilities. One EMS representative noted that while all personnel in his department had full bunker gear, none had access to SCBAs, a shortcoming that the department had recently recognized as one needing to be addressed. Another service opted to place two SCBAs on every truck in its fleet and issue responders face pieces that also accept air-purifying filters to be worn during extended response times in the case of a hazmat event or chemical attack. The service also equipped its trucks with chemical protective garments, duct tape, and chemical-resistant Nytril gloves. Another EMS service outfitted its vehicles with personal protective equipment kits to be used in the event of a WMD attack: large duffel bags containing gas masks, emergency escape hoods,$^4$ dust masks, helmets, goggles, and leather gloves. The service’s goal was for each of its EMS squads to be able to handle 25 to 35 patients immediately in the case of a WMD attack, pending the arrival of backup support.

A critical part of taking the proper precautions in a WMD or chemical threat environment, two EMS agency representatives observed, is having an awareness of the potential threats in such environments. Yet, unlike the fire service and law enforcement, which have specialized teams such as hazmat and SWAT teams that possess special training and equipment to deal with nonconventional and extremely hazardous situations, emergency medical services for the

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$^4$An emergency escape hood is a soft-sided pullover hood with an elastic neck seal. These hoods provide particulate and chemical respiratory protection enabling wearers to exit hazardous environments.
most part have not developed their own hazard-awareness protocols, training, and capabilities, even though they are often among the first responders at incident scenes. One solution to this shortcoming cited by participants is providing emergency medical service personnel with environmental monitoring technologies, such as indicator badges that would alert them to hazardous conditions. A more immediate solution is interagency training exercises, through which EMS personnel would be able to quickly learn hazard awareness and response skills and develop protocols for sharing information and coordinating activities, such as for hazmat, with other services that already have advanced capabilities. The goal of such efforts, one participant said, was to avoid the “rush-in mentality” and stage emergency response operations from a safe place. “We stress that over and over again. We just want our people to live through it.”