



Eastern Mediterranean Regional Office
World Health Organization

public information on

BIOLOGICAL & CHEMICAL THREATS



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**BIOLOGICAL
&
CHEMICAL
THREATS**

**PUBLIC
INFORMATION
ON**

**BIOLOGICAL
& CHEMICAL
THREATS**



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Some of the information for this report was gathered from:

www.who.int/emc/diseases

www.bt.cdc.gov

www.emedicine.com/emerg

www.hopkins-biodefense.org

www.jama.ama-assn.org

www.inchem.org

www.hse.gov.uk/pubns

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Foreword

We live in an era in which we are faced with different types and degrees of insecurity. Unfortunately, the existence of biological and chemical agents and the willingness of some to use them, present us with a dilemma: how to prepare the public for any contingency but how to prevent unnecessary distress. The solution would seem to be to provide timely, accurate and useful information.

In any biological or chemical incident, there are certain appropriate and inappropriate responses. How we respond determines the chances of survival for the victims and the long-term impact on families, communities, and even nations. The only meaningful way in which we can try to prevent great tragedies is by not only assisting the public health sector in being prepared for all eventualities, but by enlisting the support of the public.

The agents reported here are: Anthrax, Botulism, Haemorrhagic Fever, Smallpox, the Plague, Tularaemia, Chlorine, Cyanide, Lewisite, Mustard Gas, Ricin, Sarin, Soman, Tabun and VX. This list is not exhaustive and no doubt other dangerous types could be produced. They have been selected as they are the most often mentioned threats. This information has been prepared with the public in mind, and thus much of the medical terminology has been removed and replaced with every day language.

Details on the incubation period, or the time between exposure to an agent and the manifestation of illness, modes of transmission, the progression of illness and treatment for each disease has been provided for the biological threats. Information on chemical hazards, their appearance, odour, routes of exposure and decontamination, has been summarised in table form for ease of reference as many of them share similar characteristics and treatments.

The purpose of this document is to inform the public about biological and chemical hazards and thereby prepare the population for an immediate response in the event of an incident until public health support is provided. This is to enable individuals, families and communities to protect themselves in the event of the accidental or intentional release of an agent until access to medical care is available. The population within the vulnerable zone includes the residents, workers in the area, and other transient groups, such as tourists and visitors to entertainment facilities.

An educated public is one that can reduce the burden on healthcare facilities in the event of an incident, and one that is less likely to succumb to panic.



Part I

BIOLOGICAL THREATS



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ANTHRAX

BIOLOGICAL THREAT

Anthrax is a bacterial disease. In the environment, the bacteria exists as a spore which is very resistant to adverse conditions and can survive in the environment for years.

The disease takes one of three forms in humans; the cutaneous form is by far the most common form in naturally acquired disease.

Incubation Period

The period between exposure to infection and manifestation of symptoms, incubation, is usually within 2-7 days.

Transmission

Natural infection in humans is almost invariably acquired from infected animals or contaminated animal products such as wool, hides, bones, etc., Human-to-human transmission is extremely unlikely and only reported with skin anthrax.

Progression of Illness

■ Skin

Localised itching followed by a spotty rash that becomes black in 7-10 days

■ Stomach and Intestines

Feeling sick, vomiting, loss of appetite, fever leading to severe stomach pain, vomiting blood and bloody diarrhoea. Sudden death can occur within 2-5 days of onset

■ Lungs

Initially, low fever, dry cough, feeling unwell, tiredness, muscle pain, marked sweating, discomfort in the chest.

1-5 days later, may have sudden onset of high fever and very severe noisy breathlessness and blue lips and fingers. Shock may occur with death in 24-36 hours. (NB: naturally acquired pulmonary anthrax is a very rare occupational disease affecting those handling infected animal products, for instance wool and hide workers, and dock workers).

The 3 Types of Anthrax

Skin a spore enters the skin through a cut or an abrasion. It is the most common naturally occurring type

Stomach and intestines contracted from eating contaminated food

Lungs contracted from inhaling airborne anthrax spores

Anthrax cannot be transmitted from person to person.



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Treatment

Provided there is early treatment of skin anthrax, the outcome is very good. Early treatment of all forms is important for recovery. Antibiotic therapy usually results in recovery of the individual or infected animal if given before onset or immediately after onset of illness.

Precautions

Prevention of anthrax in both humans and animals is based on enforcement of regulatory methods in endemic areas

- Vaccines are widely available for animals. However, the human vaccine is not readily available commercially and its use should be confined to high-risk groups, such as those occupationally exposed and in some military settings
- Bandages, clothing and other contaminated materials should be disposed of, preferably by burning as spores are very resistant to normal decontamination methods
- In the event of infection, antibiotic therapy with a broad-spectrum antimicrobial agent such as ciprofloxacin, should be used. It can also be used for preventive treatment in asymptomatic persons believed to have been exposed to anthrax spores
- The proper disposal of anthrax carcasses and vaccination of at-risk herds. The most efficient method of disposal is incineration in a manner that ensures heat sterilization of the soil
- Once a case is suspected, the local health authorities must be informed immediately

If left untreated, anthrax in all forms can lead to septicaemia and death.

Patient isolation is not required.

An anthrax vaccine for livestock is available and can prevent the disease.



BOTULISM

BIOLOGICAL THREAT

Botulism is a rare but serious paralytic illness that can be fatal. It is caused by a nerve toxin produced by spore-forming bacteria.

Incubation Period

From 2 hours to 8 days (usually between 12-72 hours) after ingestion, depending on the amount of the bacteria or the toxin in the food.

Transmission

- **Food-borne botulism** follows when food containing the toxin is eaten. The most frequent source is home preserved foods, prepared in an unsafe manner.
- **Infant botulism** occurs when spores of bacteria are eaten and they produce toxin inside the stomach and intestines of small children
- **Wound botulism** occurs when spores of bacteria grow within wounds and produce the toxin

Progression of Illness

With food-borne botulism, symptoms begin within **6 hours to 2 weeks** (mostly within the first 12 to 36 hours) after eating the toxin in the food. Typical symptoms are difficulty in speaking, seeing and/or swallowing. Patients may have stomach upset and vomiting before nerve symptoms occur. When the breathing muscles are affected (paralysed) the person stops breathing and dies, unless assistance with breathing (mechanical ventilation) is provided.

3 Main Kinds of Botulism

Food-borne botulism occurs when food containing the toxin is eaten

Infant botulism occurs when spores are eaten, they grow in the intestines and produce the toxin

Wound botulism occurs when wounds are infected with the bacterium and it produces toxin

Botulism does not spread from one person to another.



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Treatment

The medicament (antitoxin) against botulism is effective in reducing symptoms if administered early in the course of the disease. Most patients eventually recover after weeks to months of supportive care. Recovery from paralysis can take from weeks to months.

Precautions

- Exposed persons should be closely monitored. If signs of poisoning occur, rapid administration of antitoxin and supportive care must be given without delay. This may include assisted ventilation for weeks or months. An outbreak constitutes a major public health emergency
- Once a case is suspected, the local health authorities must be informed immediately
- Food botulism may be prevented by inactivation of the bacterial spores in heat-sterilised canned products, and by preventing the growth of bacteria with preserving techniques such as salt content and low temperature, alone or in combination

Botulism toxin is the single most poisonous substance known.



HAEMORRHAGIC FEVER

There are many different viruses that cause haemorrhagic fever, which is associated with bleeding.

Incubation Period

Usually 2-21 days following exposure, patients would present with fever, rash, body aches, headache, and fatigue. Bleeding manifestations occur later in the course of the disease.

Infectivity

These viruses occur naturally in certain geographic areas. Infection can be acquired while handling animal carcasses, or by contact with sick or dead animals or people with the disease, and by insect bites.

Transmission

A major mode of transmission is by direct contact with a sick person or contaminated items, such as syringes. Transmission via the airborne route appears to be rare but cannot be conclusively ruled out. Mosquito-borne Dengue haemorrhagic fever is an important cause of death, especially in children.

Progression of Illness

Early signs typically include fever, high blood pressure, relatively slow heart beat, fast breathing, sore eyes, and sore throat. Most diseases are associated with skin reddening or a skin rash, but the specific characteristics of the rash vary with each disease. Later, patients may show signs of progressive haemorrhage, such as in the skin, mouth, nose and eyes; blood may be seen in the urine and stools and may be vomited. Widespread blood clots and circulatory shock may ensue. Central nervous system dysfunction may be present, and made noticeable by hallucinations, convulsions (fits), and/or coma.

BIOLOGICAL THREAT

Contact with contaminated animals or people, insect bites, blood transfusions or syringes are common means of infection. Airborne transmission is not common.

Some of these viruses (Ebola, Marburg, Lassa fever, New World arenaviruses, Crimean-Congo haemorrhagic fever, Bolivian haemorrhagic fever and Argentine haemorrhagic fever viruses) are transmissible from person-to-person.

Diseases that are not spread by person-to-person transmission include: Rift Valley Fever, Omsk haemorrhagic fever, Dengue haemorrhagic fever, Yellow Fever and Kyasanur Forest Disease.



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Treatment

Currently, there is no approved antiviral medication for the treatment of any of these diseases. An antiviral medication Ribavirin, when used with another medication Interferon is active against some of these viruses.

Precautions

- Persons taking care of the sick, medical care givers, health attendants, and mortuary workers, even if vaccinated, should wear gloves, caps, gowns, and surgical masks
- Isolate the patient
- Strict hand hygiene and the wearing of double-gloves, impermeable gowns, leg and shoe coverings, face shields or goggles for eye protection, and masks or respirators (for airborne precautions)
- Use a very diluted solution of household bleach (one teaspoon in a litre of water) to clean the environment
- Wash all clothes, bed linen and towels in hot water, detergent and disinfectant such as bleach
- If facilities are available, patients should be nursed in a negative pressure isolation room
- A vaccine exists only for yellow fever. The vaccine is very effective in protecting travellers to areas where the disease is endemic. In a person who is already infected with the virus, this vaccine is unlikely to provide protection
- Bodies of haemorrhagic fever cases should be buried deeply (at least two metres) and covered completely with powdered lime (Calcium hydroxide), followed by soil or incinerated if this is culturally appropriate
- Once a case is suspected, the local health authorities must be informed immediately

Dengue, Rift Valley and Yellow Fever viruses are transmitted by mosquitoes.



SMALLPOX

Smallpox manifests itself in two forms, *variola minor* and *variola major*. The latter is more contagious.

Infectivity

- During the incubation period, infected persons cannot infect others
- Infection is highest after face-to-face contact with a patient once fever has begun, and during the first week of spotty rash, when the virus is released from the lungs
- Patients remain infectious for about 3 weeks, until the last scabs fall off the spots. Exposure to patients in the late stages of the disease is much less likely to produce infection in susceptible contacts
- Epidemics develop comparatively slowly. New cases develop every 2–3 weeks

Transmission

- From person-to-person by infected air droplets spread in face-to-face contact and by coughing
- By contaminated clothes and bedding
- In a closed environment, by airborne virus spread within buildings via the ventilation system
- Insects and animals play no role in transmission

Progression of Illness

- After the incubation period, the patient feels unwell with flu-like symptoms, fever, headache, severe back pain and, at times, abdominal pain and vomiting
- 2 to 3 days later, fever reduces, and the patient begins to feel better. However, small red spots appear on the tongue and in the mouth. They develop into sores that break open and spread large amounts of virus in the mouth and throat. The patient is the most contagious at this time. Within 24 hours a rash appears starting on the face, and then spreading to the arms and legs and then to the hands and feet. This progressive distribution is a distinctive diagnostic feature of smallpox

BIOLOGICAL THREAT

During incubation period (7-17 days) the individual looks and feels healthy.

Forms of Smallpox

Ordinary
the more prevalent

Modified
mild
occurring in
previously vaccinated
patients

Malignant
flat
soft lesions

Haemorrhagic
bleeding into the
mucous membranes
and the skin

Insects and animals
do not transmit the
disease.



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- By day 4, spots fill with thick fluid and have a dent in the centre, which is a major distinguishing feature and fever reappears
- 8 to 14 days after the onset of symptoms, scabs form on the spots and when they fall off leave depressed scars

Treatment

No effective treatment, other than the management of symptoms, is currently available

Precautions

- Persons taking care of the sick, medical care givers, health attendants, and mortuary workers, even if vaccinated, should wear gloves, caps, gowns, and surgical masks
- Isolate the patient
- Shower the patient using soap, preferably antiseptic liquid soap
- Use a very diluted solution of household bleach (one teaspoon in a litre of water) to clean the environment
- Wash all clothes, bed linen and towels in hot water, detergent and disinfectant such as bleach
- Bodies of smallpox cases should be buried deeply (at least two metres) and covered completely with powdered lime (Calcium hydroxide), followed by soil or incinerated if this is culturally appropriate
- Once a case is suspected, the local health authorities must be informed immediately

Those vaccinated before 1972 may still have residual protection.

Smallpox vaccine administered up to 4 days after exposure to the virus, and before spots appear, provides protection and can prevent infection or lessen the severity of the disease.



THE PLAGUE

BIOLOGICAL THREAT

Plague is primarily a disease of wild rodents, transmitted from one to another through flea bites. In certain favourable circumstances, plague can cause huge epidemics in humans. It is caused by a bacterium.

Incubation Period

The time from exposure to the bacteria to the development of first symptoms is 1 to 6 days, most often 2 to 4 days.

Infectivity

The bacteria are found in mammals, particularly in rodents and their fleas. Tissue or body fluids of a plague-infected animal are highly infectious. Droplets of saliva expelled by victims of pneumonic plague are infectious within a 1 metre radius.

Outside of its host, the bacteria is fragile: high temperatures, sunlight and dryness have a destructive effect and ordinary disinfectants such as those containing chlorine kill it within 1 to 10 minutes.

Humans are extremely susceptible to plague.

Transmission

Most frequently, plague is transmitted by the bites of infected fleas. However, it can also occur by direct contact with a plague-infected animal, for instance in the process of skinning. Plague is also transmitted by inhaling bacteria suspended in droplets from a person or domestic animal with pneumonic plague coughing or sneezing.

3 Main Kinds of Plague

Pneumonic (lung) plague occurs when the bacterium infects the lungs

Bubonic plague is the most common form of plague. It occurs when an infected flea bites a person or when materials contaminated with the bacterium enter through a break in a person's skin

Septicaemic plague occurs when plague bacteria multiply in the blood. It can be a complication of pneumonic or bubonic plague or it can occur by itself. When it occurs alone, it is caused in the same ways as bubonic plague



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Progression of illness

- In pneumonic plague, patients first develop fever, headache, weakness, and rapidly developing pneumonia (lung infection) with shortness of breath, chest pain, cough, and sometime bloody or watery sputum. The pneumonia progresses for 2 to 4 days and in 50% of cases may cause death.
- In bubonic plague, patients develop swollen, tender lymph glands (called bubos) and fever, headache, chills, and weakness
- In septicaemic plague, bubos may or may not develop. Patients tend to lie stretched out and have fever, chills, abdominal pain, shock, and bleeding into skin and other organs.

Treatment

A number of antibiotics are effective. The drugs of choice are the antibiotics streptomycin and gentamicin. To reduce the chance of death, antibiotics must be given within 24 hours of first symptoms.

Precautions

- Since plague is closely linked with rodent populations, environmental management including rat proofing and disinfection is particularly necessary in endemic areas
- Close contact with infected patients requires specific protective measures, especially in the case of pneumonic plague (strict isolation, droplet precautions). A prophylactic drug therapy may be of value in the latter case, as well as in the event of exposure to flea bites during an outbreak
- Strict isolation is needed in the event of pneumonic plague
- A plague vaccine exists but cannot be used routinely. It should be considered only for high-risk professionals
- Once a case is suspected, the local health authorities must be informed immediately

Early treatment of pneumonic (lung) plague is crucial.

Only pneumonic (lung) plague can spread from person-to-person.

Controlling house rat populations is a must in endemic areas.



TULARAEMIA

BIOLOGICAL THREAT

Tularaemia is caused by a highly infectious bacterium.

Incubation Period

The incubation period for tularaemia is typically 3 to 5 days, with a range of 1 to 14 days.

Infectivity

Tularaemia is a highly infectious disease, requiring 10 to 50 organisms to cause infection and disease in humans. However, the disease in humans is not known to be contagious since no instance of human-to-human transmission has been documented.

Transmission

The bacteria naturally inhabit small mammals such as voles, mice, water rats, squirrels, rabbits and hares. Naturally acquired human infection can occur in a variety of ways. These include bites of infected insects such as ticks and deerflies; handling infectious animal tissues or fluids; direct contact or ingestion of contaminated water, food, or soil; and by breathing in bacteria from dusts or aerosols.

Progression of Illness

These bacteria may cause skin ulcers, swollen and painful lymph glands, inflamed eyes, sore throat, mouth ulcers, or pneumonia. If an infective dose of the bacteria were to be inhaled, several days later there would be sudden onset of fever, chills, headache, muscle aches, joint pain, dry cough, and progressive weakness. Persons with pneumonia (lung infection) can develop chest pain, difficulty in breathing, blood in the sputum, and may stop breathing altogether. 40% or more of persons with the lung and generalised forms of the disease may die if they are not treated with appropriate antibiotics.

It is generally believed that human-to-human transmission does not normally occur.

Without antibiotic treatment, illness could progress to severe breathing difficulties, shock and death.



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Treatment

Tularaemia is best treated with the antibiotics streptomycin or gentamicin given by injection daily for 10 days. Alternate antibiotics include the tetracyclines (such as doxycycline) or chloramphenicol daily for 14 days, which can be given by injection or taken by mouth. Fluoroquinolones, such as ciprofloxacin, have been used with success, and may be given by injection or taken by mouth.

Precautions

- Post-exposure prophylaxis with antibiotics may be recommended in some instances. Doxycycline or ciprofloxacin, daily for 14 days, have been recommended for persons thought to have had an infectious exposure
- A live vaccine is available in some countries for limited use only, and has been used to protect laboratory personnel who routinely work with the bacteria. However, the short incubation period of tularaemia and the partial protection against inhalation tularaemia makes this current generation of vaccines of little use once exposure has occurred
- Isolation is not recommended for tularaemia patients given that there is no established human-to-human transmission
- Once a case is suspected, the local health authorities must be informed immediately

A vaccine to protect against tularaemia is available.



Part II

CHEMICAL THREATS



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CHLORINE

Chlorine reacts with water in human tissues to form certain harmful acids. The severity of injury depends on the concentration of the gas, duration of contact, water content of the tissue involved and the presence of existing lung disease.

APPEARANCE

Greenish-yellow gas or clear amber liquid (under pressure).

ROUTES OF EXPOSURE

Chlorine can be absorbed into the body by all routes.

EFFECTS

- Gas irritates the eyes and causes tears. The extent of the injury depends on the concentration of the gas
- This can range from mild mucous membrane irritation (after 1 hour) to toxic lung disease and water-logged lungs or death within a few minutes

Inhalation

Initially, irritation of the eyes, nose and throat, followed by coughing and wheezing, shortage of breath, sputum production and chest pain. Larger exposures may lead to heart and lung failure. Those surviving exposure may have persistent cough for up to 14 days or even several months. Symptoms may include chest pains, vomiting and coughing.

Skin contact

Irritation, pain, redness, blister and burns. Liquid chlorine may cause burns on contact.

Eye contact

Irritation and inflammation. Liquid chlorine may cause burns on contact.

CHEMICAL THREAT

Chlorine causes severe irritation and burning of the eyes, skin, mouth and lungs.

Chlorine gas has a strong, suffocating odour.

There is no antidote available.



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DECONTAMINATION AND TREATMENT

- Remove victim from source of exposure and then remove clothing.

Inhalation

- All persons who have inhaled chlorine should have a full physical examination and a record made of their lung function. This will assess any immediate and subsequent effects of the exposure
- Lung damage is treated with oxygen, antispasmodic drugs and steroids.

PRECAUTIONS

- Persons caring for injured people must ensure adequate protection to prevent self-contamination when carrying out decontamination and medical treatment
- Put all contaminated clothing in a sealed bag
- Once a case is suspected, the local health authorities must be informed immediately

Wash skin with running or saline (salty) water and treat as for a burn.

Use protective clothing while caring for contaminated person.



CYANIDE

Cyanide is a very poisonous chemical in the form of a gas.

APPEARANCE

Hydrogen cyanide is a colourless gas with a faint, bitter, almond-like odour. Sodium cyanide and potassium cyanide are both white solids with a bitter, almond-like odour in damp air.

ROUTES OF EXPOSURE

The substance can be absorbed into the body by all routes.

EFFECTS

In large amounts, cyanide is very harmful to people. Same sequence of symptoms occur despite the route of exposure.

- Deep breathing and shortness of breath
- Convulsions (fits)
- Loss of consciousness
- Weakness of the fingers and toes
- Difficulty walking
- Dimness of vision
- Deafness
- Decreased thyroid gland function
- Irritation and sores on the skin
- Irritation and inflammation of the eyes
- Death

CHEMICAL THREAT

Cyanide gas is highly flammable.

Exposure to high levels of cyanide harms the brain and heart, and may cause coma and death.

Exposure to lower levels may result in breathing difficulties, heart pains, vomiting, blood changes, headaches, and enlargement of the thyroid gland.

Speed in providing medical care to affected persons is essential.

Cyanide is a fast acting poison in the human body.



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DECONTAMINATION AND TREATMENT

- Remove victim from source of exposure and then remove contaminated clothing
- Keep warm and at rest
- A 0.5% hypochlorite solution can be used (5ml (one teaspoon) of bleach in 1 litre of water) for decontamination
- Immediately flush eyes with clean water for at least 15 minutes
- If cyanide has been swallowed, wash out the stomach with sodium bicarbonate solution. Do not induce vomiting. Give victim milk or alkaline bicarbonate solution to drink
- Do not give acidic liquids or water to drink
- If breathing difficulty, give oxygen
- If breathing stopped, give artificial respiration **BUT** do not do mouth-to-mouth as face may be contaminated

PRECAUTIONS

- First aid personnel should wear full protective clothing and breathing apparatus
- Prevent contamination to uncontrolled areas
- Do not breathe fumes
- Avoid skin contact at all times
- If mask available, hold breath until it is in place
- Wear protective rubber gloves
- Wear chemical goggles or face shield if available
- Once a case is suspected, the local health authorities must be informed immediately

Administration of oxygen is the most useful initial treatment for cyanide poisoning.

There are 3 antidotes for cyanide poisoning –none of which are of proven benefit and can actually be harmful.

In the event of ingestion, give milk or alkaline bicarbonate. **NO** acidic liquids should be given.



LEWISITE

APPEARANCE

Industrially-produced Lewisite is an amber to dark brown liquid with a strong penetrating geranium odour. The pure compound is a colourless, odourless, oily liquid.

ROUTES OF EXPOSURE

The substance can be absorbed into the body by all routes.

EFFECTS

Lewisite is a severe irritant and contact with the vapour or liquid can be fatal.

Inhalation

- Immediate burning pain
- Runny nose and violent sneezing
- Cough and frothing mucous
- Fluid in the lungs
- Poisoning causing restlessness, weakness, subnormal temperature and low blood pressure
- Non-fatal destruction of the blood causes anaemia
- Liver damage
- Shock and death

Skin

- Immediate stinging pain
- Skin redness within 30 minutes with pain and itching for 24 hours
- Blisters within 12 hours with pain lasting 2-3 days
- Deep skin burns

Eyes

- Instant pain, irritation and swelling of eyelids
- Corneal scarring and inflammation of the pupil
- Severe permanent damage or blindness within 1 minute

Remove the victim from the source of exposure.

Remove victim's clothing and apply an absorbent powder to the skin.

Treat minor skin injuries with soothing lotions, such as Calamine.



DECONTAMINATION AND TREATMENT

- Remove victim from source of exposure and then remove contaminated clothing.
- Avoid showering victim as this may spread the agent. Apply an absorbent powder such as Fuller's Earth, talcum or flour. If this is not available, a 0.5% hypochlorite solution can be used (5ml (one teaspoon) of bleach in 1 litre of water) for decontamination
- Immediately flush eyes with clean water for 10-15 minutes
- Do not induce vomiting. Give patient milk or clean water to drink
- If breathing difficulty, give oxygen
- If breathing stopped, give artificial respiration **BUT** do not do mouth-to-mouth as face may be contaminated

PRECAUTIONS

- Do not breathe the fumes
- If mask is available, hold breath until it is put on
- Fire fighting personnel should wear full protective clothing and breathing apparatus
- Protective rubber gloves should be worn
- Chemical goggles and face shields should be worn
- Once a case is suspected, the local health authorities must be informed immediately

Skin contact must be avoided at all times.



MUSTARD GAS

The term "Mustard gas" refers to several manufactured chemicals, including sulphur mustard. They are not naturally occurring in the environment. Mustard gas does not behave as a gas under normal conditions.

APPEARANCE

It is colourless and odourless, but when mixed with other chemicals, it becomes brown and has a garlic-like smell.

ROUTES OF EXPOSURE

The substance can be absorbed into the body by all routes.

EFFECTS

- Mustard gas is a powerful irritant and blistering threat
- It can cause skin burns and blisters within a few days and damage to the respiratory tract
- It is more harmful to the skin on hot, humid days, or in tropical climates
- It causes the eyes to burn, eyelids to swell, and repeated blinking
- If mustard gas is inhaled, it can cause coughing, inflammation and irritation of the lungs, and long-term respiratory disease and the patient could eventually die

Immediate - effects of exposure to mustard gas vapour or liquid are typically delayed for several hours

- a feeling of sickness (nausea)
- trying to vomit (retching)
- actual vomiting
- irritation and watering of the eyes

Long-term – Risk of :

- Developing cancer is likely after a single exposure
- Mortality from influenza, pneumonia and chronic breathing disease
- People who are severely poisoned dying during the second week after exposure due to respiratory complications and septic shock

Mustard gas is a liquid and does not easily change into a gas.

It does not easily dissolve in water, and the amount that does breaks down quickly.

It does not go from soil to groundwater.

It is particularly harmful to the skin and lungs on hot, humid days.



CHEMICAL THREAT

Exposure to important concentrations may induce

- Fits (convulsions)
- Coma
- Death within one hour after exposure.

Two to six hours after exposure,

- Nausea
- Fatigue
- Headache
- Eye inflammation with intense eye pain
- Watery eyes
- Quivering eyelids
- Cannot tolerate the light
- Runny nose
- Reddening of the face and neck
- Soreness of the throat
- Increased pulse

Six to twenty four hours after exposure,

- the above symptoms are generally increased in severity and are accompanied by skin inflammation followed by blister formation in the warmest areas of the body such as the inner thighs

Twenty four hours after exposure,

- the condition generally worsens, blistering becomes more marked, coughing appears. Mucus, pus and necrotic slough may be coughed up. Intense itching of skin and increased skin pigmentation occur

DECONTAMINATION AND TREATMENT

- Remove victim from source of exposure and then remove contaminated clothing
- Support breathing, circulation and heart function
- Treat water-logged lungs and breathing problems
- The patients with severe reduction in white blood cells should be isolated to avoid secondary infection and septic shock

Eye decontamination

- Irrigate the eyes immediately with ample amounts of normal or saline (salty) water for at least 15 minutes
- Since sulphur mustard is fat soluble, it is advisable to use diluted infant shampoo as well

Delayed toxic effects may occur months and even years after exposure, mainly as breathing disorders and cancer.

Contamination is through all routes, including water and food ingestion.

Skin decontamination is mainly by washing with soap and water.



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MUSTARD GAS

Skin decontamination

- Avoid showering victim as this may spread the agent. Apply an absorbent powder such as Fuller's Earth, talcum or flour. If this is not available, wash exposed area thoroughly with water and neutral soap
- Washing with paraffin followed by the use of soap and water has also been recommended

Stomach decontamination

- Do not induce vomiting
- The stomach should be washed out, making sure that the lungs are protected. Prior to washing out the stomach, contents should be diluted by 100 to 200 ml of milk or clean water.
- Activated charcoal is of unproven benefit, but may be used

Symptomatic treatment

- Provide adequate pain relievers **BUT NOT** morphine
- Correct fluid and electrolyte imbalance carefully
- Steroids are effective in staving off lung tissue poisoning
- Treat eyes with antibiotics, preferably sulphacetamide 20% solution, and a solution to widen the pupils. In the event of inflammation of the cornea of the eye, **DO NOT** use steroid eye drops. Dark glasses are helpful, but contact lenses are not to be worn.
- Observe patients who ingested contaminated food or water with mustard gas for the development of complications caused by stomach and intestinal burns, such as haemorrhage and perforation. Blood transfusion may be required in patients with bone marrow depression

Visual recovery is usual.

Care for skin wounds with soothing lotions such as Calamine if injuries are minor. Standard treatment for severe chemical burns is with silver sulphadiazine cream.

Once a case is suspected, the local health authorities must be informed immediately.



RICIN

Ricin is a lethal toxin.

APPEARANCE

It is a colourless and odourless residue, extracted from the beans of the castor oil plant.

ROUTES OF EXPOSURE

The substance can be absorbed into the body by all routes.

EFFECTS

- Symptoms may occur within hours or days, depending upon dose. Death usually occurs within 72 hours after absorption of a fatal dose
- **If inhaled**, ricin can cause death within 36 to 48 hours by respiratory failure and cardiac arrest
- **If injected**, ricin causes immediate death of the muscles and lymph nodes near the site of the injection. Major-organ failure and death usually follow
- **If ingested**, it causes nausea, vomiting and internal bleeding of the stomach and intestines, liver, spleen and kidney failure as well as circulatory failure

DECONTAMINATION AND TREATMENT

- Remove victim from source of exposure and then remove contaminated clothing
- Treatment is symptomatic and supportive: support circulation and heart function
- Provide adequate pain relievers (paracetamol for fever), and cough suppressants
- Do not induce vomiting. Give patient milk or clean water to drink
- Treat water-logged lungs and breathing problems
- If eyes are exposed, irrigate the eyes immediately with ample amounts of normal or saline (salty) water for at least 15 minutes

PRECAUTIONS

- If mask is available, hold breath until it is put on
- Fire fighting personnel should wear full protective clothing and breathing apparatus
- Protective rubber gloves should be worn

CHEMICAL THREAT

Ricin is particularly toxic if injected.

Less than a pinpoint of ricin can kill a human.

The long-term effects of ricin poisoning are unknown.

Skin decontamination is mainly by washing with soap and water.

Once a case is suspected, the local health authorities must be informed immediately.

There is no antidote available.



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SARIN

Sarin is a nerve agent.

APPEARANCE

When pure, it is a colourless and odourless gas. When it is mixed with other chemicals, it is yellow-brown with no odour.

ROUTES OF EXPOSURE

The substance can be absorbed into the body by all routes.

EFFECTS

No matter what the route of exposure might be, the sequence of symptoms is the same.

MILD

- Runny nose
- Tightness of the chest and breathing difficulty
- Eye pain, dimness of vision and pin pointing of pupils
- Difficulty in breathing and cough

MODERATE

- Increased eye symptoms with blurred vision
- Drooling at the mouth
- Excessive sweating
- Severe nasal congestion
- Increased tightness of the chest and breathing difficulty
- Nausea, vomiting, diarrhoea, and cramps
- Generalised weakness, twitching of large muscle groups
- Headache, confusion, and drowsiness

SEVERE

- Involuntary passing of stools and urine (defecation)
- Very rapid onset of symptoms
- Very copious secretions
- Twitching, jerking, staggering and convulsions
- Cessation of breathing, loss of consciousness, coma and death
- Pupil size may range from normal to moderately reduced

Sarin is 26 times more deadly than cyanide gas. Just a pinprick sized droplet will kill a human.

Liquid or vapours can be fatal.

Speed in providing medical care to affected persons is essential.



DECONTAMINATION AND TREATMENT

- Remove victim from source of exposure and then remove contaminated clothing

Inhalation

- If severe signs, immediately administer, in rapid succession, all three Nerve Agent Antidote Kit(s), Mark I injectors (or atropine if directed by a physician)
- If signs and symptoms are progressing, use injectors at 5 to 20 minute intervals. (No more than 3 injections unless directed by medical personnel.)
- Maintain record of all antidote injections given
- Give artificial respiration if breathing has stopped. Do not use mouth-to-mouth if face is contaminated
- Administer oxygen if breathing is difficult

Skin contact

- Avoid showering victim as this may spread the agent. Apply an absorbent powder such as Fuller's Earth, talcum or flour. If this is not available, wash with soap and water. A 0.5% hypochlorite solution can also be used (5ml (one teaspoon) bleach in 1 litre of water)

Eye contact

- Flush eyes with water for at least 15 minutes. Symptoms of only miosis do not warrant antidote injection

Ingestion

- Do not induce vomiting, instead give patient milk to drink. First symptoms are likely to be abdominal discomfort and pain. Immediately administer Nerve Agent Antidote Kit, Mark I

PRECAUTIONS

- Do not breathe fumes
- Avoid skin contact at all times
- If mask is available, hold breath until protective mask is in place
- Fire fighting personnel should wear full protective clothing and breathing apparatus
- Wear protective rubber gloves
- Wear goggles and face shield if available
- Once a case is suspected, the local health authorities must be informed immediately

There is an antidote available.

Prevent contamination to uncontrolled areas.



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SOMAN

Soman is a nerve agent.

APPEARANCE

When pure, it is a colourless liquid with a fruity odour. When impure, it is amber or dark brown with a camphor odour.

ROUTES OF EXPOSURE

The substance can be absorbed into the body by all routes.

EFFECTS

No matter what the route of exposure might be, the sequence of symptoms is the same.

MILD

- Runny nose
- Tightness of the chest and breathing difficulty
- Eye pain, dimness of vision and pin pointing of pupils
- Difficulty in breathing and cough

MODERATE

- Increased eye symptoms with blurred vision
- Drooling at the mouth
- Excessive sweating
- Severe nasal congestion
- Increased tightness of the chest and breathing difficulty
- Nausea, vomiting, diarrhoea, and cramps
- Generalised weakness, twitching of large muscle groups
- Headache, confusion, and drowsiness

SEVERE

- Involuntary passing of stools and urine (defecation)
- Very rapid onset of symptoms
- Very copious secretions
- Twitching, jerking, staggering and convulsions
- Cessation of breathing, loss of consciousness, coma and death
- Pupil size may range from normal to moderately reduced

Liquid or vapours can be fatal.

There is an antidote available.



DECONTAMINATION AND TREATMENT

Inhalation

- If severe signs, immediately administer, in rapid succession, all three Nerve Agent Antidote Kit(s), Mark I injectors (or atropine if directed by a physician).
- If signs and symptoms are progressing, use injectors at 5 to 20 minute intervals. (No more than 3 injections unless directed by medical personnel.)
- Maintain record of all antidote injections given
- Give artificial respiration if breathing has stopped. Do not use mouth-to-mouth if face is contaminated
- Administer oxygen if breathing is difficult

Skin contact

- Avoid showering victim as this may spread the threat. Apply an absorbent powder such as Fuller's Earth, talcum or flour. If this is not available, wash with soap and water. A 0.5% hypochlorite solution can also be used (5ml (one teaspoon) bleach in 1 litre of water)

Eye contact

- Flush eyes with water for at least 15 minutes. Symptoms of only miosis do not warrant antidote injection

Ingestion

- Do not induce vomiting, instead give patient milk to drink. First symptoms are likely to be abdominal discomfort and pain. Immediately administer Nerve Agent Antidote Kit, Mark I

PRECAUTIONS

- Prevent contamination to uncontrolled areas
- Avoid skin contact at all times
- If mask is available, hold breath until protective mask is in place
- Fire fighting personnel should wear full protective clothing and breathing apparatus
- Wear protective rubber gloves
- Wear goggles and face shield if available
- Once a case is suspected, the local health authorities must be informed immediately

Remove victim from source of exposure and then remove contaminated clothing.

Do not breathe fumes.



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TABUN

Tabun is a nerve agent.

APPEARANCE

- Colourless to brown liquid, faintly fruity odour. Odourless in pure form
- The industrial product has a brownish colour and odour reminiscent of bitter almonds due to the formation of hydrogen cyanide

ROUTES OF EXPOSURE

The substance can be absorbed into the body by all routes

EFFECTS

Same sequence of symptoms occur despite the route of exposure

MILD

- Runny nose
- Tightness of the chest and breathing difficulty
- Eye pain, dimness of vision and pin pointing of pupils
- Difficulty in breathing
- Cough

MODERATE

- Increased eye symptoms with blurred vision
- Drooling at the mouth.
- Excessive sweating
- Severe nasal congestion
- Increased tightness of the chest and breathing difficulty
- Nausea, vomiting, diarrhoea, and cramps
- Generalised weakness, twitching of large muscle groups
- Headache, confusion, and drowsiness

SEVERE

- Involuntary passing of stools and urine (defecation)
- Very copious secretions
- Twitching, jerking, staggering and convulsions
- Pupil size may range from normal to moderately reduced
- Liquid or vapours can be fatal.
- Cessation of breathing, loss of consciousness, coma and death

CHEMICAL THREAT

Liquid or vapours can be fatal.

Clothing releases agent for about 30 minutes after contact with vapour.

Contaminated surfaces present long-term contact hazard.

Inhalation and eye contamination can cause symptoms in 2-5 minutes. A lethal dose can kill in 1 to 2 hours.

There is an antidote available.



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DECONTAMINATION AND TREATMENT

- If severe signs, immediately administer, in rapid succession, all three Nerve Agent Antidote Kit(s), Mark I injectors (or atropine if directed by a physician)
- If signs and symptoms are progressing, use injectors at 5 to 20 minute intervals. (No more than 3 injections unless directed by medical personnel.)
- Maintain record of all injections given
- Give artificial respiration if breathing has stopped. Use mouth-to-mouth when mask-bag or oxygen delivery systems not available. Do not use mouth-to-mouth if face is contaminated
- Administer oxygen if breathing is difficult
- Apply an absorbent powder such as Fuller's Earth, talcum or flour. If this is not available, a 0.5% hypochlorite solution can also be used (5ml (one teaspoon) of bleach in 1 litre of water) for decontamination
- Flush eyes with water for at least 15 minutes
- Do not induce vomiting

PRECAUTIONS

- Prevent contamination to uncontrolled areas
- Do not breathe fumes
- Avoid skin contact at all times
- Hold breath until mask in place
- Fire fighting personnel should wear full protective clothing and breathing apparatus
- Wear protective rubber gloves
- Wear chemical goggles or face shield if available
- Once a case is suspected, the local health authorities must be informed immediately

Remove victim from source of exposure and then remove contaminated clothing.

Avoid showering victim as this may spread the agent.



VX

VX is a nerve agent.

APPEARANCE

Colourless to straw-coloured liquid and odourless, similar in appearance to motor oil. It can be found in liquid or vapour form.

ROUTES OF EXPOSURE

The substance can be absorbed into the body by all routes

EFFECTS

- Symptoms may occur within minutes or hours, depending upon dose. Death usually occurs within 15 minutes after absorption of a fatal dose
- Same sequence of symptoms occur regardless of the route of exposure

MILD

- Runny nose
- Tightness of the chest and breathing difficulty
- Eye pain, dimness of vision and pin point of pupils
- Difficulty in breathing
- Cough

MODERATE

- Increased eye symptoms with blurred vision
- Drooling and excessive sweating
- Severe nasal congestion
- Increased tightness of the chest and breathing difficulty
- Nausea, vomiting, diarrhoea, and cramps
- Generalised weakness, twitching of large muscle groups
- Headache, confusion, and drowsiness

SEVERE

- Involuntary defecation and urination
- Very copious secretions
- Twitching, jerking, staggering and convulsions
- Pupil size may range from normal to moderately reduced
- Cessation of breathing, loss of consciousness, coma and death

CHEMICAL THREAT

Potentially fatal at doses only slightly larger than those producing least effects.

Clothing releases agent for about 30 minutes after contact with vapour.

Contaminated surfaces present long-term contact hazard.

There is an antidote available.



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DECONTAMINATION AND TREATMENT

- If severe signs, immediately administer, in rapid succession, all three Nerve Agent Antidote Kit(s), Mark I injectors (or atropine if directed by a physician)
- If signs and symptoms are progressing, use injectors at 5 to 20 minute intervals. (No more than 3 injections unless directed by medical personnel.)
- Maintain record of all antidote injections given
- Give artificial respiration if breathing has stopped. Do not use mouth-to-mouth if face is contaminated
- Administer oxygen if breathing is difficult
- Immediately flush eyes with clean water at room temperature for at least 15 minutes, then put on a respiratory protective mask
- Symptoms of only pin point pupils does not warrant antidote injection
- Avoid showering victim as this may spread the threat. Apply an absorbent powder such as Fuller's Earth, talcum or flour. If this is not available, a 0.5% hypochlorite solution (5ml of bleach in 1 litre of water) can also be used
- Do not induce vomiting

PRECAUTIONS

- Prevent contamination to uncontrolled areas
- Do not breathe fumes
- Avoid skin contact at all times
- If mask available, hold breath until it is in place
- Fire fighting personnel should wear full protective clothing and breathing apparatus
- Wear protective rubber gloves
- Wear chemical goggles or face shield if available
- Once a case is suspected, the local health authorities must be informed immediately

Remove victim from source of exposure and then remove contaminated clothing.

First symptoms are likely to be stomach and abdominal discomfort, in which case immediately administer Nerve Agent Antidote Kit, Mark I.



Part III

ANNEXES



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CHEMICAL THREATS
PROTECT YOURSELF AND YOUR FAMILY BY STAYING IN AN UNCONTAMINATED AREA

Threat	Odour	Characteristics	Antidote	Local Level	Clinical Level
Chlorine	Stinging odour	Greenish-yellow gas or clear amber liquid under pressure.	None available. There are 3 available – none of which are of proven benefit.	<ul style="list-style-type: none"> ➤ Remove victim from source of exposure and then remove contaminated clothing ➤ Avoid breathing in fumes ➤ Do not induce vomiting in victim. ➤ Give milk or alkaline bicarbonate solution. Do not give acidic liquids to drink. Do not do mouth-to-mouth resuscitation. ➤ Avoid skin contact 	<ul style="list-style-type: none"> ➤ Wear full protective clothing and breathing apparatus. ➤ Administer oxygen. ➤ Identify and isolate the affected area <p>Inhalation, lung damage is treated with oxygen, antispasmodic drugs and steroids. Eyes, wash immediately for at least 15 minutes with clean water. Skin, wash skin with running or saline (salty) water and apply soothing lotions such as Calamine to the injured skin. If severe burns, treat as for chemical burns.</p>
Lewisite Mustard Gas Ricin	Odourless	Colourless liquids when pure. Amber to dark brown when mixed with other chemicals.	None available.	<ul style="list-style-type: none"> ➤ Remove victim from source of exposure and then remove contaminated clothing. ➤ Do not induce vomiting in the victim. Give victim milk or clean water to drink. ➤ Avoid breathing in fumes. ➤ Increase air ventilation in closed, contaminated areas if gas has been locally released. 	<ul style="list-style-type: none"> ➤ Wear full protective clothing and breathing apparatus. ➤ Identify and isolate the affected area <p>Inhalation, administer oxygen. Eyes, flush with clean water for at least 15 minutes. Skin, apply an absorbing powder such as talcum or flour. Avoid showering or washing skin as it may disperse the threat over the body. Only if this is not possible, wash contaminated areas with soap and water. Care for minor skin wounds with Calamine lotion or, if severe, the usual treatment is with silver sulphadiazine cream. Ingestion, wash out the stomach with sodium bicarbonate.</p>



<p style="text-align: center;">CHEMICAL THREATS PROTECT YOURSELF AND YOUR FAMILY BY STAYING IN AN UNCONTAMINATED AREA</p>					
Threat	Odour	Characteristics	Antidote	Local Level	Clinical Level
Ricin	All are odourless when pure.			<ul style="list-style-type: none"> ➤ Remove victim from source of exposure and then remove contaminated clothing ➤ Avoid breathing in fumes. Increase ventilation in closed, contaminated areas if gas has been locally released ➤ Avoid skin contact ➤ Do not induce vomiting in victim. ➤ Instead give victim milk to drink. ➤ Do not use mouth-to-mouth resuscitation 	<ul style="list-style-type: none"> ➤ Wear full protective clothing and breathing apparatus ➤ Identify and isolate the affected area ➤ Maintain record of all antidote injections given
Sarin	When mixed with chemicals:	Nerve agents. Liquids or vapours.	Nerve agent antidote or atropine.		<p>Inhalation, administer oxygen.</p> <p>Skin, apply an absorbing powder such as talcum or flour. Avoid showering or washing skin if possible as it may disperse the threat over the body. Only if this is not possible, wash contaminated areas with soap and water.</p> <p>Care for minor skin wounds with Calamine lotion or, if severe, with silver sulphadiazine cream.</p> <p>Eye, flush with clean water for at least 15 minutes.</p>
Soman	Soman has a camphor smell.				
Tabun	Tabun has a fruity smell.				
VX	VX is odourless.				



CHEMICAL THREATS
PROTECT YOURSELF AND YOUR FAMILY BY STAYING IN AN UNCONTAMINATED AREA

Threat	Effects	Exposure	Characteristics	First Response	Antidote	Advice to First Responders Do's Don't's	
Chlorine	Can range from mild mucous membrane irritation (after 1 hour) to toxic lung disease and water-logged lungs or death within a few minutes Inhalation , irritation of the eyes, nose and throat. Larger exposures may lead to heart and lung failure. Symptoms may include vomiting and coughing. Respiratory failure is the major cause of death in nerve threat poisoning. Skin contact , irritation, pain, redness, blister and burns. Eye contact , irritation and inflammation. NB: Exposure to high levels of cyanide harms the brain and heart, and may cause coma and death.	Can be absorbed into the body through ingestion, the skin, eyes, and lungs.	Greenish-yellow gas or clear amber liquid (under pressure) with a stinging odour. Hydrogen cyanide colourless gas with a bitter, almond-like odour. Sodium cyanide and potassium cyanide white solids with a bitter, almond-like odour in damp air.	The severity of injury depends on the concentration of the substance, duration of contact, and water content of the tissue involved. Gas irritates the eyes, causing tears. Inhalation , lung damage is treated with oxygen, antispasmodic drugs and steroids. Eye , wash immediately for at least 15 minutes with clean water. Skin , wash skin with running or saline (salty) water and apply soothing lotions such as Calamine to the injured skin. If severe burns, treat as for chemical burns.	No antidote available for chlorine poisoning. There are 3 antidotes for cyanide poisoning – none of which are of proven benefit and can actually be harmful	The Public: Remove victim from source of exposure and then remove contaminated clothing. Avoid breathing in fumes. Increase ventilation in closed, contaminated areas if gas has been locally released. Warmth, rest and quiet are essential for the victim. First aid personnel: should wear full protective clothing and breathing apparatus. Administer oxygen. Identify and isolate the affected area.	Do not induce vomiting in victim. Give milk or alkaline bicarbonate solution. Do not give acidic liquids or water to drink. Do not do mouth-to-mouth resuscitation. Avoid skin contact.
Cyanide	Exposure to lower levels may result in breathing difficulties, heart pains, and enlargement of the thyroid gland						



<p style="text-align: center;">CHEMICAL THREATS PROTECT YOURSELF AND YOUR FAMILY BY STAYING IN AN UNCONTAMINATED AREA</p>						
Threat	Effects	Exposure	Characteristics	First Response	Antidote	
<p>Lewisite and Mustard Gas</p>	<p>Poisoning causes restlessness, weakness, subnormal temperature and low blood pressure. Inhalation/Ingestion, immediate burning pain, runny nose and violent sneezing, shock and death. Skin, immediate stinging pain, redness with pain and itching, blisters with pain. Eyes, instant pain, irritation and swelling of eyelids, severe permanent damage or blindness within 1 minute. In the long-term, a single exposure to Mustard gas likely causes cancer.</p>	<p>Can be absorbed into the body through the skin, eyes, ingestion, and lungs.</p>	<p>Colourless and odourless in pure forms, amber to dark brown when mixed with other chemicals. Mustard gas does not behave as a gas under normal conditions. It is a liquid and unlikely to change into a gas if it is released at ordinary temperatures. Mustard gas is particularly harmful to the skin on hot, humid days or in tropical climates</p>	<p>Inhalation If breathing difficulty, give oxygen. If breathing stopped, give artificial respiration. Eyes, immediately flush with clean water for at least 10 minutes. Skin, apply an absorbing powder such as Fuller's Earth, talcum or flour. Avoid showering or washing skin as it may disperse the threat over the body. Care for minor skin wounds with Calamine lotion or, if severe, the usual treatment is with silver sulphadiazine cream. Ingestion, wash out the stomach with sodium bicarbonate.</p>	<p>None available.</p>	<p>Advice to First Responders Do's Remove victim from source of exposure and then remove contaminated clothing. Avoid breathing in fumes. Increase air ventilation in closed, contaminated areas if gas has been locally released. Provide adequate pain relievers BUT not morphine. First aid personnel: should wear full protective gear. Before washing out stomach, dilute contents with milk or clean water and make sure the lungs are protected.</p>
	<p>Do's Do not induce vomiting in the victim. Give victim milk or clean water to drink. Do not perform mouth-to-mouth resuscitation. Avoid skin contact at all times.</p>					



CHEMICAL THREATS

PROTECT YOURSELF AND YOUR FAMILY BY STAYING IN AN UNCONTAMINATED AREA

Threat	Effects	Exposure	Characteristics	First Response	Antidote	Advice to First Responders Do's Don't's
Ricin	<ul style="list-style-type: none"> ➤ Abdominal discomfort and pain ➤ Runny nose and breathing difficulty ➤ Eye pain, dimness of vision and pin pointing of pupils ➤ Excessive salivation and sweating ➤ Nausea, vomiting, diarrhoea, cramps ➤ Feeling weak, twitching of arm and leg muscles ➤ Headache, confusion, and drowsiness ➤ Involuntary passing of stools and urine ➤ Cessation of breathing, loss of consciousness, coma and death 	Can be absorbed into the body through ingestion, the skin, eyes, and lungs.	<p>Nerve agents stop nerve signals and disrupt vital functions such as breathing.</p> <p>Colourless and odourless in pure forms, amber to dark brown when mixed with other chemicals.</p> <p>Soman has a camphor odour.</p> <p>Tabun has a fruity odour.</p> <p>VX is odourless.</p>	<p>Mild, moderate or severe symptoms, depending on concentration of the substance. If severe, immediately administer antidote.</p> <p>Inhalation, administer oxygen if breathing has stopped.</p> <p>Skin, apply an absorbing powder such as Fuller's Earth, talcum or flour. Avoid showering or washing skin if possible as it may disperse the threat over the body. Care for minor skin wounds with Calamine lotion or, if severe, with silver sulphadiazine cream.</p> <p>Eye, flush with clean water for at least 15 minutes.</p> <p>Ingestion, administer antidote.</p>	<p>Nerve Agent Antidote Kit, Mark I injectors or atropine.</p> <p>The antidote is available commercially</p> <p>Maintain record of all antidote injections given.</p>	<p>The Public: Remove victim from source of exposure and then remove contaminated clothing.</p> <p>Avoid breathing in fumes.</p> <p>Increase ventilation in closed, contaminated areas if gas has been locally released.</p> <p>Avoid skin contact.</p> <p>First aid personnel should wear full protective clothing and breathing apparatus.</p> <p>Identify and isolate the affected area.</p>
Sarin						<p>Do not induce vomiting in victim. Instead give victim milk to drink.</p> <p>Do not use mouth-to-mouth resuscitation.</p>
Soman						
Tabun						
VX						



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