timely intervention, minimizing exposure of casualties, and preventing exposure of wider communities, thus reducing burden of disease. This requires the assessment of available information regarding identification of involved chemicals, environmental interactions and reactions, and their collective toxicity profiles, likely media contaminated and expected levels of contamination. From this, at risk receptors can be ascertained, exposure assessed by a combination of environmental sampling, monitoring, and modeling, as well as biological monitoring. Epidemiological studies supplement HIA. Therefore, ascertaining public health risk requires collection, collation, and integration of numerous sources of information relating to source, pathway, and receptor. Interpretation and subsequent HIA requires collective expertise in environmental chemistry and toxicology, environmental science, human toxicology, laboratory medicine, and epidemiology.

In the United Kingdom, undertaking such rapid health risk assessments is a function of the Health Protection Agency (HPA). This was established on the 1 April 2003 to protect populations from the threat of infectious diseases, chemical, radiological, nuclear, and other environmental hazards. It is an integrated and holistic structure for advice and support on environmental hazards; one of the key core objectives is to prevent or minimize the public health burden of exposure to environmental chemicals through enhancing, emergency planning and preparedness, thereby ensuring effective and efficient response, and recovery. In accordance with the principles of integrated emergency management, it works as part of a multiagency, multidisciplinary team, including frontline responders, regulators, and other agencies, such that preparedness and subsequent response are co-ordinated and integrated, with the principles of HIA being used to target the HPA’s responsibilities in planning for, and responding to, chemical releases.

This role is well illustrated by the Buncefield incident of 11 December 2005. An explosion at a fuel distribution terminal in Hemel Hempstead, Hertfordshire, England, resulted in the largest post-war explosion in Western Europe. A dense black plume ~10 km across dispersed in a south-easterly and south-westerly direction. The temperature at the seat of the fire was estimated to be >3000°C, with the likelihood that the plume would largely consist of products of combustion, soot, and particulates. The plume rose very rapidly due to its high buoyancy. Environmental sampling data from air quality monitoring stations, together with soil and herbage samples were collected, collated, and interpreted. Despite calculations suggesting that large quantities of particulates (up to 8% of UK annual emissions) and other important pollutants including benz[a]pyrene and nitrogen dioxide had been released, monitoring data showed that the plume had not grounded. The incident had not led to elevated ambient air concentrations of key pollutants, suggesting that the public health impact of the plume was unlikely to be significant. This is in keeping with reports of few if any direct toxicological effects of the incident (shown in the unexceptional levels of hospital admissions and GP consultations). However, the HPA is investigating the potential psychological effects. Although there have been occasional assessments of these effects following incidents, this is a largely neglected area in the UK response to incidents. The HPA is developing a portfolio of skills and resources to ensure that this important aspect of individual and community health is not overlooked.

The Dutch experience with Health Impact Assessment of disasters

Marc Ruijten

Over the past decade, the Dutch government has learned that a crisis/disaster is not over when the fire has been extinguished, chemical spills have been contained or affected livestock has been cleared. Examples are as follows:

- The crash of an El Al airplane in a residential area in Amsterdam (1992, 39 fatalities), where a disaster Health Impact Assessment (HIA) amongst 7300 victims was initiated after 8 years under political and societal pressure.

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- Fireworks explosion in Enschede (2000, 22 fatalities): integral aftercare programme for the 20 000 involved people including HIA was started within weeks, and lasted 5 years.

- Café fire in Volendam (2001, 14 fatalities, 350 youngsters injured), where an integral aftercare programme was initiated within days.

- Avian flu epizootic (2003, 1 human fatality) with an immediate health response including infectious disease outbreak investigation and mental health aspects.

After the learning experiences with more reactive approaches to disasters, the Dutch government has adopted a three-pronged pro-active approach to health care provision and follow-up of disaster victims as follows:

- Development of a single information and assistance authority.

- Development and implementation of an integrated mental (health) care programme.

- Disaster HIA to develop an information basis for health care provision.

This article only deals with the disaster HIA. A disaster HIA is usually set in very complex political and societal circumstances. Some stakeholders may wish to put the incident behind, while others are concerned about (health) effects, and yet others are focused on criminal investigations and/or questions of guilt. A HIA may not appear to be necessary or even

References


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undesirable to some shortly after an incident.

**Why conduct disaster HIA**

The underlying goal of disaster aftercare is to contribute to the restoration of control at both individual and societal level. A disaster HIA may contribute to a proactive government response by providing information on the needs of the victims and, consequently, on the relief facilities required to support individual and collective post-disaster care activities. It may also serve to recognize and acknowledge the victims and their post-disaster problems. The following three main objectives of disaster HIA are recognized:

1. Provision of (health) care information:
   - Determining victims’ health state: type, numbers, development, and possible trends/patterns of health problems, either directly related and/or attributed to the disaster.
   - Identifying groups at increased risk, need for special health care (provisions).
   - Monitoring the effects of interventions.

2. Provision of (health) care policy information:
   - Initiation, adaptation and coordination of suitable (health) care provision.
   - Co-ordination and dissemination of information on the public health consequences of the disaster.
   - Development of protocols to improve disaster relief in future events.

3. Scientific objectives:
   - Improving understanding of mechanisms that affect the health and well being of disaster victims.
   - Improving understanding of the possibilities to prevent or minimize (persistent) health problems resulting from disasters.

In the above-mentioned Dutch disaster HIA’s different approaches have been applied, ranging from surveillance of existing or ad hoc health care registries, surveys of health and exposure end points, exposure assessment in contact media, screening, and evaluation or effect studies. Each study type has distinctive strengths and weaknesses depending on objectives, circumstances, and burden to participants.

**Organization of disaster response in The Netherlands**

In The Netherlands, disaster preparedness and response are managed by the regional public health authorities, fire brigades, police, and the municipalities. The mayor has overall command over disaster control, usually the fire chief has operational control. Depending on the severity, or if the (consequences of the) crisis or disaster cross administrative boundaries, the command and control can be scaled up to national level.

Therefore, any preparedness planning for disaster HIA needs to include all these players in local government, emergency response and public health organizations, and health care providers. This is a challenge in itself.

Disasters are rare, and hence the complicated undertaking of a HIA is not often needed. It would be unrealistic to expect that every regional public health authority prepare for such events. For this reason, a national Centre for Health Impact Assessment of Disasters (CGOR) was founded by the Ministry of Health, Welfare, and Sports to serve as a clearing house and support unit for local authorities.

**Initiate a disaster HIA, or not?**

One main function of CGOR is to provide the government with rapid and authoritative advice on whether or not to initiate a disaster HIA, its possible objectives, and an outline of the study programme. To this end an independent Expert Advisory Committee has been set up to provide such advice within 24 h after alert, on the basis of previously agreed rules of engagement.

**References**


**Recommendations to improve post-disaster HIA: planning before the disaster**

Pierre Verger¹, Marc Ruijten², David Russell³, Thierry Lang⁴

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**Why?**

Establishing the health impact of a disaster as completely, reliably, and credibly as possible is essential to provide information for a democratic debate about all of the issues (health, social, and economic) that these events might raise. Health Impact Assessment of disasters may provide essential information for designing, adjusting, and implementing the aftercare activities following a disaster, and improve decisions about future risk prevention and choices in development and zoning. Lack of appropriate and timely HIA response after disasters such as the Chernobyl accident or the Schiphol