Appendix 9
INHALATION OF CHEMICALS

Suffocation (asphyxia)

THIS IS AN EMERGENCY

It may be due to:

- Obstruction to breathing in the throat or the air passage through spasm of the air tubes or by swelling of the linings of the voice box due to irritant fumes.
- Fluid in the lung air spaces caused by irritant fumes.
- Poisoning of the blood which prevents the carriage or use of oxygen in the body, caused, for example, by carbon monoxide and cyanide.
- Poisoning of the mechanism of breathing in the chest (e.g. by organophosphorus insecticides) or the brain (e.g. by chlorinated hydrocarbons).
- Gases which do not support life because they replace oxygen in the atmosphere (e.g. carbon dioxide, nitrogen).

Diagnosis

Symptoms and signs include:

- Difficulty in breathing with an increased rate at first (over 30 per minute). Later it may become slow and stop.
- A rapid pulse, usually over 100 per minute.
- Blueness of the skin with purple lips and tongue.
- Agitation at first but later the casualty becomes apathetic, with muscular weakness. Unconsciousness may follow this.
- Large pupils which will not react to light. **LIFE IS IN DANGER**.

Further advice: **see table 2, table 3 and table 4.**

Chemical irritation of the lungs: dry cough, breathlessness and wheezing

Shortly after exposure to smoke, fumes or some gases, the casualty may develop irritation and inflammation of the throat, windpipe and bronchi (the branches of the windpipe inside the lungs). Sometimes this inflammation is delayed for several hours or, rarely, for some days after exposure.

Diagnosis

Symptoms and signs include:

- A harsh, dry cough;
- A feeling of rawness in the windpipe in the neck and under the breastbone, which is made worse by coughing;
- Breathlessness and wheezing.

Further advice: **see table 9.**

Usually, these symptoms subside within a few hours of exposure. If they do not, **RADIO FOR MEDICAL ADVICE**.

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Chemical irritation and oedema of the lungs: severe breathlessness and frothy sputum

This occurs after inhalation of some irritant gases and fumes, and may be delayed for up to 48 hours after exposure, and rarely, for longer. The lung air spaces become filled with tissue fluid so that the casualty is drowning in his own secretions.

THIS IS AN EMERGENCY. RADIO FOR MEDICAL ADVICE IN ALL CASES. Every effort should be made to get medical help on board, or to transfer the casualty to hospital if there is not rapid improvement in symptoms.

Diagnosis

Symptoms and signs include:

- Severe difficulty in breathing;
- Increase in breathing rate to 30 to 40 per minute;
- Cough with the production of frothy sputum, which is sometimes pink in colour with flecks of blood;
- Difficulty in lying flat;
- Gurgling noise in the throat when the casualty is breathing;
- Blue discoloration of the skin;
- Anxiety and sweating;
- In severe cases, acute circulatory collapse, unconsciousness, and convulsions may occur. Breathing and the heart may both stop suddenly.

Further advice: **see table 9.**

Chemical irritation and secondary infection of the lungs: productive cough (sticky white, yellow or green phlegm [sputum])

In cases of significant exposure to smoke, fumes or some gases, secondary infection may occur several days later.

Diagnosis

Symptoms and signs include:

- Fever (usually mild);
- Productive cough. Phlegm (sputum, spit) is coughed up, at first sticky, white and difficult to bring up, later greenish yellow, thicker and more copious. The phlegm is occasionally tinged with blood;
- Breathlessness and wheezing;
- A pulse rate over 110 per minute with blueness of the skin, ears and lips indicates severe infection.

Further advice: **see table 9.**

The chemical hazards from fire

Combustion of many chemicals may produce a wide range of substances which are toxic. These may be present at a distance from the main site of the fire, and may have no odour. Self-contained breathing apparatus should be used in approaching chemical fires.

The main toxic chemicals which may be produced are:

- Carbon dioxide
- Carbon monoxide
- Hydrogen chloride (hydrochloric acid fumes)
- Hydrogen cyanide
- Nitrogen oxides (particularly produced in smouldering fires)

Hypoxia due to “consumption” of oxygen by fire may occur. Oxygen must only be administered to a casualty in a place of safety.

Further advice: **see table 2 and table 3.**

Diagnosis

Symptoms and signs include:

- Dizziness
- Headache
- Nausea and vomiting
- A persistent cough and difficulty in breathing
- Unconsciousness

Inhalation of fumes may result in rapid collapse and unconsciousness.

Further advice on **disturbed consciousness: see table 4.**

Further advice on **inhalational injuries: see table 9.**

Chemical hazards from welding

If adequate precautions are not taken, symptoms of poisoning may arise during welding in confined spaces.

The main danger is from nitrogen oxides.

Certain metal alloys, in particular those containing zinc or cadmium, also give off fumes, causing characteristic symptoms known as “metal fume fever”. These usually do not develop for a period of 6 to 12 hours after exposure, and comprise:

- Shivering
- Fever, headache and muscle pains
- Nausea
- A dry cough

These symptoms usually resolve spontaneously without any treatment over the following 12 hours. Lung oedema, however, may occur as a very rare complication.

Further advice on **lung oedema: see** table 9.

Chemical hazards from explosive chemicals

The main hazard is injury from explosion.

Contact with explosives does not normally cause a medical problem from the chemicals themselves, unless they are in a decomposed state, when they may produce fumes, particularly of nitrogen oxides, which may be inhaled.

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