The Hazards of Cold Water Immersion – and how to cope with them

1) Dry drowning (risk from immediate, to any time after immersion)

a) What is it?

Unfortunately sometimes (up to a fifth of all drownings) instead of the sequence described as cold shock the body may respond differently. There may be a sudden reflex closing of the airway due to muscle spasm. No water can enter the lungs, but neither can air.

It is thought to be an automatic shock reflex due to cold water hitting the back of the nose or throat. It may happen the instant you hit the water.

b) How can I avoid it?

Dry drowning is more likely to occur if you enter the water feet first – which allows water to get up the nose. It is also more likely if you are tense and mentally unprepared – i.e. you weren't expecting to be immersed.

Of course any accident is unexpected (though most are avoidable!) but unless you are actually thrown into the water (e.g. by catching a crab) you will usually have a few seconds warning that immersion is going to happen. Use that moment to mentally take control – you know what to do to maximise survival, so now is the time to put it in to action.

If possible take a deep breath in, pinch your nose with your fingers to close the nostrils, keep your mouth closed and enter the water gently by rolling in, rather than feet first. Avoid jumping into cold water.

As described in the Cold Shock section, once immersed concentrate on keeping your face out of the water and keep your back to the waves to avoid getting spray into your nose and throat.

2) Cold Shock (max risk at 1- 5 minutes)

a) What is it?:

Cold shock is an increased respiratory response to cold water immersion. At first there is an involuntary gasp (indrawing of breath) which is followed by hyperventilation (rapid and disordered breathing). There is usually an associated degree of disorientation, so for a few moments you may not be sure which way is up, or where you are in relation to the boat, the bank etc.

The severity of the effects of cold shock are proportional to reduction in water temperature, with the maximum effect being at 10 – 15°C. Ability to breath hold is proportionally reduced the colder the water.

Cold shock only lasts for approx 1 – 3 minutes.

b) How do I cope with it?

For those first crucial few minutes just completely concentrate on not drowning! It may sound too simplistic, but if you are expecting the cold shock response, and you understand it will soon pass, then you have a better chance of surviving it.

If the first involuntary gasp takes place when your face in is the water, then you will get a lungful of water instead of air. If you are in choppy water and your breathing is uncontrolled and you are feeling disorientated then you may have difficulty co-ordinating breathing with gaps between the waves.

In order to NOT drown you must concentrate on keeping your face out of the water: turn your back to the waves to avoid inhaling spray and water and try your hardest to control your breathing. Remind yourself it will soon pass.

After your breathing begins to settle, and you get your bearings you will then have time to assess the situation and decide what is best to do for rescue.

3) Swimming Failure (risk increasing with time in the water)

a) What is it?

Your ability to swim is reduced in cold water. The colder the water the more your swimming deteriorates. This effect takes hold long before there is significant cooling of the body core, so is not due to core hypothermia.

Swimming stroke length is decreased and stroke rate is increased – so the stroke becomes less and less efficient, and more exhausting. The swim angle is increased, i.e. your body lies more upright in the water, so forward progress with each stroke is reduced. It becomes more and more difficult to straighten the limbs and to co-ordinate swimming movements. The fingers splay and start to flex.

These effects are thought to be due to local cooling of the limb muscles.

Wearing a personal flotation device does not prevent the onset of swimming failure.

b) How can I avoid it?

Unfortunately the only answer is to avoid swimming in cold water as much as you can.

Different people are affected by swimming failure to varying degrees. Some are affected very rapidly, and others are able to swim for reasonable distances before the effects take hold. In one experiment the significant factor seemed to be upper arm skinfold thickness. The more insulation around the muscles, the warmer and more efficient they remain.

Rescue by swimming should be a last resort measure only.

4) Hypothermia (max cause of death at 30 minutes plus)

a) What is it?

Hypothermia is defined as body core temperature below 35℃ (normal body temperature is 37℃).

The body loses heat in water 25 – 30 times faster than in air.

The rate of heat loss is dependent on several factors:

- Temperature differential – how much hotter your body is compared to the water.
- Clothing insulation.
- Body fat thickness – inbuilt insulation.
- Ratio of body mass to surface area – the bulkier you are, the better you retain heat.
- Rate of agitation of the water – each bit of water next to the skin, and warmed by it, is constantly replaced by a new colder bit.
- Physical activity – movement draws warm blood out of the body core and into the muscles of the limbs, where heat loss is more rapid. Treading water or swimming increases the rate of heat loss by approx 40%.
- Body posture in the water – some parts of the body lose heat faster than others i.e. the head (50% of heat loss), neck, armpits, chest and groin.
- Physical fitness.
- Diet prior to immersion.

Predicted survival time for a fully clothed adult male wearing a lifejacket in water at 5℃ is approx 1 hour, and 2 hours at 10℃. A thin youth, inadequately clothed, and without a life jacket would succumb much sooner.

However many people who die from cold water immersion do not die of core hypothermia. Many die before this has had a chance to fully take effect.

As the core body temperature cools usually the first obvious effect is on the brain. The victim becomes confused, unable to remember things and will become drowsy and ultimately unconscious. At first the heart rate slows, but then the heart muscle becomes irritable, and dangerous disturbances of rhythm may occur. Less oxygen gets to the body tissues. Urine production increases, leading to loss of blood volume and thickening of the blood. The airway protective cough reflex becomes impaired – so there is an increased risk of water getting into the lungs.

Hypothermia can kill even after the victim has been rescued from the water. Mortality rates at this stage vary from 20 – 80% according to age, fitness, degree of hypothermia and the quality and timing of medical treatment.

Before core hypothermia sets in there are the more immediate effects of local cooling of the limbs to contend with. This reduces grip strength and manual dexterity, and reduces the ability to feel with the fingers. This effect can occur very soon after immersion, and may severely hamper survival actions, such as clinging to the boat.