

Survivors should be brought on board as quickly as possible since they may be exhausted, nearly drowned, and perhaps injured. They may be in the last stages of exhaustion and totally unable to help themselves. Even a short scramble up rope netting will be beyond their capability and could endanger their life. They will have to be assisted or carried. If possible they should be lifted in a horizontal posture as this reduces the chances of a sudden drop in blood pressure on removal from the water.

## Hypothermia

Hypothermia is the term given to the condition when deep body temperature is lowered to less than 35°C. At and below this temperature normal body function will be impaired. Loss of life may occur when deep body temperature falls below 30°C.

### Causes

The usual causes among seafarers are immersion in the sea, or exposure to cold air while in a survival craft. In a cold environment body heat production will automatically increase in an effort to balance heat loss, but if the rate of heat loss exceeds the rate of heat production then body temperature must fall and hypothermia will result. The rate of heat loss is many times greater in water than in air. The rate of heat loss will vary depending on the difference in the temperature between the body and the water. Hence in tropical water one may not die of hypothermia for a considerable period of time, whereas in colder water death from hypothermia can occur in less than an hour. In addition, death by drowning is a frequent consequence of weakness caused by hypothermia, before death from hypothermia alone would occur. Almost all seas in the world are at a temperature which can be classed as a cold environment, as heat loss will occur in water at temperatures below 35.5°C.

### Diagnosis

Hypothermia should always be suspected in any individual rescued at sea. The three broad categories of uncomplicated hypothermia are illustrated in Figure 11.1

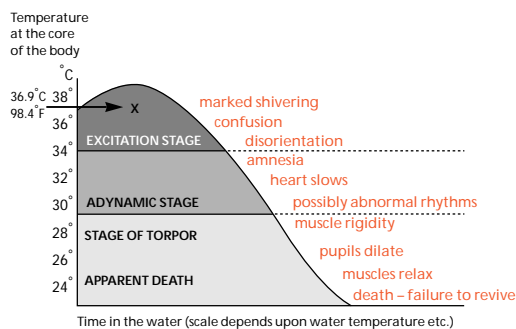


Figure 11.1 Curve representing the change in body temperature during cold water immersion with the associated signs and symptoms encountered at various body temperatures.

Hypothermia

Freezing cold injury (frostbite)

Non-freezing cold injury (immersion foot)

Contamination with oil

Dehydration and malnutrition

Problems in the lifeboat

The use of a low reading rectal thermometer will be necessary in order to record deep body temperature.

Note that the stage of torpor may terminate in a comatose state which is difficult to distinguish from death. The casualty is unconscious, there are no reflexes and the pupils are dilated. The respiratory rate is very slow with two or three movements a minute. The pulse is imperceptible and heart sounds cannot be heard even with a stethoscope. The condition could suggest death, but the usual criteria for death are not strictly applicable in the case of hypothermia. Death by hypothermia is then defined as being the failure to revive the casualty by re-warming.

### Treatment

The treatment for hypothermia will of course depend on both the condition of the survivor and the facilities available. Generally, survivors who are rational and capable of recounting their experiences, although shivering dramatically, merely require removal of all wet clothes and replacement with dry clothes or blankets. Hot sweet drinks and rest in a warm environment not exceeding 22°C (normal room temperature) are also recommended. However, always bear in mind that even conscious survivors can collapse and become unconscious shortly after rescue. They should therefore be laid down and should not be left alone. **NEVER GIVE ALCOHOL**. In more serious cases, where the survivor is not shivering and is semi-conscious, unconscious or apparently dead, slow re-warming is essential. Never attempt rapid re-warming by immersion in a hot bath except on medical advice. The following measures will be necessary to preserve life:

- On rescue always check the survivor's airway and breathing, and then listen for heart sounds. If the survivor is not breathing, ensure the airway is clear and start artificial respiration immediately (mouth to mouth or mouth to nose). Attempts at resuscitation should be continued until medical advice can be obtained, or for at least 30 minutes.
- Prevent further heat loss due to evaporation or exposure to the wind.
- Do not massage the limbs.
- Avoid all unnecessary handling, even the removal of wet clothing. If handling is necessary then be as gentle as possible.
- Enclose the survivor in a plastic bag or blankets or preferably both. It is important that the head, but not the face, is well covered. Place in a warm area with a temperature not exceeding 22°C. Never attempt to give any fluids by mouth to an unconscious casualty. When consciousness is regained never give alcohol. If the survivor is breathing but unconscious, lay him in the unconscious position. When consciousness has been fully regained warm sweet drinks may be given.
- Conscious survivors suffering from hypothermia should be laid on their side and, whenever possible, in a slightly head-down attitude.
- In survival craft, seriously affected survivors should be placed in close proximity to warmer occupants, to permit transfer of body heat.
- When spare clothing or blankets or survival bags are available they should be given to those most affected. Huddling together under blankets or any other covering will conserve heat and permit mutual re-warming.

### Freezing cold injury – frostbite

Frostbite is the term given to the condition when tissue fluids freeze in localised areas of the body; the hands, face and feet are particularly susceptible.

#### Cause

Exposure, particularly of bare skin to sub-zero temperatures, especially when combined with air movement. Look-outs in life rafts or survivors in open boats are particularly prone to this injury. Accordingly, consideration should be given to the length of watch periods and watch keepers should be supplied with any spare clothing.

#### Diagnosis

The signs are:

- extreme waxy pallor of the skin;
- initial local tingling and stiffness when it is difficult to wrinkle the face or wiggle affected toes or fingers;
- complete absence of sensation in the area affected; and
- local hardness due to freezing of the flesh.

The depth of tissue damage can be graded, like burns, into 1st degree (frost nip), 2nd degree, 3rd degree and 4th degree.

#### Prevention

If bare skin has to be exposed to the elements, the periods of exposure should be kept to a minimum and freezing winds particularly avoided. Moderate exercise and massage at an early stage will help to prevent the onset of cold injury. Do not smoke; smoking reduces the blood supply to the hands and feet.

#### Treatment

On detection of the above signs, immediate steps should be taken to re-warm the frozen parts before permanent damage occurs. Get out of the wind. Re-warm the frozen area by applying it to a warmer part of the body, e.g. hands under armpits, cupped hand over cheek, nose, ear, etc. Once freezing has occurred do not rub or massage affected areas. When treatment has been ineffective the skin dies and becomes black. If this occurs dry dressings should be applied to the affected part.

### Non-freezing cold injury – Immersion foot

This is a term given to the condition when the temperature of local tissues in the limbs (usually the feet) remains sub-normal but above freezing for a prolonged period. It is commonly encountered by shipwreck survivors who have been adrift and cold for several days. Usually the feet have been wet and immobile, but this injury can occur in dry conditions. Other contributory factors are tight footwear and sitting still with the feet down for prolonged periods.

#### Diagnosis

Feet become white, numb, cold and frequently are slightly swollen. When returned to the warmth, the feet become hot, red, swollen and excruciatingly painful.

#### Prevention

Every effort should be made by survivors to keep their feet warm and dry. Shoe laces should be loosened; the feet should be raised and toe and ankle exercises encouraged several times a day. When possible, shoes should be removed and feet kept warm by placing them under the armpits, but outside the clothing, of another occupant of the life-raft or boat. Alternatively, unwanted spare clothing may be wrapped round the feet to keep them warm. Smoking should be discouraged.

#### Treatment

After rescue every effort should be made to avoid rapid re-warming of the affected limbs. Care should be taken to avoid damaging the skin or breaking blisters. Do not massage affected limbs.

### Contamination with oil

Do not clean oil off the skin (except around the mouth and eyes) until the person is warm and comfortable. Survivors who have recovered from hypothermia can be taken to a warm shower or bathroom and should have all their clothes taken off. Then their skin should be wiped with soft cloth and strong paper towels to remove as much of the oil as possible. Injured or burned areas should be wiped with care or not at all. If a strong warm shower is available, mechanical removal of much of the oil can be accomplished by the water jet effect. Hair shampoo will remove oil from the hair and can be used to help remove oil from the body. Then, with time, patience, help, and wiping, and using good toilet soap or shower gel to clean the skin, the rest of the oil can be washed away. Solvents, scouring compounds, kerosene, and other cleaners not designed for skin cleaning must not be used. It is, however, all right to use jellied cleansing agents that are designed for skin cleaning.

### Dehydration and malnutrition

Survivors who have been adrift for several days may be suffering from dehydration. If they have been adrift for several weeks malnutrition may also be a problem. Caution should be exercised in trying to reverse either dehydration or malnutrition rapidly. Give sweetened fluids in quantities which will produce a urinary output of one litre per day initially. In temperate climatic conditions (or air-conditioned accommodation) this will usually mean an input of about 2 litres a day. If the weather is warm and the skin is moist or sweaty, higher intakes may be permitted. Initially, a diet of nourishing liquids (sugar and water or milk or soup) will satisfy nutritional requirements and should be given for the first two days. Then small amounts of normal food can be given additionally. **RADIO MEDICAL ADVICE** should be sought. This diet should continue until either the survivor can be transferred to care ashore or medical assistance is given on board.

### Problems in the lifeboat

#### Vomiting

This may be due to the unusual motion of the small craft (sea-sickness is inevitable in a life raft), or to swallowing fuel oil or sea water. It is unlikely to continue very long. After severe vomiting the patient should lie down and be kept warm with coats or blankets. Seasickness tablets may give relief if taken well before the onset of vomiting. They should be issued at the earliest opportunity after entering a life raft.

#### Constipation

Action of the bowels is not expected when taking little or no food. No treatment is needed for this condition – in fact laxatives will do harm.

#### Difficulty in urination

There may be some difficulty in passing urine and the bladder may feel uncomfortably full. In any case, not much water will be passed when the drinking ration is small. The urine may appear dark in colour and thick. This is to be expected and need not cause alarm.

#### Swollen legs

Swelling of the legs is a common occurrence in the boat and continues for a few days after rescue. The condition subsides without treatment and, by itself, is a matter of no importance but can be partially relieved by the exercises recommended for immersion foot.