



PERSONAL PROTECTIVE EQUIPMENT (PPE) FOR FIRST MEDICAL RESPONDERS IN
DISASTERS

**WORKSHOP ORGANISED BY THE SHIELD GROUP and THE
INSTITUTE of TERRORISM RESEARCH and RESPONSE
Amsterdam, Netherlands 12-13 January 2009**

PERSONAL PROTECTIVE EQUIPMENT

On 12-13 January 2009, in Amsterdam, Netherlands, emergency medical experts representing Spain, Italy, the Czech Republic, Israel, and the Netherlands, were present at the **PERSONAL PROTECTIVE EQUIPMENT (PPE) OF FIRST MEDICAL RESPONSE IN DISASTERS WORKSHOP** organized by the Shield Group and the Institute Of Terrorism Research and Response. These experts discussed issues that occur when providing emergency medical services in the Warm Zone of a hazardous event or other disaster.

Background

Natural and man-made (both intentional and unintentional) disasters can involve a wide range of hazardous substances – from industrial chemicals to military grade chemical or biological weapons agents to radiological/nuclear materials. Transportation and treatment of patients, whether at the scene of such an emergency or at a medical care facility, can put healthcare providers at risk of occupational exposures to hazardous materials of all kinds. Having appropriate personal protective equipment (PPE) is essential in order for healthcare providers to perform their life-saving duties providing care to the injured while protecting themselves and the facilities in which they work.

Healthcare providers' need for PPE during patient care was demonstrated in the wake of the 1995 sarin nerve gas attack in the Tokyo subway system. Off-gassing from patients during and after transport to hospitals added 135 pre-hospital providers and over 100 medical providers to the list of victims (Okumura, 2000). This event also illustrated the need for decontamination capabilities and comprehensive medical response planning, training, and preparedness efforts within the healthcare community. Almost 14 years after the Tokyo attack, much of the PPE in use by healthcare providers remains incompatible with delivering patient care.

Medical personnel must wear proper PPE when working in an area known or suspected to be contaminated, or when handling patients who are or may be contaminated. Experience has shown that hospitals will receive not only those patients transported by emergency medical services (EMS). In addition, hospitals – especially those closest to the scene of the emergency – will receive a large number of self-referred casualties. In many cases, these walk-in casualties will not have undergone any field decontamination, making the need for PPE at the hospital even more acute.

Speakers

Joel Yonkman, Institute of Terrorism Research and Response

From Regulation to Response: The US Perspective

In the response to hazardous materials incidents in the United States there are many organizations that provide technical guidance. This guidance is provided in order to assist first response organizations to develop a safe and efficient response to hazardous material incidents. In an attempt to understand a typical response a few of the regulatory agencies and their role in planning for, response to, and recovery from an incident were discussed.

Each standard requires independent, third party certification to ensure that the protective clothing meets its design, performance, and documentation requirements. Certification agencies, such as Underwriters Laboratories (UL) or the Safety Equipment Institute (SEI), certify the garment performance, not NFPA.

The First Receiver: The Hospitals' Expanded Role

In the fight against terrorism hospital systems, a new member of the response community has been cast into the spotlight across the United States. In these types of incidents it is expected that hospitals will play a much more active role in the future handling of contaminated patients.

To that end organizations across the US have worked at providing guidance to healthcare facilities regarding how to respond to such incidents. This guidance focuses on classification of the first receiver, training requirements, incident command implementation and PPE selection for hospitals. The intent is to provide for a safe, organized, and coordinated response by hospital staff.

Mr. Chaim Rafalowski, MDA

“The response to a Toxicological Multi-Casualty Incident - the Israeli perspective”

Israel's planning for providing emergency medical procedures have been put to the test in the emergency response to industrial accidents. As a result of this experience, Israel has provided its Advanced Life

Israel uses a response system that includes the Police (as incident command), the Fire Department, Emergency Medical Management (MDA), hospitals, local authorities, and (in the case of industrial-type accidents) the owner of the hazardous material.

- Ambulance personnel are provided with pocket sized medical procedure cards that assist them in making correct decisions in the field
- EMS personnel have the authority to take action without receiving permission
- BLS and ALS are equipped with auto-injectors to deal with chemical agents

- The rescue of the injured starts with the area furthest from the harmful agent and working in towards the focal point of the agent.

Michael Perelman, Institute of Terrorism Research and Response

Animal Rights activists are affecting the ability of researchers to develop new and innovative equipment, procedures, and tactics for emergency medical responders to deal with terror related incidents. Research institutions, testing laboratories, and their personnel are continuously harassed by activists who are willing to use threats and fire to stop all medical testing on animals.

The Animal Rights groups are affecting research in North America, South America, and Europe. A company located in one area, that has facilities in other areas (or countries) is vulnerable to having any of facilities targeted for damage or destruction.

Dr. Irene van de Woude, Ambulance Service Netherlands

In the Netherlands, the Fire Department is responsible for issues of chemical contamination.

The Fire Department, together with the medical department, is responsible to identify whether a situation is a small scale incident with fewer than 10 casualties, or a large scale incident with up to 250 casualties. Upon arriving at an incident, the Fire Department must set up a 3 zone environment – hot, warm, and cold zones.

One ambulance, with its crew including driver and nurse, will enter the warm zone and stay in the warm zone until the end of the incident. They will stabilize patients before the Fire Department carries out the decontamination.

The Ambulance Service of the Netherlands conducted tests on decontaminating individuals within the warm zone. Among other things learned in the tests – water and wind chill become problematic in the Netherlands' weather conditions. As a result, the decontamination on-site will only be carried out in a sheltered place using warm water.

For large scale events, the Ambulance Service anticipates the use of schools or swimming pools for decontamination of ambulatory victims.

Mr. Tibor Mikes, National Institute of Nuclear, Chemical and Biological Protection

National Institute of Nuclear, Chemical and Biological Protection is a public research institution established by the State Office for Nuclear Safety pursuant. For the purposes of research and development activities in the field of chemical, biological and radioactive substances and security technical support supervisory and inspection activities conducted by the Office of Radiation Protection and the control of the prohibition of chemical and biological weapons.

The work of the National Institute of nuclear, chemical and biological protection has been involved in the measurement and evaluation of natural radioactivity with particular emphasis on the measurement of radon and its transformation products. This work was done by its predecessors, whose origins go back to 1954.

When discussing the development of PPE, the National Institute of Nuclear, Chemical and Biological Protection suggests that,

There are various doctrines, technologies and equipment to face a CBRN event in the individual EU member states. ...Due to historical and economical development of member states, as well as for many other reasons, there will always be some national differences that are not feasible to supersede within few years. Hence the reports concentrate on those aspects that are more or less common in the whole EU community.

It may be declared that in each EU state, there exists “something”(Personnel, technology and equipment) applicable for CBRN events. Though such means and products were usually developed for other purposes, they more or less satisfy the imperative needs –under adverse conditions “something” is better than nothing. The basic conclusion is that technologies and equipment exist in each EU country but they are not unified, neither fully adapted to the FRs’ missions.

Aaron Richman, Institute of Terrorism Research and Response

The initial moments of an incident that involves a chemical attack requires an immediate response by protected emergency services both as receivers and responders as well as command and control that is dynamic and flexible in the unified decision making. The presentation addressed considerations related to command decision making in the field based on the threat and the adversary techniques for targeting.

Command considerations include:

- Training with realistic scenarios using the equipment that will actually be used during real emergencies
- Identifying communications weaknesses in advance
- Explosives and device recognition
- Policies, procedures, and tactics

The preparations for dealing with major incidents requires not only training, but extensive exercises through the use of Table Top, Functional, and Full Scale Exercises.

Mrs. Paloma Rey, SAMUR

The Emergency Management System in Spain is based on a regional framework. Thus the **Servicio de Asistencia Municipal de Urgencia y Rescate (SAMUR)** equipment and training standards that are in place for the SAMUR are not necessarily the standards that are in place for the rest of Spain.

In order to maintain a high level of training with their personal protection equipment (PPE) the well equipped vehicles of the SAMUR respond to numerous non-medical emergencies.

PPE Improvement Workshop

On 13 January 2009, in Amsterdam, Netherlands, emergency medical experts representing Spain, Italy, the Czech Republic, Israel, and the Netherlands, present at the PERSONAL PROTECTIVE EQUIPMENT (PPE) FOR FIRST MEDICAL RESPONDERS IN DISASTERS WORKSHOP organized by the Shield Group and the Institute of Terrorism Research and Response, identified the following issues relevant to The wearing of Personal Protective Equipment (PPE) while providing emergency medical services in the Warm Zone of a hazardous materials incident or event or other disaster:

- PPE must be designed that permits the fine movements required for medical care
- Breathing apparatus used by should be designed to be less scary to the public and to the wearer
- Current breathing apparatus does not permit adequate ability to communicate through existing communications equipment. The failure of the equipment to work together reduces clarity of communications or the integrity of the PPE.
- Current equipment that is used by EMS was designed for industrial applications, not EMS. Emergency medical personnel need equipment that was designed for the EMS task (e.g., reinforced knees in garments)
- The current “PPE manufacturer – EMS user relationship” does not have a feedback mechanism (to the manufacturers) for design improvements
- Current EMS PPE equipment has not been designed for the differences in gender physical structures. The failure to address these difference results in poorly fitting garments that can inhibit movement.
- Emergency Medical personnel need multi-use “everyday uniforms” that can be worn as a component of PPE within the warm zone
- The issue of heat build-up within PPE is a critical issue affecting the wearer’s ability to perform tasks over an extended period. Breathable suits that permit heat/moisture build-up to exit the suit (similar to Gore-Tex) while still permitting safe emergency medical work in the warm zone is a design request for the next generation of PPE.
- There is a confusion of standards as to when certain levels of PPE are appropriate – and when they are not. There should be 1 set of standards – civilian and military, providing guidelines on when to use PPE and at what level.
- Smart sensors in air breathing filters currently exist. However, the wearer is unable to ascertain when his/her filter requires replacement.

- Because of the civilian nature of EMS, Emergency Medical personnel have different vision correction (glasses) and some have facial hair. Breathing apparatus that will fit with beards and glasses should be designed.
- Equipment that is environmentally stable so it can be stored in vehicles
 - Example: gloves that deteriorate because of the high heat environment of Israel (current designs permit storage in storerooms, not necessarily in vehicles)
- Standards produced by manufacturers for ongoing certification of equipment in use in the field
- Different EMS organizations have different combinations of equipment. However, there is no independent validation of what equipment will provide acceptable levels of protection with other equipment.
- Emergency Medical personnel have various levels of training. Because of this fact, PPE that is designed to be intuitive (“idiot-proof”) and can be used with minimal training should be developed.
- Face pieces of breathing apparatus should be designed to be anti-fogging
- Emergency Medical personnel would benefit from the standardization of
 - Training and guidelines
 - Placement of equipment on vehicles
 - Credentialing of personnel
 - Color coding of equipment for identification of personnel and to identify task

MEDICAL PPE STANDARDS WORKSHOP

Attendees

Israel	Richman,	Aaron	ITRR
Israel	Richman,	Esther	ITRR
USA	Perelman,	Michael	ITRR
Israel	Segal,	Kinert	ITRR
USA	Yonkman,	Joel	ITRR
Aruba	Dompig,	Gerold	Shield Group
Italy	Allessandra,		Diodati Italian R.C
Israel	Rafalowski,	Chaim	MDA
Spain	Gimenez,	Juan	Samur Esp
Spain	Rey,	Paloma	Samur Esp
Netherlands	v.d.Woude,	Irene	Ambul.Ned
Netherlands	Vullers,	Theo	Ambul.Ned
Spain	Fernandez,	Ignacio	Samur Esp
Netherlands	Hoogeveen,	Margreet	Ambul.Ned
Luxembourg	Steffens,	Rainer	DuPont
Czech Republic	Mikes,	Tibor	Sujchbo