TAP CBRN Preparedness: Knowledge, Training and Networks

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Abbreviations:
15WCDEM = 15th World Congress on Disaster and Emergency Medicine
CBRN = chemical, biological, radiological, or nuclear
EMS = emergency medical services
TAP = targeted agenda program
WADEM = World Association for Disaster and Emergency Medicine

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Abstract

The main goal of this targeted agenda program (TAP) was the establishment of an international network that would be able to advise on how to improve education and training for chemical, biological, radiological, or nuclear (CBRN)) responders. By combining the members of the TAP group, the CBRN Task Force of the World Association for Disaster and Emergency Medicine (WADEM) and the European network of the Hesculaep Group, an enthusiastic and determined group has been established to achieve the defined goal. It was acknowledged that the bottlenecks for education and training for CBRN responders are mainly awareness and preparedness. For this reason, even basic education and training on CBRN is lacking. It was advised that the focus for the future should be on the development of internationally standardized protocols and standards. The face-to-face discussions of the TAP will be continued at future Hesculaep expert meetings. The intention is that during the 16WCDEM, the achievements of the established network will be presented.

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Introduction

When a chemical, biological, radiological, or nuclear (CBRN) event occurs, life or death often is determined within the first few minutes of its onset. The medical knowledge and expertise of CBRN responders can make a critical difference in CBRN disasters with respect to the mortality, morbidity, and social consequences. In this article, CBRN responders are defined as all first responders (fire, police), emergency medical services (EMS) personnel, and officials from the Public Health Departments. If a CBRN event occurs, CBRN responders must be knowledgeable in how to: (1) protect themselves and others from further harm;[1,2] (2) communicate effectively with other emergency personnel and the media;[3–5] and (3) address the unique psychological impacts and related social chaos that may ensue when CBRN agents are involved.[6,7] Most important in these situations is the need for efficient coordination among local, state or region, and national emergency response efforts.[8]

Dealing with CBRN incidents can be divided into three major parts: (1) daily emergencies; (2) large-scale accidents; and (3) terrorism. Concern has been expressed that knowledge, specific expertise, and education and training of CBRN responders working in the field of hazardous materials (hazmat) are not well organized because of the lack of standardization, availability of necessary protocols, training programs, and international standards.[9–13]

The main purpose of the Targeted Agenda Program (TAP) during the 15th World Congress on Disaster and Emergency Medicine was to provide answers to the following five research questions:

1. What is the bottleneck in dealing with CBRN issues?;
2. Which detection equipment should be used by CBRN responders?;
3. To what extent are individual countries prepared for CBRN-related events when the event is caused by an act of terrorism or by an industrial accident?;

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4. To what level should CBRN responders be trained in the different areas of disaster management?; and
5. What specific medical knowledge should be available for CBRN responders when the event is caused by an act of terrorism or by an industrial accident?

The Medical Emergency Preparedness and Planning Office, the Netherlands (GHOR Nederland) started a TAP) for the 15WCDEM. The project was relevant for GHOR Nederland because new educational initiatives related to the development of expertise in responding CBRN incidents and disasters, recently had started. Obtaining information from an international network would further improve the national educational initiatives.

Methods

An initiating discussion paper showed as the start of the TAP. Three questions were formulated to be answered during the Congress:

1. What are the state-of-the-art and best practices at this moment?;
2. What developments are foreseen for the near future?; and
3. What are the needs for further developments from the point of view of CBRN responders; focus should be twofold: (1) "What state-of-the-art data is available;" and (2) "What is needed".

After this initiating discussion paper had been placed on the TAP section of the Congress Website, international experts dealing with CBRN, education, and EMS were contacted with the invitation to become actively committed to reach the defined target during the 15WCDEM, and to participate in an online discussion about the topic before the beginning of the Congress. Experts, who had access to the Website, could respond, advise, criticize, or support the information provided in the initiating discussion paper as published on the Website.

The online discussion between the invited experts did not flourish. Therefore, the TAP group was coupled with the CBRN working group of Hesculaep in which GHOR Nederland was participating. The objective of the Hesculaep Project (Health Emergency National Regional Programs for an Improved Coordination in Pre-Hospital Setting) is to improve the overall management of medical emergencies in the European Union Member States by developing consistent and structured coordination of national research programs. The threat of CBRN terrorism and new diseases (e.g., severe acute respiratory syndrome (SARS)) show that Europe must prepare for these threats at a transnational level. The long-term vision of Hesculaep is to establish coordinated, transnational activities and research programs. The CBRN working group is part of Work Package 3 of Hesculaep, which involves the identification and analysis of strategic activities. Also, members of the CBRNE Task Force of the WADEM were interested in participating in the TAP and were invited to participate in the TAP.

To facilitate the discussions, an inventory of opinions was completed, from which 19 discussion statements were formulated concerning knowledge, education and training, and networks to reflect on the status of preparedness in the country or region of the TAP participants. These statements were designed to stimulate discussion. All TAP and Hesculaep members received the statements two weeks before the Congress and were urged to respond.

During the Congress, many participants, together with the inventory of opinions, resulted in intense and stimulating discussions. Due to the time required to discuss the items on the inventory by mutual agreement, only five items from the inventory of opinions were selected and discussed in-depth.

Results

The discussions of the five items of the inventory of opinions led to the following results:

1. What is the bottleneck in dealing with CBRN issues in EMS?

The participants concluded that the bottlenecks for CBRN issues for CBRN responders are awareness and preparedness.[14–17]

Awareness can be divided into two levels: (1) the responders dealing directly with the incident; and (2) the policymakers that should reserve the budget to help the responders prepare. Therefore, an important issue for creating awareness is defining the exact benefits related to CBRN education and training. These benefits include a quicker understanding of the given situation that leads to more efficient and effective response by which the situation can return to normal more quickly.[18] A Canadian study calculated the human and economic consequences of a bioterrorist attack in Canada using aerosolized *Bacillus anthracis* and *Clostridium botulinum*. The results of this study indicated that an investment in planning and preparedness to manage the consequences of such an attack can reduce morbidity, mortality, and economic costs.[19]

Moreover, it should be recognized by the (local) authorities that the way the public will perceive a deliberate release of hazardous materials may influence the expectations towards the responses, and therewith, the expected level of preparation and amount of available resources,[13,20–22] This, however, may differ between countries, as it is dependent on culture and historic experiences.

The development of (if possible evidence-based[23]) international standards and guidelines for the multidisciplinary health responses to major events should be the first focus for education and training. Another important focus for action is to understand that a current inventory of education is needed that the operational, tactical, and strategic officials from the CBRN responders are receiving, and how this compares to the needs of the tasks of the official. The inventory also should include an overview of national and international courses that currently are available. This inventory is needed in each member state of the participating countries. In this way, the gaps in knowledge can be detected and suggestions for the need for specific and joint developments can be discussed and planned.

2. Which detection equipment should be used by CBRN responders?

Participants of the TAP concluded that detection is part of a triplet of actions: (1) detection; (2) identification; and (3) monitoring. Simple, pre-tuned devices for detection are available for non-expert responders, such as an explosion danger meter, which can be used to detect the presence of a gas that could explode. Other pre-tuned devices include a dose-rate meter, which can be used to detect the presence of nuclear agents.

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More sophisticated detection equipment, such as chip measurement system (CMS) analyzers, ion-mobility spectroscopy (IMS), or infrared spectroscopy-based methods, only should be used by specified teams—these devices require interpretation by experts. The ability of devices to detect all CBRN agents is an illusion. It is practical but not possible, to operate all of the available detection equipment and interpret all of the results by just one expert. Therefore, before answering the question "Which detection equipment should be used", it is essential to define which variables should be detected. Only then can the question can be answered.

3. To what extent are individual countries prepared for CBRN-related events when the event is caused by an act of terrorism or by an industrial accident?

The participants of the TAP concluded that dealing with CBRN-related incidents caused by terrorists is different from dealing with CBRN-related incidents that occur in the chemical industry.

In terms of medical treatment, the approach of dealing with terrorist and industrial CBRN incidents will not differ in most situations. However, it was a common opinion that CBRN incidents caused by terrorists, in general, generates more victims than do industrial CBRN incidents. But, substantial differences will occur while managing the incident from a tactical and strategical point of view. Dealing with terrorist CBRN incidents not only involves the agents released, but many more issues, such as collecting evidence, trying to find the motive, and the group or person responsible. Also, dealing with the fear that an attack may evoke and dealing with the subsequent public opinion is a challenge unique for these incidents.[6,7,20–22] Accidents in the chemical industry can be dealt with by sealing of the area and the agents released.

Irrespective of the cause, each country should be prepared to deal with at least 500 victims of a CBRN accident.

4. In case of a CBRN event, to what level should CBRN responders be trained in the different areas of disaster management?

Participants in the TAP concluded that daily emergencies involving chemical agents are not handled well. Minimum knowledge of all CBRN responders is set to include the recognition and fostering of awareness, self-protection measures, notifying the experts and authorities, and knowing the command and control structure and strategy that should be applied during CBRN disasters.[18,24] The content and level of the education and training should be mapped to the needs of the responder. To be able to handle daily small-scale events, a minimum level of knowledge should apply for all CBRN responders. A more thorough knowledge is needed for the more sophisticated incidents.

Additional education and training for those in charge for the medical treatment in CBRN disaster situations is needed.

5. What specific medical knowledge should be available for responders on CBRN accidents when the accident is caused by an act of terrorism or by an industrial accident?

Due to geographical, demographical, historical, and industrial characteristics, there may be large differences in the level of preparedness that is needed on local, regional, and national levels. Some countries have experienced terrorist attacks. Also, the threat of terrorist attacks is not the same in all countries. Therefore, the level of preparedness will differ by country, but may be better in countries with a history of terrorist attacks.

Overall, dealing with a CBRN event always starts at the local level. Initially, there are no differences in the knowledge needed when dealing with a CBRN agent—this general knowledge is (or should be) included in the basic education and training.

Apart from these five questions, experts discussed the establishment of an international, multidisciplinary network. The network should facilitate the exchange of knowledge concerning best practices for CBRN responses. Moreover, the network could be used to develop (if possible evidence-based) international standards and guidelines on CBRN education and training for the multidisciplinary health response to major events and accidents. This will lead to improved education and training for CBRN responders.

As other international networks already exist, it was considered that a logical step is to combine the networks to form one, stronger network. Therefore, the CBRNE Task Force of the WADEM and the CBRN working group of Hesculaep were linked during this TAP.

Discussion

The TAP CBRN Preparedness: Knowledge, Training and Networks has led to the establishment of one, strong, international network that has set goals in order to improve the medical knowledge and expertise of CBRN responders. This network, comprised of the Hesculaep Group, the WADEM CBRN Task Force members, and the TAP group members, not only should be able to guarantee a specific or shared level of education for the officials, but also will facilitate the international exchange of trainee posts; knowledge and the way of coping with CBRN incidents will be interchangeable between countries.

It was acknowledged during the TAP sessions that at this moment in time, even best practices in CBRN management are of poor quality. Basic training in CBRN is lacking, but necessary. It became apparent that a joint international vision, for which the first steps have been taken during the TAP sessions, is a prerequisite to be able to improve the current situation.

An important first step that is required to develop CBRN management is the manufacturing of an inventory of existing CBRN protocols worldwide. This inventory should focus on "tasks" rather than on "functions", to be able to compare local, regional, national, and international levels and protocols. Each CBRN responder will have different tasks, and responsibilities—and therefore, will not be at the same function by definition, meaning that a fire officer in one country can have different tasks and responsibilities as a fire officer in another country, while having the same function. However, if a task can be linked to a responsibility that can be linked to an existing protocol, a clear picture will emerge on the specific knowledge, expertise, education, and training necessary for each CBRN responder involved. This approach will facilitate a structured comparison between different countries. To be able to accomplish such comparisons, first a clear, uniform description on

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international levels of tasks and responsibilities should be aimed for, as the same functions in different countries can have different tasks. The ultimate goal of the inventory will be the development of internationally accepted standards on the minimum desirable as well as country-specific, tailor-made requirements required to fulfill a specified task. The WADEM is the right forum to identify the training that is lacking, and therefore, identify what is needed.

Based on the outcome of such an inventory the development of internationally recognized standards and guidelines on education and training can be started for CBRN responders, followed by the identification and, if possible, setting up training programs for experts and train-the-trainer sessions.

The subject of the TAP CBRN Preparedness: Knowledge, Training, and Networks attracted many people during the Congress. It was apparent that the topic is high on the agenda of policy-makers, researchers, clinicians, responders, and other experts from around the world. The pre-Congress inventory of opinions turned out to be a useful tool to initiate and stimulate the discussion.

The idea of a TAP is interesting and a perfect tool to gather knowledge about a given subject and to streamline and collect the available knowledge from a group of experts from various scientific and geographic backgrounds. However, starting a TAP from scratch, based on experts who had never met, seems hardly possible. Besides, the full agendas of people involved, beginning a not so well defined online discussion before the Congress started—although conceptually interesting—is a challenge.

However, the series of face-to-face meetings during the WADEM Congress were successful. Mentally, many experts were prepared to participate. Due to the set up of these meetings, all members had the opportunity to collaborate on the chosen items and reflect on how the issues were organized in their own country. As several countries participated in the discussion, a basis has been set to guarantee the follow-up of the outcome in future meetings and congresses.

Looking back, it seems that the TAP approach can be continued as an excellent tool to continue the discussion, during the preparation period of future congresses.

Conclusions

The conclusions drawn by the CBRN TAP group are:

1. Basic training on CBRN for CBRN responders is lacking, but necessary;
2. International protocols and standards are desirable;
3. In order to determine what detection equipment is needed for use by CBRN responders, the purpose and strategy when the outcome of the measurements is known, must be established first;
4. Dealing with terrorist attacks involving CBRN and dealing with industrial CBRN incidents does not differ in terms of medical treatment. However, managing the incident from a tactical and strategic point of view, will differ; and
5. Dealing with a CBRN accident always starts local and at such a moment that there are no differences in the knowledge needed when dealing with a CBRN agent (as this general knowledge is included in the basic training).

Participants

The group that joined the TAP discussions during the 15WCDEM was comprised of the following people: David Baker, Health Protection Agency, Central Office, United Kingdom; H.W. Broekman, VU University Medical Center, the Netherlands; Clarence Brown, Organization for the Prohibition of Chemical Weapons (OPCW), the Netherlands; Gudrun Cassel, Swedish Defense Research Agency, Sweden; Johan de Cock, Medical Emergency Preparedness and Planning Office, the Netherlands; Zeger Hutten, Utrecht Public Health Service, the Netherlands; Pier Luigi Ingrassia, University del Piemonte Orientale "A. Avogadro", Italy; Marianne Leenders, National Poisons Information Centre (NVIC/RIVM), the Netherlands; Marco Tengattini, University. del Piemonte Orientale "A. Avogadro", Italy; Charlotte Meiss, Safety Region Utrecht, the Netherlands; Stephen Neawt, Organization for the Prohibition of Chemical Weapons (OPCW), the Netherlands; Tetsu Okumura, Department of Acute Medicine, Kawasaki Medical School, Japan; Will van Roessel, Medical Emergency Preparedness and Planning Office, the Netherlands; Alessandra Rossodivita, San Raffaele Hospital, University. "Life and Health", Italy; Marc Ruijten, Crisistox, the Netherlands; Irene van der Woude, Medical Emergency Preparedness and Planning Office, the Netherlands; Andreas Ziegler, Emergency Medical Service, Austria.

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