Review

PUBLIC HEALTH PREPAREDNESS FOR CHEMICAL INCIDENTS IN EUROPE

Dinko KELLO*

MED-EKON Consulting and Services, Zagreb, Croatia

Received March 2003

In response to the attack of 11 September 2001 on the USA, World Health Organization (WHO), Regional Office for Europe took immediate steps in order to be able to assist countries in case of a terrorist attack. Among other things, WHO organised a series of different consultations with international organisations, government representatives and experts in order to assess the state of preparedness at the national and international levels, to identify the main problems and to make recommendations. The problems were addressed in the context of possible public health consequences, regardless of whether such an incident derived from a deliberate act or a naturally occurring event. This overview gives a brief account of presentation made at the European Union "First Civil Protection Forum", which was held in Brussels in November 2002, and which served as a basis for defining the EU priorities and actions to make Europe a safer place to live.

KEY WORDS: *chemical accidents, chemical incidents, crisis communication, early warning system, emergency preparedness, poison control, prevention, public health, terrorism*

The 11 September 2001 attack on innocent civilians confirmed that the threat of deliberate use of biological, chemical, or radiological agents by terrorists must be considered very seriously. The World Health Organization (WHO) took immediate steps in order to be able to assist countries in case of a terrorist attack. Among other things, WHO updated a manual for the public health response to biological and chemical weapons, prepared other relevant guidelines and manuals, and organised a series of different consultations with government representatives and experts in order to assess the state of preparedness at the global and regional levels, to identify the main problems and to agree on the priority actions. The problems were addressed in the context of possible public health consequences, regardless of whether such an incident derived from a deliberate act or a naturally occurring event.

The question to be asked is how well are the countries and the international community prepared to respond to chemical incidents in general, such as industrial, occupational or domestic accidents, or to the deliberate use of chemical agents by terrorists. In order to provide the most reliable answers to this complex question, WHO has organised a series of different meetings in order to consult governments, experts and other relevant international organisations concerning problems and recommendations for priority actions. The most important events that took place in 2001 and 2002 are presented in Table 1. Most results of these international consultations have been published (1-6), or are available on different websites (*http://www.euro.who.int*, *http://who.int/csr/delibepidemics*).

This paper summarises the assessment made by WHO and other relevant international organisations of public health preparedness and response to chemical incidents by countries and in the international community. The summary of this work was presented at the international conference organised by the

* Dr Dinko Kello is the former staff of WHO Regional office for Europe in charge of the Programme on Public Health Preparedness and Response in Europe

Table 1 *WHO/Europe: response to September 11, 2001*

2001	
SEPTEMBER	- established BT taskforce
OCTOBER	- adopted action plan
NOVEMBER	- organised consultation on BT and water services, Copenhagen
DECEMBER	- organised consultation on "Health cooperation in the face of terrorism", Futures Forum consultation of chief medical officers, Copenhagen
DECEMBER	- organised global consultation on public health preparedness for chemical incidents, Geneva
2002	
FEBRUARY	- organised consultation on epidemic risks and alert system, Lyon
MARCH	- organised consultation on national preparedness & response to biological weapons, Rome
APRIL	- organised consultation on European preparedness and response to chemical incidents, Copenhagen
APRIL	- organised consultation on surveillance of foodborne diseases and alert systems, Berlin
MAY	- WHO Assembly passed relevant Resolutions, Geneva
MAY	- organised consultation on roles of poison centres in bioterrorism, Lisbon
MAY	- participated in consultation "Is Europe ready for the threat of bioterrorism - Transatlantic collaboration, Brussels
JUNE	- organised consultation on communicable diseases surveillance in Europe, Portorož
OCTOBER	- international conferences on "Preparing for Chemical Incidents" in Cardiff,
NOVEMBER	- participation in International Conference "EU First Civil Protection Forum" in Brussels

European Union "First Civil Protection Forum" in Brussels in November 2002 (7). This presentation, as well as contributions made by other speakers and participants served as a basis for defining the EU priorities and actions to make Europe a safer place to live.

Public health preparedness by European countries

All European countries have, in one form or another, developed public health preparedness and response plans related to biological, chemical or nuclear emergencies. Most of those plans are based on different WHO guidelines or guidelines developed in association with other relevant agencies, such as International Atomic Energy Agency (IAEA), Organization for Economic Co-operation and Development (OECD), United Nation Environment Programme (UNEP), and other policy documents.

Chemical incidents of public health importance are common, and no country in Europe is immune to this problem. Although there is no single unified surveillance system of industrial accidents, there are some data available from different reporting systems, such as the UNEP Global report, the Agency for Toxic Substances and Disease Register (ATSDR) in the USA, or the National Focus for Chemical Incidents (NFCI) in the UK (8). Between October 2000 and March 2001, a total of 704 chemical incidents took place in the United Kingdom alone. Three of these incidents affected over 50 people (9). The UNEP has made a list of large incidents that involved hazardous substances. Large is defined as where 25 or more people have been killed, or 125 or more have been injured, or 10,000 or more evacuated. Table 2 shows the frequency and the outcome of large-scale public health chemical incidents between 1970 and 1998 (8). Since the ratio of the annual number of large scale incidents to all incidents in the USA and UK is about 1:600 and 1:400 respectively, the estimated number of all incidents worldwide could range from 100,000 to 500,000, if the same ratios were applied (8).

Table 2 *Frequency and outcome of large scale public health chemical incidents in 1970-1998 (8)*

Geographical area	No. of large-scale incidents	Died	Injured	Evacuated
USA	87	372	14,356	517,000
UK	9	167	489	133,000
Worldwide	350	13,000	100,000	3 million

The estimated total number of industrial accidents in the EU and accession countries appears to be around 9,000 a year (10). In the EU member states, there were 71 fatalities and 185 injuries on-site, and 5 fatalities and 37 injuries off site in "major" accidents as defined by the EU Seveso Directive (11).

Two of the most dramatic examples were the explosion in a petrochemical and fertilizer factory in Toulouse, France, in September 2001, which killed 29 people and injured over 2500, and the explosion of fireworks factory in Enschede, Netherlands, in May 2000, which killed 21 people and injured about 900 (12). The most recent episode is the disaster of oil tanker *Prestige*, affecting seriously the economy and life of people in Spain, Portugal and France (13).

In response to this new challenge, the World Health Assembly adopted a resolution (14) calling upon all countries to assess their public health preparedness and response to chemical incidents, as well as their capacities against biological, chemical or nuclear attacks.

In many European countries, special government committees or high-level decision-making bodies were established to coordinate different government sectors and services in the case of terrorist attack. As part of this process, some countries decided to establish special agencies that would deal with such new emergencies. For example, the United Kingdom decided to establish the Health Protection Agency that will embrace three essential pillars, that is, the chemical incidents programme, the communicable disease services and radio-nuclear protection programme (15). This major change followed a very comprehensive analysis which has been published in a report "Getting Ahead of the Curve" (16). The USA introduced even a more radical reform, setting up the Homeland Security Department composed of 24 former agencies and programmes (17).

These measures were introduced primarily because of the poor "horizontal" coordination and collaboration between different public services at all levels. It was identified as being a major obstacle to an effective response to terrorist attack. Since this problem is inherent in the existing legal framework and mandates given to different public services, no country in Europe has yet been able to set up a response system with a fully effective "horizontal" integration of services and actions (5).

Within this context a number of countries have decided to strengthen their central, regional and local planning, to ensure preparedness and response systems with clear command and control mechanisms. In some cases this requires changes in their legislation to enable the central government to act effectively in case of such an event since, typically, existing legal systems make local authorities fully responsible for public health preparedness and response, without any mechanism for horizontal and vertical "information management" or coordination of actions (5).

Since the existing emergency preparedness plans have not been developed for the purpose of responding to terrorism, simulation exercises are essential to evaluate whether revised preparedness plans will work in the case of a terrorist attack. The "Dark Winter", a smallpox simulation exercise in the US, carried out in May 2001 by the Johns Hopkins University, Centre for Civilian Biodefense Strategies, Baltimore, brought to the attention of the political leadership how vulnerable the US preparedness system was (18).

INTERNATIONAL PREPAREDNESS

WHO response to 11 September 2001

The World Health Organization immediately took a number of steps. The first task was to assess the state of preparedness at the global and regional level, identifying the ongoing programmes, guidelines and other available documentation that could be used immediately in case of terrorist attack. The second task was to identify deficiencies in the existing programmes and guidelines related to this specific public health threat. Finally, it was important to define the policies, strategies and the actions to be taken on a short-, mid-, and long-term basis.

The WHO Regional Office for Europe has established its anti-terrorist taskforce with links to the relevant units and programmes in WHO Headquarters and the European Commission. A quick inventory at the global and regional levels indicated that there are several ongoing WHO programmes that can be utilised fully in response to terrorist attack, particularly those involved with identifying and containing communicable disease outbreaks or responding to chemical incidents. Over the last three decades, WHO produced a number of different guidelines and training material relevant to public health preparedness and response to different emergencies. It was therefore possible to rapidly compose a comprehensive manual on public health response to biological and chemical

weapons that would cover all aspects of this complex problem. A comprehensive list of other relevant material and databases is available through WHO websites (*http://www.euro.who.int*, *http://who.int/csr/delibepidemics*).

In addition to this work, WHO has organised a series of different meetings in order to consult governments, experts and other relevant international organisations about problems and priority actions (Table 1). These consultations provided an assessment of the preparedness of individual countries, and appropriate action to be taken at the international level. However, all consultations underlined that the responsibility for the preparedness and response to chemical incidents lay primarily with the countries and local authorities and services. International actions should therefore focus on facilitating national efforts by providing good examples or specific expertise on request. There are, however, some problems that individual countries are not able to resolve alone, such as those involving trans-boundary public health hazards. Therefore, WHO has a crucial role in providing the international mechanism for collaboration between countries in such cases. One example is the establishment and maintenance of an effective international early warning system.

European Union response to 11 September 2001

A Declaration from the European Council in Ghent on 19 October 2001 called on the Council of the European Union and the Commission *…to prepare a programme to improve the co-operation between Member States on the evaluation of risks, alerts and intervention, the storage of such means, and in the field of research. The programme should cover the detection and identification of infectious and toxic agents as well as the prevention and treatment of chemical and biological attacks. The appointment of a European co-ordinator for civil protection measures will be part of the programme.*

A series of meetings took place at ministerial and senior administrative levels between the Member States and the Commission. The Commission established an ad hoc Committee on Health Security composed of high-level representatives of Member States, and a Task Force gathering all necessary expertise was appointed in order to assist in the design and implementation of the action programme requested by the Health Ministers. The Task Force became fully operational on 1 May 2002. The activities of the European Commission are also co-ordinated with the Global Health Security Action Programme of the G7 plus Mexico.

OCHA/UNEP response mechanism in environmental emergencies

The UNEP/OCHA Environmental Emergencies Section has the role of mobilising and coordinating international assistance for countries facing environmental emergencies. This mechanism can be activated and emergency assessment teams deployed in the case of major chemical or environmental disasters, including those caused by terrorists.

OECD programme on prevention of chemical accidents

The OECD Chemical Accidents Programme provides opportunities for experts from governments, industry, labour, and international organisations to exchange information and experience in order to help prevent chemical accidents and to respond appropriately if one does occur. The programme works in three areas:

- developing guidance on prevention of, preparedness for, and response to chemical accidents
- facilitating sharing of information/experience among OECD and non-member countries, and
- analysing special issues of concern.

There is a number of guidelines and related materials published or in print such as the second edition of the *Guiding Principles for Chemical Accidents Prevention, Preparedness and Response*, *Guidance on Safety Performance Indicators*, or the second edition of the *International Directory of Emergency Response Centres for Chemical Accidents* (a joint publication of UNEP, UNEP/OCHA and OECD). A meeting on "Counter-terrorism: New Security Risks Related to Chemicals" organised by OECD under the auspices of the Inter-Organisation Programme for the Sound Management of Chemicals (IOMC) was held in Geneva in June 2002.

Organisation for the Prohibition of Chemical Weapons – OPCW

The Chemical Weapons Convention is a binding global convention, and therefore represents one of the most important legal instruments in controlling

the proliferation and use of chemical weapons. Furthermore, there is a provision for assistance and protection to the countries, with the emphasis on the OPCW Response Mechanism related to Chemical Weapons.

SPECIFIC PROBLEMS AND CONSIDERATIONS

The main conclusion of this comprehensive evaluation is that an effective public health preparedness system against the possible terrorist attacks requires not only an effective coordination, but also that all components of this complex structure are in place and are fully functional. This complex system is usually composed of many independent agencies and services, many different professionals that are acting at different levels, from local to international (5). Therefore, the most common mistake made by government authorities is to focus on one or two components only, such as the medical first responders, or laboratories.

There are, however, some specific problems identified that are requiring special attention in improving public health preparedness and response to terrorist attacks, such as:

- Early warning system
- Role of poison control centres
- Risk communication
- Collaboration with economic sectors
- International collaboration

Early warning system

An appropriate early warning system is of special importance to contain the problem of deliberate intoxications within the smallest possible geographical areas, and in particular to prevent their spread across national borders. As early as December 2001, a decision was made to expand the existing WHO Global Outbreak Alert and Response Network (GOARN) to cover outbreaks of chemical origin (2). This early warning system is particularly important in the case of "silent" or suspected chemical incidents, when the time is critical in preventing the spread of poisons through the country or even across the border. The GOARN was established about five years ago to ensure global health security related to infectious diseases. The formal sources of information include 191 WHO Member States, regional and country offices, and the WHO Collaborating Centres and laboratories located throughout the world. Informal sources include nongovernmental organisations and the Global Public Health Intelligence Network (GPHIN). The GPHIN is an Internet-based system that constantly checks for reports and rumours of any outbreak of infectious diseases, whether naturally occurring or deliberate. Each report is then thoroughly checked and verified by a team of specialists at WHO, and an appropriate response planned and launched in conjunction with national and international partners. The main objectives, functions and components of the GOARN are described in more detail on the WHO website (*http://who.int/csr/delibepidemics*).

The *WHO/Europe Early Warning System* was established in 2001 as part of the *Computerized Information System for Infectious Diseases* (CISID – *http://cisid.who.dk*), with the purpose of timely dissemination of outbreak information between the countries, leading to effective intervention measures, including investigative and containment activities. The main objective of CISID is to monitor certain infectious diseases and provide a detailed description of clusters of cases by time, place and person.

The EU Early Warning System is the principal Community instrument that can be used for the purpose of countering threats to health from natural or deliberate exposure to biological agents (the European Parliament and Council Decision 2119/98/EC of 24 September 1998). This decision came into force in January 1999, and provided a basis for creation of a network between Member States and the Commission, linking officially designated structures responsible for the collection of surveillance data and authorities responsible for the implementation of control measures at the national level. This system aims at timely detecting outbreaks of any communicable disease regardless of its nature and source, including unusual epidemic phenomena. This network is now linked to a recently established, highly secured network for the collection and rapid exchange of information, between national "crisis committees", on any type of event which may be the result of a terrorist action involving the use of chemical or biological agents. The reinforcement of the network and the development of relevant strategies and mechanisms of rapid response to health threats are foreseen in the Commission proposal for an action programme in the field of public health (2003-2008). Under the second of its three strands of action, the programme includes activities to counter health threats and react to unforeseen events, enable

investigations and coordinate responses, including those related to bioterrorism and deliberate releases of chemical agents to cause harm.

It can be concluded that the quality of an international surveillance, alert and response system depends primarily on the quality of national epidemiological services. The epidemiological services are seen to be the backbone of national outbreak alert and response systems. It is hoped that the new *International Health Regulations (IHR)* will provide a framework for harmonisation and coordination between many surveillance and early warning networks currently operating in Europe, and in that way contribute to global health security.

Role of poison control centres

One of the main tasks of poison control centres is to provide a round-the-clock medical toxicological information on acute and chronic poisoning by chemicals. This involves both accidental and intentional poisoning, chemical accidents and disasters. A poison control centre provides information to the first responders related to the symptoms, diagnostics and treatment. It is desirable that clinical toxicologists are involved in this process to ensure that the information provided is the most appropriate and applicable.

Closer collaboration between the epidemiological and poison control services may significantly upgrade the preparedness and response to chemical incidents. In this context, poison control centres and clinical toxicological services should be involved in the preparation of public health emergency plans. They should be, also, fully involved at the onset of an outbreak. They should provide expert advice in identifying chemicals involved, thus facilitating the treatment of patients, the protection of first responders, and appropriate public information. In this respect WHO intends to launch a special collaborative programme to improve the teamwork between epidemiologists and poison control in Europe (5).

WHO has played a very important role in establishing national poison control centres in many countries and has provided very important services to poison control centres and clinical toxicologists over the years, including the interactive INTOX programme. WHO initiated the establishment of the European Association of Poison Centres and Clinical Toxicologists (EAPCCT) which has played an important role in launching different international activities.

Risk communication

All countries identified crisis communication as the major challenge in all emergencies, in particular when dealing with a suspected or real terrorist attack. Anticipating that the main objective of a terrorist attack is to induce panic and to disturb normal public functions, public communication is seen as a very important component of the preparedness system. Risk communication is still a major problem in public health preparedness and response to emergencies, including chemical incidents for the following reasons (5):

- Professionals in communication have not yet become members of multi-sectoral teams responsible for planning, assessing and responding to emergency situations
- Crisis communication is not properly planned prior to, nor executed during and after an event
- There is no knowledge available to predict human behaviour and public reaction to different forms of emergencies, in particular related to terrorist actions
- Authoritative communication tools and information resources to support planning, assessment and response to emergency situations are not available in an appropriate form.

International collaboration

Although the main responsibility and the burden of any chemical incident lies with local authorities and services it is clear that there are issues that countries cannot address alone, such as those involving trans-boundary public health hazards. For instance, the establishment and maintenance of an effective international early warning system is of great importance (3, 4).

All international consultations which have taken place on these issues pointed out the lack of an appropriate mechanism for coordination at the international level (2, 5, 7, 19). A number of specific recommendations were made, such as to establish a mechanism for sharing information, to establish a network of specialised reference centres and experts, or to develop incident-specific public health recommendations (5, 7, 17, 19, 20).

In this context, the possibility for establishing an international consortium of European centres of excellence was discussed recently at the international conferences on “Preparing for Chemical Incidents” in Cardiff (19) and at the EU “First Civil Protection Forum” in Brussels (7). It is clear that Europe has

enormous potentials and intellectual capacities, which are currently dispersed in the countries and not organised in an effective international force.

The experiences and lessons from the United States, not only in respect to 11 September, but also in relation to anthrax cases, the "Dark Winter" simulation exercise and the new homeland security initiative were found to be very valuable to the European countries. However, the transatlantic collaboration between relevant public health services, educational institutions and research centres is currently more sporadic than planned. The initiatives recently launched to upgrade this collaboration and to establish different collaborative programmes on more sustainable basis are expected to facilitate an upgrade of the international response capacity to the growing threat of terrorism (21).

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Sažetak

PRIPRAVNOST JAVNOG ZDRAVSTVA EUROPSKIH ZEMALJA ZA KEMIJSKE NESREĆE

Kao odgovor na napad na Sjedinjene Američke Države 11. rujna 2001, Regionalni ured za Europu Svjetske zdravstvene organizacije (SZO) odmah je poduzeo nekoliko koraka kako bi bio spreman da pomogne državama u slučaju terorističkog napada. Među ostalim, SZO je organizirao niz različitih konzultacija s međunarodnim organizacijama, predstavnicima država i ekspertima s ciljem da se procijeni stupanj pripreme na nacionalnoj i međunarodnoj razini, da se identificiraju glavni problemi, te da se donesu preporuke. Tim problemima pristupilo se u kontekstu mogućih posljedica na javno zdravstvo, neovisno o tome da li se radi o namjernom aktu ili prirodno nastalom slučaju. Ovaj pregled predstavlja kratki sadržaj uvodnog predavanja pripremljenog za "Prvi forum civilne zaštite" Europske unije, koji je održan u Bruxellesu u studenome 2002, a koji je poslužio kao osnova za definiranje prioriteta i akcija Europske unije, kako bi Europa postala sigurnije mjesto za život.

KLJUČNE RIJEČI: *javno zdravstvo, kemijski akcidenti, kemijski incidenti, kontrola trovanja, krizna komunikacija, prevencija, rano otkrivanje trovanja, terorizam, urgentna pripremljenost*

REQUESTS FOR REPRINTS:

Dinko Kello, D.V.M., Ph.D.
MED-EKON - Consulting and Services
Savska 41/VII, HR-10000 Zagreb, Croatia
E-mail: *dinko.kello@zg.htnet.hr*