Training Israeli Medical Personnel to Treat Casualties of Nuclear, Biologic and Chemical Warfare

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Abstract

Recent events have significantly increased concern about the use of biologic and chemical weapons by terrorists and other countries. Since weapons of mass destruction could result in a huge number of casualties, optimizing our diagnostic and therapeutic skills may help to minimize the morbidity and mortality. The national demands for training in medical aspects of nuclear, biologic and chemical warfare have increased dramatically. While Israeli medical preparedness for non-conventional warfare has improved substantially in recent years especially due to extensive training programs, a standardized course and course materials were not available until recently. We have developed a core curriculum and teaching materials for a 1 or 2 day modular course, including printed materials.

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The use of chemical or infectious agents against civilians and military personnel is not a new idea; in fact, various agents were used almost a century ago during World War I. Several nations and terrorist groups are currently involved in an attempt to create an arsenal of such agents to be used as weapons of mass destruction. Public awareness around the world has grown over recent years as a consequence of several mass casualty incidents. However, it was the tragic events of 11 September 2001 in the United States and the subsequent use of envelopes containing anthrax spores that dramatically increased the concern regarding the use of biologic and chemical weapons by terrorists. Even before the September 11 attacks, U.S medical officials and others were engaged in special preparations to confront the threat of non-conventional warfare [1]. Another example of the potential threat to modern society was the Tokyo subway incident in March 1995 when the nerve gas sarin was used against civilians, resulting in thousands of casualties. This incident indicated the need for a systematic approach for evacuation and management of casualties in such a scenario and the importance of community-based efforts and preparedness for terrorist attacks [2,3]. The recent attacks on the World Trade Center and the Pentagon underscore the fact that terrorism may use unexpected types of weapons.

These incidents and the attacks on the Israeli civilian population during the last year demonstrate that the actual use of weapons of mass destruction against a civilian population may depend only on their availability. Israeli military and non-military institutions have been involved in preparing for the event of non-conventional warfare for many years and the theory and practice of mass casualty incidents were always taught. However, following the Iraqi threats and subsequent missile attacks on Israeli cities during the Gulf War in 1991, the Israeli medical system became engaged in an effort to increase its preparedness. Accordingly, a new approach for the utilization of our civilian and military resources was adopted and the home front command was established in 1992. As a result of this development and the increased need to improve civilian preparedness for dealing with casualties of non-conventional warfare, the home front command together with the Israel Defense Forces Medical Corps substantially increased their nationwide educational activity. Most of the hospitals that include a functioning general emergency department have been trained by military medical advisors and indoor experts on the handling of nuclear, biologic and chemical warfare casualties, and were taught the principles of managing a mass casualty incident of non-conventional warfare. However, as more and more medical professionals became involved in these processes the need for standardized teaching utilities, methods and topics became clearer. Due to the increased demand for continuous medical education in this field, and together with the experience accumulated in the IDF, we have created a core curriculum and methods to teach the medical aspects of NBC warfare in Israel.

Do Israeli doctors and paramedics need a course on the medical aspects of NBC warfare?

The need for this type of knowledge has long existed in Israel, but it was only in the last decade that a nationwide training program was established and applied. The medical preparedness for conventional warfare and terrorist attacks in Israel are being tested, sadly, in real time and far too often. Fortunately, the real-time performance of Israeli emergency medical personnel in an NBC incident has so far not been tested. Many medical personnel in Israel are unfamiliar with this topic, mainly because it was never taught routinely in our medical schools. Moreover, it seems that the fear of the unknown demoralizes some medical personnel and leads them to assume that medical efforts in such incidents are doomed to be futile. Based on the medical literature and the minimal training programs that are available in many countries, it would be reasonable to assume that we can still improve our performance

IDF = Israel Defense Forces
NBC = nuclear, biologic and chemical

significantly and that correct educational interventions are the key for improving our preparedness [4,5].

Why should we apply a standardized approach to training?

The advantage of a standardized course has been shown for other topics. Among them are: The Advanced Cardiac Life Support Course (ACLS) provided by the American Heart Association, and the Advanced Trauma Life Support Course (ATLS) by the American College of Surgeons. Since the learning experience with these courses has been substantial, the extensive educational activity and spread of knowledge may be a model for our course [6–9]. While course format and style may be variable and based on participants' needs, the course objectives (knowledge and skills) and the evaluation methods should be constant [7,10]. The creation of a standardized course may also improve our ability to influence the content and integrity of the core curriculum. Establishing a central educational facility that includes a supervisory panel may improve the downstream flow of knowledge and help create a constructive process of bilateral feedback. It may also assist in evaluating new medical interventions and technologies or advanced educational concepts.

What should we teach?

In April 2001 the American College of Emergency Physicians, together with the Office of Emergency Preparedness and other U.S. national organizations, issued a final report on the training of emergency medical personnel to care for casualties of NBC incidents [11]. An important part of this extant data analysis involved the review of six prominent courses that were nationally available in the U.S. These included:

- Medical response to biologic warfare and terrorism
- Medical response to chemical warfare and terrorism
- Medical planning and care in radiation accidents
- Domestic preparedness for hospital providers
- Domestic preparedness for emergency medical system technicians
- Emergency response to terrorism: basic concepts

We believe that the Israeli official course for management of NBC casualties should integrate elements of all of these courses. More specifically we should teach:

- The medical aspects of NBC warfare or terrorism. More specifically the course should cover the medical management of the following topics: a) chemical agents including nerve gas, mustards, cyanides and others; b) biologic agents classified into three categories: toxins, non-contagious agents, and contagious agents; and c) radiation injuries; and d) the use of antidotal drugs.
- Triage and the principles of a mass casualty event.
- Hospital or army unit organization and performance in such an incident (including medical personnel safety and the use of protective gear, patients' safety, decontamination, coordination of medical and environmental efforts, and handling of fatalities).

We have prepared a core curriculum for a short (1 day) or a long (2 day) course. Both courses include a pre-test, lectures with slide presentations, videos, hands-on practice, final examination, and debriefing. The courses will rely on our new textbooks and will confront the issues of diagnosis and treatment of NBC casualties. A modular approach is used to design the materials so that the content will be presented in reasonably sized modules and thus the course could be offered in a number of time frames. However, due to logistic considerations we prefer to deliver the course in a concentrated effort (1 or 2 days). Concentrating the course into 1 or 2 days may also allow students to enter a "non-conventional" state of mind for this short period. A modular approach would also facilitate tailoring the course to various audience levels. Modules and scenarios (including case studies and analysis of international experience in the modern era) were developed for medical personnel with varying levels of experience and knowledge. This will enable instructors to choose appropriate modules and activities or scenarios based on their trainees. Example of the course timetable and content is presented in Table 1.

How should we teach?

At present, Israeli military and non-military medical and paramedical personnel are exposed to a variety of teaching tools and materials. This includes lectures and simulation exercises for

Table 1. Management of nuclear, biologic and chemical casualties course: example of a 1 day curriculum*

Subject	Included topics and duration
Pre-test	Duration: 15 min
Introduction to non-conventional warfare	Historic perspectives and current threats (15 min)
Organophosphate intoxication	Pathophysiology, clinical presentation and syndromes (45 min)
Organophosphate intoxication – continued	Protection and management (45 min)
Mustard and other chemical agents	Including cyanides, "choking agents" and others (1 hour)
Basic concepts of biologic warfare	Identification and care (45 min)
Non-contagious agents	Models and specific clinical syndromes (45 min)
Contagious agents and toxins	Models and specific clinical syndromes (45 min)
Radiation injuries: basic concepts	Protection and therapeutic regimens (45 min)
Institution-based organization and command	Protection, preparation, scheme and communication: practical issues (45 min)
Post-test and debriefing	Evaluation of students and of the course (45 min)

* The 2 day course includes extended lectures, 3 hours of practice training and simulations, and 3 hours of OSCE (objective structured clinical examination).

military units and hospitals with and without the participation of simulated casualties. Other drills are conducted by the emergency medical system in Israel. Large-scale drills are also performed in order to increase the coordination of efforts in such an incident among different authorities such as the emergency medical system, hospitals, police department, the city authorities, Ministry of Health personnel, home front command, IDF medical corps, etc. At the national level, joint committees representing the different authorities will coordinate to develop new concepts but also to enhance educational efforts. The Israel Medical Association has also prepared some official statements on NBC issues, particularly in the area of bioterrorism. Computer-based material for the training of military paramedical personnel is also available.

Nevertheless, at present, most of the training programs available for physicians and paramedical personnel are based on lectures and simulated exercises. In our view, although passive learning may have its limitations, lectures are still needed. The core curriculum we have created will be presented on slides and recorded on a CD-ROM. Web-based materials should be developed as soon as possible to enhance public and professional access to the printed material. Our computer-based interactive software has recently been updated but is suitable at present only for the training of paramedical military personnel. We have tried to convey the main principles of NBC-related training together with pictures and videos presenting worldwide NBC incidents. However, the practical training of medical personnel and the simulation of an NBC scenario remain problematic. An animal laboratory session is viewed as unacceptable. We may still derive some benefit from institutional specific drills using simulated casualties and incorporate it into our course. However, the availability of "standardized patients" (experienced actors who play the role of simulated casualties and are trained to create a realistic environment and repeat it the same way for each trainee) and the recent advances and performance of sophisticated robotic simulators in the training of trauma patients' management may improve our ability to convey hands-on training [12–14].

Who should be taught?

The recommendations of the executive committee led by the ACEP and the U.S. office for Emergency Preparedness were confined to emergency medicine technicians, emergency physicians and emergency nurses [11]. We agree that emergency personnel and army physicians should be trained first, preferably in their original functioning unit. However, other paramedical professionals and hospital care providers should follow soon thereafter. In 2001 we began teaching this course to senior year medical students and it is now a mandatory course in all medical schools in Israel. An ACEP recommendation also supports the introduction of NBC medical aspects into medical schools [11]. Our initial experience with medical students is encouraging and already shows a short-term effect on the students' knowledge, as shown from preliminary pre- and post-training standardized tests (authors' personal communication). The retention of knowledge remains an important challenge [15]. An additional course for experienced care providers may serve in the future as a bridge to a higher proficiency level.

ACEP = American College of Emergency Physicians

Who should teach?

The faculty should include a supervisory panel consisting of content and medical education experts. This group would be given the responsibility for the consistency, quality and updating of the products developed. Train-the-trainer sessions should be offered at a national level for organizational indoor instructors to create a critical mass of trainers. The trainers may specialize in instructing specific populations in their organizations (hospital administrators, IDF doctors, emergency physicians, nurses, etc.). In addition, update meetings should be scheduled regularly to deliver faculty developments to the authorized instructors.

Summary

Training and learning about the medical aspects of terrorism and nuclear, biologic and chemical warfare are an important part of our national medical preparedness. There is a need for a higher level of proficiency. The importance of standardization in training and the coordination of efforts in the military and non-military medical institutions remain high. We have designed a 1 and 2 day course that became mandatory in medical schools and will be available to all medical training institutions in the near future. The courses will be crossed-referenced to our new textbooks. Video-based training and the use of standardized simulated casualties and simulators will enhance our hands-on practice and teaching ability.

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The fear of hell is hell itself, and the longing for paradise is paradise itself.

Khalil Jibran (1883–1931), Lebanese writer and philosopher