Emergency Medical Response to Organophosphorus poisoning in Guangdong China

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Common organophosphates toxic

- **Extremely hazardous:**
  parathion 1605, phosphor 1059, thimet.
- **Highly hazardous:**
  methyl parathion, dichlorphos, Rogor, dipterex, etc.
- **Moderately hazardous:**
  karbofos, enemy insects, and fruit.

- used as Chemical terror attack agents
  Sarin
Common occurrences of organic phosphorus poisoning:
- Suicide (oral pesticide poisoning)
- Intentional poisoning
- Occupational poisoning

The great concern of organic phosphorus poisoning: Sarin poisoning as a chemical terror attack

Chemical terrorism:
---- Chemical Warfare Agents

Identification
- Chemical terrorism is the form of terrorism that uses the toxic effects of chemicals to kill, injure, or otherwise adversely affect the interests of its targets. It can broadly be considered a form of Chemical warfare.
In order to minimize the harm to society, emergency response should be based on the deployment of governments at different levels respectively.

Emergency response should follow these principles:

- Unified leadership, Hierarchical command, Appropriate task allocation, Closely collaboration, Harmonization, Rapid response, Efficient disposal, Confront together.
Principle of reporting

In the case of suspected terrorist attacks (whether there are victims or suspected victims), every unit or individual should report to public security first. The public security must seal and isolate the suspect objects, send to the professional institutions for detection, and report to local government. Local government report to the higher authorities.

Principle of management

The governments at various levels should coordinate various departments concerned to participate in the emergency response. And organize the rescue personnel and equipments. They are responsible for delimiting the control area, developing epidemic control measures, implementing population & traffic health quarantine, releasing information and so on in order to maintain social security and stability.
Principle of individual protection
Rescue workers should implement **effective personal protection** before entering danger area, and **mark down the names and the time (in&out)** and take drug prevention when necessary or possible.

**Operation Procedures for Chemical Warfare Agent Emergency Response**

- Early Warning
- Reporting
- Hazard identification
- Hazard evaluation
- Hazard Control
Operation Procedures of Emergency Response for Chemical Warfare Agents

懂事 Warning
- By Chemical accident information system at home and abroad and the Toxic information monitoring system.

懂事 Reporting
- Follow local laws and regulations

懂事 Hazard identification
- Main task is to identify the possible chemical warfare agents (usually by the professional team).

懂事 Hazard evaluation
- Make a quantitative assessment of the range of hazards and the casualty, provide scientific, systematic, and objective suggestions for the command.

懂事 Hazard Control
- The main measure is to form an equipped, fast-reacted, professional rescue team and set up an effective, efficient toxic information system. And the coverage of hospital network is also indispensable.
Chemical Warfare Agents in Terrorist Events

- **Nerve agent.** Such as sarin, soman, VX etc..
- **Systemic toxic agent.** Such as HCN, CNCl.
- **Vesicant agent.** Such as mustard gas, Louis gas, nitrogen mustard etc..
- **Choking agent.** Such as phosgene, diphosgene, CFCl₃, Cl₂ perfluorinated olefins.

Chemical Warfare Agents in Terrorist Events

- **Pesticides.** Such as phosphorus pesticide, carbamate, pesticide etc..
- **Toxins.** Such as botulinum toxin, tetanus toxin, etc..
- **Strong corrosive chemicals.** Such as NaOH, H₂SO₄, HNO₃ etc..
- **Other toxic and harmful chemicals** in civilian use. Such as pipeline gas, CO, H₂S, etc.
Targets might be attacked

- Guangzhou Metro/Subway
- Large chemical plants /warehouses
- Hospitals / schools / shopping malls
- A large or important group of people

Basic Principle for Rescue Workers in Chemical Warfare Agents Emergency Response

No. 1 Protect Yourself

No. 2 Save Others
No.1 Protect yourself

- Identify the general situation of event
- According to the possible chemical warfare agents, implement effective personal protection and choose safe areas to conduct the rescue
- Mark down the names (victims&rescue worker) and the time (in&out)
- Launch decontamination when necessary
- Take drug prevention before entering when necessary or possible
- Appropriate task allocation and collaboration
No.2 Save others

- Evacuation from danger area
- Decontamination
- Rescue and first aid
- Application of antidote
- Triage of the sick and wounded
- Transfer of the sick and wounded
Chemical Warfare Agents
--Organophosphorus neurotoxin

- Sarin or GB (G-series, 'B')
  - It is a colorless, odorless organophosphorus liquid with extreme potency as a nerve agent.
  - It has a high volatility and contact with the skin or breathed in.
  - It attacks the nervous system by interfering with the degradation of the neurotransmitter acetylcholine.

- Sarin
  - Death will usually occur as a result of asphyxia due to the inability to control the muscles involved in breathing function.

- Orally Toxic Dose Low (TDL₀) : 2 μg/kg;
- Cutaneously Lethal Dose 50(LD₅₀) : 28 mg/kg.
- Inhalation Toxic Concentration Low(TCL₀) : 90 μg/m³.
Clinical manifestations of sarin poisoning

- Like other acute organophosphorus pesticide poisoning, the clinical manifestations appear as constriction of the pupils, salivate, dyspnea, nausea, vomiting and sweating (Muscarinic action) twitching and jerking (Nicotinic action) and so on.
- The sever patients has signs and symptoms such as convulsions and coma (central nervous system damage).
- Blood AChE (cholinesterase) activity decreases.

Clinical manifestations of sarin poisoning

- The characteristics of acute sarin poisoning are sudden outbreak, no latency or short latency, fast process, short disease course, quick relief after treatment.
- The severe patients may present convulsions and coma quickly. It should be noted that this poisoning is different from HCN, CO, phosgene or diphosgene poisoning (onset in seconds).
Diagnosis of sarin poisoning

1. History of poisoning:
A group of people get poisoned at the same time suddenly, and smell a kind of fruit aroma.

2. Clinical manifestations:
Patients present with similar poisoning symptoms as neurotoxic agents poisoning

3. Laboratory tests:
The blood AChE activity decreases.

4. Identification of chemical agent
The nerve agent is detected.

Medical emergency rescue for sarin poisoning

- Wear a protective mask immediately and take anti-phosphorus tablets in advance when entering
- Remove the poisons in time, flush the poison in the eye with water or 2% of sodium bicarbonate; take off, or cut out the contaminated clothes; brush contaminated skin and wound gently with soft paper, cloth or handkerchief;
- Apply antidotes, atropine and pralidoxime
- Other treatments refer to general organic phosphorus poisoning emergency rescue.
Key to Chemical terrorism rescue

- The characteristics of chemical terrorism
- The common chemical warfare agent
- Identification and evaluation of chemical terrorism
- Medical emergency rescue for chemical terrorism
- Personal protection in the field
- Management and analysis of chemical terrorism medical emergency rescue

Equipment preparation for chemical terrorism emergency rescue

- 1. Medical aid equipments
- 2. Detection equipment
- 3. Hazard control equipments
- 4. Other materials
1. Medical aid equipments

- SCBA (Self Contained Breathing Apparatus)
- Protective mask (equipped with various types of filter tanks)
- Protective clothing (flame retardant and all kinds of chemical defense etc.)
- Consumables (apron, gloves, boots cover, cloaks)
- Specific antidote

1. Medical aid equipment

- Specific antidote
- Routine first aid medicine and equipments
- Decontamination agent (for personnel/equipment)
- Ambulance, Artificial breathing machine, Cardiac defibrillators, Oxygen supply system, Stretcher
2. Detection equipment

- Chemical agent detector alarm (Single component / Multi-component)
- O₂ Monitor
- Explosimeter
- Wind anemometer
- Rapid detection box for chemical warfare agents
- Portable detection box (including: sampler, various kinds of toxic detection tube)
- Multi-component analyzer
3. Hazard control equipments

- Explosion-proof equipments
- Hardware and tools (e.g., hammer, pliers, chisel, shovel, wrench, etc.)
- Special sealing equipments (all kinds of fixtures, stop plugs, etc.)
- Lifting jack
- Air blower
- Rescue ropes and tape measures

4. Other materials

- Command vehicle
- Inspection vehicle
- Decontamination vehicle/Shower vehicle
- Satellite phone, Walkie-talkies, Radio base station
- Explosion proof lamp (flashlight)
- Alarm, Camp flag,
- Triage mark (card, tape)
- Warning sign, Loudspeake
Welcome to our hospital in Guangzhou China!

Poisoning Control Centre  Email: gdszybfzy@126.com

Thank you for listening!
Any suggestions are highly appreciated!
神经毒剂Nerve agent. Such as 沙林sarin, 索曼soman, VX etc..
全身中毒Systemic toxic agent. Such as HCN(hydrogen cyanide),
CNCl(cyanogen chloride).
糜烂性毒气Vesicant agent. Such as 芥子气mustard gas, 路易Louis gas, 氮芥气
nitrogen mustard etc.
窒息性毒剂, 肺损伤剂Choking agent. Such as 光气phosgene, 双光气diphosgene,
氯氟化碳CFCl₃chloropicrin, 氯气CL₂chlorine,氟化烯烃perfluorinated
olefins.
农药Pesticides. Such as 有机磷农药phosphorus pesticide, 氨基甲酸酯
carbamate, pesticide etc.
毒素Toxins. Such as 肉毒杆菌botulinum toxin, 破伤风毒素tetanus toxin, etc..
强刺激性Strong corrosive chemicals. Such as NaOH(sodium hydroxide),
H₂SO₄(sulfuric acid), HNO₃(nitric acid)etc.
*Other toxic and harmful chemicals* in civilian use. Such as pipeline gas,
CO(carbon monoxide), H₂S(hydrogen sulfide), etc.