WORLD HEALTH ORGANIZATION ORGANISATION MONDIALE DE LA SANTE

...../EPR/96 9
Distr. Limited
Original English
RHA969.DOC

Rapid Health Assessment

in Chemical Emergencies

9 August, 1996

CH-1211 GENEVA 27-SWITZERLAND Telegr UNISANTE-GENEVA Telex 415416 OMS Fax 791 07 46 CH-1211 GENEVE SUISSE Telegr UNISANTE GENEVE

Table of contents

1. Assessment Purpose and Background

1.1 Purpose of a Rapid Assessment

The purpose of a rapid health assessment in a chemical emergency is to.

- confirm the existence of a chemical emergency .
- identify the characteristics of the chemicals involved as well as the source of release and estimate its type, size, location and distribution
- determine the population at risk and the impact on health.
- assess local health response capacity.

1.2 Background

Most chemical accidents occur within the workplace, and may have no direct, large-scale and/or long-term effects. On such a limited scale, a rapid assessment is a relatively simple undertaking.

However, when a large number of people and a wider area are exposed to a chemical hazard, the assessment becomes a major exercise

Most accidents occur at the interfaces between transport, storage, processing, use and disposal. This is where controls are least, and probability of poor practices greatest.

The risks represented by the accidental releases of chemicals is increasing along with the number of new hazardous substances produced First, production, storage, transportation and use of flammable, explosive or toxic chemicals have increased significantly in both developing and developed countries. Second, greater and more centralised productions have increased both the quantities of chemicals manufactured and the distances they are transported. Third, population growth close to chemical plants and along transportation routes has increased the size and number of communities at high risk following a chemical accident.

The health impact of a chemical exposure is determined by the chemical itself, the exposure routes and the amount of exposure. Exposure pathways vary, depending on the stage of the release. During the release, health effects from dermal exposure and inhalation can be expected. In the post-impact phase, the greater risks are of dermal exposure through contact with contaminated objects, and of ingestion of contaminated food or water.

In many countries the Ministry of Health may not be responsible for managing chemical emergencies. However, the considerable health impact of a major chemical emergency calls for the active involvement of the health sector in the emergency preparedness process and in the assessment.

Chemical incidents can cause an emergency.

- **by acute release**: e.g. exposure to corrosive effects of ammonia, gas used as refrigerant;
- **by chronic release:** e.g pyrolizydine alkaloids found in plants that contaminate staple food crops and produce hepatic disease.

Also food contamination with chemicals or toxins can produce acute or slow onset emergencies that either way have long-term effects

This protocol will focus on assessing an acute chemical release which requires an immediate response.

As discussed in *Introduction to Rapid Assessment*, a chemical emergency should be first assessed within 24 hours following the incident at **the latest**. A more comprehensive assessment should be carried out later.

2. Conducting the Rapid Assessment

The rapid assessment consists of:

- confirming the existence of a chemical emergency,
- determining the source, site, type, size and distribution of the release;
- identifying the specific types of chemical and their reaction by-products,
- determining the population at risk and the health impact; and
- assessing existing health response capacity.

2.1 Confirming the Existence of a Chemical Emergency

The first alert or rumour that a chemical emergency is occurring may originate from a wide range of sources. A rapid visit at and around the site is important, in order to confirm or refute this first information.

Ask:

- Has some incident happened involving chemical substances?
- Has some incident happened in or around a chemical installation?
- Has an increase been noticed in the community or registered in the health facilities, of

  ⇒ irritation of the eyes, the skin, the mucous membranes?

⇒ cough, asthma, respiratory distress?

⇒ neurological illness?

Clinical examination of a sample of cases will help confirm the emergency

2.2 Determining the source, site, type, size and distribution of the release

This information is essential for defining the populations at risk, the potential range of exposures resulting from the accident and the measures that need to be taken.

The exact site and type of incident should be determined, especially as a chemical emergency may involve one or more types of releases. Other key characteristics include the size of the release (estimated weight or volume of the chemicals dispersed), and its distribution pattern (which is affected by weather conditions)

2.3 Identifying the specific types of chemicals and their reaction by-products

It is necessary to identify the chemicals involved in order to

- anticipate their likely harmful effects
- develop working case-definitions of exposed and injured individuals and set criteria for triage
- determine medical treatment for the injured and need for specific medication, decontamination and follow-up regimens for those exposed
- provide protective equipment for rescue personnel
- initiate control measures for environmental cleanup

The identity, quantity and ambient air concentrations of the chemical(s) can be determined through

- product labels (product name and UN number)
- contacting companies in charge of the manufacture, storage, transport, use or disposal of the chemicals
- contacting chemical information centres
- environmental sampling.

The collection of samples from the environment (air, water, food, soil, foliage) is important, as many unknown by-products may be produced in fires and explosions.

2.4 Determining the Population at Risk and the Health Impact

Determine the population at-risk

Gather information on the proximity and size of residential neighbourhoods, the location and numbers of high-risk populations (e.g. individuals with chronic illnesses, pregnant women, infants).

Evaluate toxicological risks and human exposure pathways

Environmental exposure and body burden measurements are usually not feasible during the acute phase of the accident. These require complex sampling and labour-intensive analytical procedures

Describe morbidity and mortality

For this to be done systematically, it is essential that a working case-definition is developed, and consistently applied During the actual emergency, it is not feasible to conduct a survey. However, it is important to collect information on whether there has been increased morbidity or mortality caused by the release

Analyse the information gathered

Time:

When did cases occur? Is their number increasing?

- Graph the daily number of cases,
- If the chemical accident has affected a wide area, graph separately for each affected community
- Survey known exposed groups.

Place:

Where have cases occurred? Are new cases being reported from other areas?

Are there accessible equipped and safe health facilities in the affected areas?

- Map the cases geographically.
- Use maps which have health facilities identified.

Person:

Which groups are at greatest risk?

- Examine data on age, sex, occupation, residence to identify highest risk groups.
- Estimate the numbers of hospital admissions and outpatient attendances for affected areas and specific facilities.

Make initial conclusions on the chemical accident

- Has a chemical release occurred?
- Has the causative chemical(s) been identified?
- What are the main risks for human health?
- How many cases or deaths so far?
- What is the geographic distribution of the cases?
- What is the size of the population at-risk?
- Do the effects of the accident appear to be spreading?

2.5 Assessing Existing Health Response Capacity

The response capacity of health services should be assessed with particular attention

- availability of first-line and backup emergency medical services (including health personnel and facilities)
- availability of protection equipment
- use of clear diagnostic criteria, standard treatment regimens and compliance with it
- availability of specific medication (e.g. antidotes)
- availability of facilities for decontamination of exposed individuals (including health workers)
- vulnerability of the health facilities to the chemical

3. Presentation of results and reporting

State the findings

- Define, quantify and map the populations at risk and/or already affected by the release.
- Determine the likely health effects of the chemical release.
- Estimate numbers of cases and deaths, and expected hospital admissions and outpatient attendances for the affected areas and specific facilities.
- Estimate needs for outside assistance based on preliminary findings (e.g qualified technical personnel, drugs, logistics, and communications support).

Give recommendations on

- Appropriate triage and case management
- Environmental control strategies to prevent further spread of chemical contaminants
- The need for population evacuation, and on how to proceed. means of information and communication with community, and relevant organizations, destination of evacuees, means of transport, routes of evacuation, etc.
- Appropriate care for those evacuated to temporary shelters
- Collection, identification and management of dead victims.

Annex - Rapid Assessment Checklist in Chemical Emergencies

1. General Information

1.1 date and time of the release

1.2 chemical released

1.3 location of the release

- country
- region
- community

1.4 population centres closest to the release

1.5 time of the assessment

2. Morbidity and Mortality

2.1 number of casualties

- mildly affected
- seriously affected

2.2 number of deaths

3. Site of the Release

3.1 source

3.2 location of source and address

3.3 are similar episodes being reported elsewhere?

4. Type(s) of Release (describe)

4.1 atmospheric dispersion

4.2 explosion

4.3 fire

4.4 spill

4.5 other

5. Size of Release

5.1 quantity of chemicals in the plant or storage site

- weight (kilogrammes or tonnes)
- volume (m^3 or litres)

5.2 amount of the leakage from a pipeline or a chemical tank (litres, tonnes, or flow rate)

6. Distribution of Release

6.1 meteorological conditions

- temperature
- wind direction to
- wind speed (metres per second)
- rainfall
- sunshine or cloudiness
- weather stability

6.2 geographic characteristics

- valleys
- mountains
- lakes, other waters

6.3 define risk zone

- size (square kilometres)
- area where personal protection is needed
- type of protective clothes needed
- type of respiratory protection

7. Define the Populations at Risk

7.1 number of individuals close to the release

7.2 number of individual houses close to the release

7.3 are any of the following close to the release?

- schools
- day-care centres
- hospitals
- shopping centres
- public buildings
- other vulnerable sites

7.4 is evacuation needed? if so, where?

8. Identification of the Chemicals and their by-products

8.1 observations related to the release

- colour
- odour
- signs and symptoms of exposed humans
- signs of exposed animals and plants
- other observations

8.2 information on the chemicals released

- correct technical name
- trade name(s) of the chemical(s)
- generic name(s)
- synonyms
- UN number, CAS number
- placards (on vehicle)
- UN hazard classification
- names of the by-products
- information source (individuals' names, chemical centres, or written documents, data sheets information)

8.3 environmental samples collected

- what samples were collected
- qualitative results of chemical analysis (chemicals identified)
- quantitative results (concentration of chemicals in the environment)

9. Toxicological Evaluation

9.1 safety information on the chemicals released

9.2 available information on the chemicals in databases and emergency response plan

9.3 physical and chemical properties of the chemicals

- molecular formula (to be completed later)
- molecular weight
- conversion factor (mg/m^3 = x parts per million)
- density
- vapour pressure
- boiling pressure
- flammability point
- critical temperature
- explosiveness
- solubility in water and other liquids

9.4 likely toxic effects of released chemicals

- irritation
- suffocation
- chemical burns
- dermal effects
- effects on eyes
- acute systematic effects
- chronic effects
- most critical health effects
- significant concentrations in air may cause
  - ⇒ lethality
  - ⇒ serious symptoms
  - ⇒ mild symptoms
  - ⇒ no symptoms

9.5 likely exposure route

- inhalation
- dermal absorption
- ingestion (contaminated water, food)

9.6 sources of further information

- data sheets
- text books
- data bases

9.7 possibilities for body burden measurement

- blood samples
- urine samples
- other samples

9.8 list of laboratories where analyses can be carried out

- names of laboratories, addresses and phone numbers
- back-up laboratories

10. Appropriate Treatment Regimens

10 1 describe (list) symptoms

10.2 describe standardized treatment

- maintenance of vital functions
- decontamination and enhancement of elimination
- general symptomatic treatment
- specific antidotes and their dose
- other specific poisoning treatment

10.3 psychological support (management of stress reaction)

10.4 registry of casualties

11. Emergency Medical Care and Health Service Needs and Capabilities

11.1 identify places where treatment can be given

- hospitals
- health centres
- field hospitals and temporary health centres
- public buildings (schools)

11.2 identify available human resource for therapy and first aid

- doctors
- nurses
- other health personnel
- volunteers

11.3 transport capabilities

- ambulances and other cars
- air transport capabilities
- transport routes available (map)

12. Environmental Health Assessment

12.1 water supply

- analysis of water safety for chemicals
- analysis of substitute water for chemicals and bacteria
- state of emergency water supply

12.2 food supply:

- analysis of food contamination
- availability of safe food

12.3 suitable shelters

13. General Response Operations

13.1 overall command

13.2 sectors involved (e.g police, fire brigade)

13 3 public information and communications

- awareness
- reassurance
- instructions

13.4 management of fatalities

- rescue operations for the dead
- morgue
- identification of dead victims
- burials.