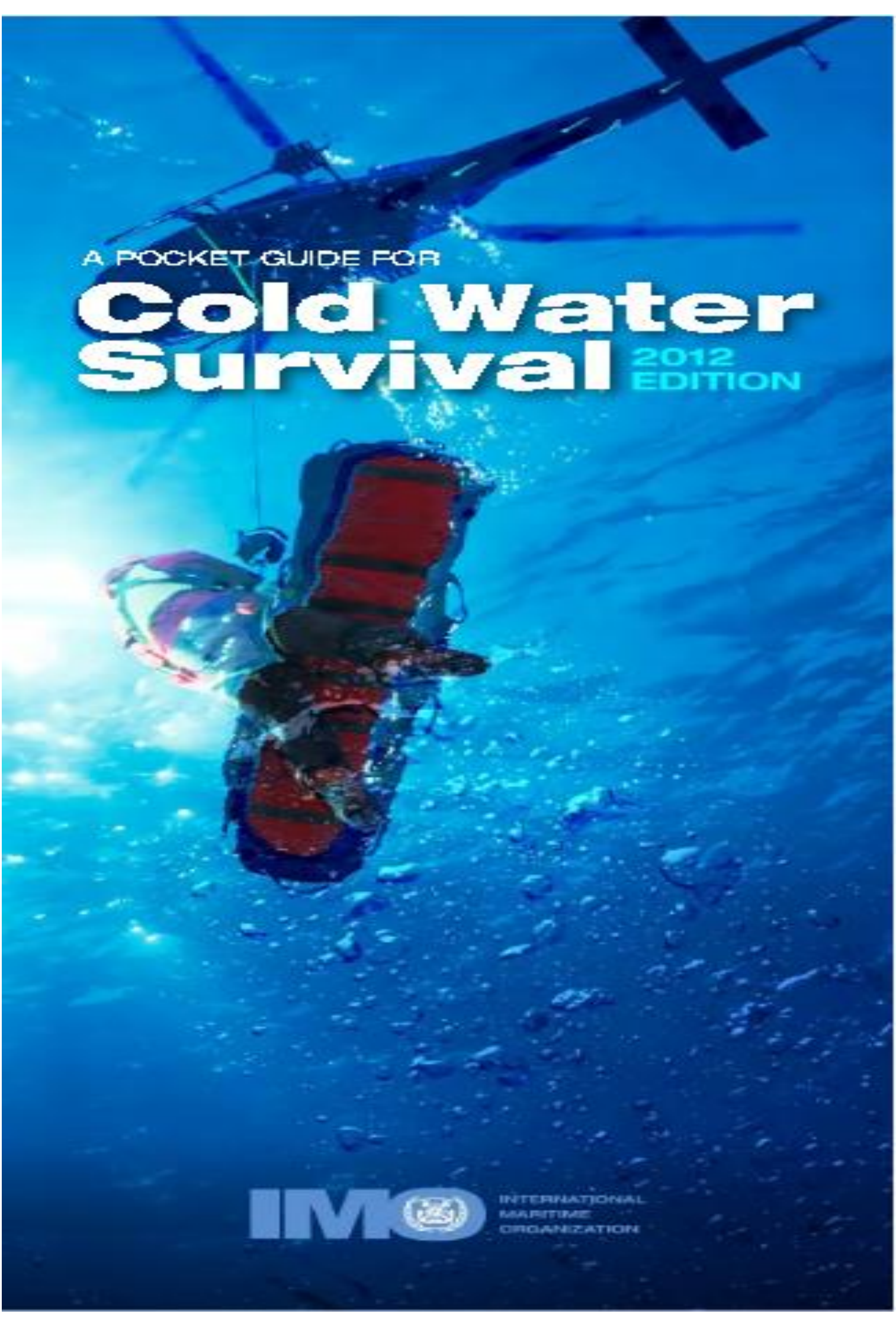
A POCKET GUIDE FOR

Cold Water Survival

2012 EDITION



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Contents

1 Introduction

This guidance is intended primarily for seafarers. It provides information which will help you if you are unlucky enough to fall into cold water, or have to enter it in an emergency, or have to use survival craft in cold conditions. It also provides information which will help seafarers, trained as first-aid providers, to treat those rescued from cold conditions.

This guide briefly examines the hazards of exposure to the cold that may endanger life, and provides advice based on the latest medical and scientific opinion on how to prevent or minimize those dangers. It is a sad fact that people continue to die at sea through a lack of this knowledge. Knowing what is likely to happen if you are exposed to cold water is a survival aid in itself. A thorough understanding of the information contained in this booklet may some day save your life – or someone else's.

It is most important to realize that you are not helpless to affect your own survival in cold water. Understanding your body's response and simple self-help techniques can extend your survival time, particularly if you are wearing a lifejacket. You can make a difference; this guide is intended to show you how.

The guidance is laid out as follows:

- an explanation of *cold water hazards and their effects*

followed by sections on:

- actions to be taken *prior* to abandoning your ship that will improve your chances of survival
- actions to be taken during *the survival phase*, whether in survival craft or in the water
- *the rescue phase*
- *treatment of people recovered from cold water or from survival craft in cold conditions*
- *treatment of the apparently dead*.

Cold Water Survival

2 Cold water hazards and their effects: knowledge that can improve survival chances

An understanding of how your body reacts to cold air or water exposure, and knowing the steps you can take to help your body delay the damaging effects of cold stress, will help you stay alive.

If you need to abandon your ship you should, if possible, avoid going into cold water at all. Cold water represents a much greater risk than cold air, partly because water takes heat away from the body much faster than air. Human beings cool four to five times faster in water than in air of the same temperature – and the colder the water is the more likely it is that you will suffer the physical reactions and medical problems described below. Therefore, you should try to enter survival or rescue craft directly, without entering the water.

The major threats of cold water immersion are:

- drowning
- hypothermia* (see appendix 2, page 20, Symptoms of hypothermia)
- collapse just before, during, or after rescue.

Four stages of immersion have been identified. Each is associated with particular risks, and it helps to understand these and so be better able to deal with them.

* By medical convention clinical hypothermia is considered present when the 'deep', or 'core', body temperature falls below 35°C (95°F); that is, when about 2°C (3.5°F) has been lost. With continued cooling consciousness will be progressively impaired and then lost; eventually death will follow. However, in cold water death from hypothermia itself is relatively rare. More often it is the loss of heat from the muscles: incapacitation may then lead to the casualty being unable to keep their airway – the mouth and/or nose – clear of the water, so that they drown. Hence the importance of being well trained and wearing a correctly fitted and adjusted lifejacket.

Initial responses to immersion in cold water may include:

- inability to hold your breath
- an involuntary gasp, followed by uncontrollable breathing
- increased stress placed on your heart.

These responses are caused by the sudden fall in skin temperature. *It is important to remember that they will last only about three minutes and will then ease.* Remember too that, at this stage:

- the fitter you are, the smaller the initial responses to cold water immersion and the smaller the chance of you experiencing heart problems
- wearing an appropriate lifejacket, properly fitted, will decrease the risk by helping to keep your airway clear of the water and reducing the need for you to exercise during this critical period
- wearing appropriate protective clothing will also decrease the risk by slowing the rate of skin cooling and, thereby, the size of the initial responses
- if you experience initial responses you should stay still for the first few minutes of immersion, doing as little as possible until you have regained control of your breathing; a lifejacket or other source of buoyancy will help you do this
- the period of possible self-rescue starts immediately after the initial responses, if experienced, and before hypothermia sets in.

Short-term immersion effects follow the initial responses. During this phase, cooling of the muscles and nerves close to the surface of the skin – particularly in the limbs – can lead to inability to perform physical tasks. Swimming ability will be significantly impaired. (Swimming accelerates the rate of cooling in any event.) It follows that:

- essential survival action that requires grip strength and/or manual dexterity – such as adjusting clothing or your

need to take action as quickly as possible before you lose full use of your hands.

- Do not attempt to swim unless it is to reach a fellow survivor or a nearby shore, craft, or other floating object onto which you can hold or climb. Staying calm and still conserves heat.
- If swimming, swim on your back, using only your legs, if possible. The arms are critical to heat loss. Not using your arms to swim means that you can keep them folded over your torso to assist in insulation.
- Swim downwind of a floating object, if you are trying to reach it, rather than straight towards it. The wind will bring it in your direction. Once upwind of a liferaft, for example, you are unlikely to be able to reach it. Keep checking the object's location and your progress towards it. If you decide that you cannot reach it, stop swimming, stay calm and stay still.
- The body position you assume in the water is very important in conserving heat. Try to float as still as possible, with your legs together, elbows close to your side, and arms folded across your chest. This position, which may only be fully achievable if you are wearing a lifejacket or dry suit, minimizes the exposure of the body surface to the cold water.
- If the lifejacket is fitted with a spray hood, put it on. The hood protects the airways against spray while drifting in the water.
- The floating body tends to turn towards oncoming waves, with the legs acting like a sea anchor. If you have to, paddle gently to maintain a back-to-wave position. Although this may increase heat loss, you need to protect your airway from wave splash.
- Link up with other survivors if you can. It helps location and rescue.
- Keep a positive attitude of mind about your survival and rescue. This will extend your survival time. Your will to live does make a difference.

6 The rescue phase:
guidance for those engaged in search and rescue

Search may have to come before rescue.

Remember to:

- Search for long enough. Survival is possible, even after many hours in cold water.
- Ask the Rescue Co-ordination Centre for advice, including on how long to keep searching.
- Plan and prepare recovery methods for a variety of possible scenarios while searching. See IMO's guidance on recovery, *A Pocket Guide to Recovery Techniques*.

Rescue

Recovery from the water:

- Be aware of the dangers to people in the water of vessel drift, including side-splash (waves generated or reflected by the hull).
- Try to ensure that the survivor does not attempt to assist; full and co-ordinated use of their fingers and arms may not be possible, and lifting an arm to take hold of a rope can induce sinking and drowning, unless they are wearing a lifejacket.
- Encourage the survivor to keep *fighting for survival*. Do not let them relax too soon.
- Ideally, the survivor should be recovered in a horizontal or near-horizontal body position. Lifting a hypothermic person vertically can induce cardiac arrest. In a relatively high lift – up to the deck of a ship or into a helicopter, for example – use two straps or loops (one under the arms, the other under the knees) or other means of near-horizontal recovery. See IMO's guidance on recovery, *A Pocket Guide to Recovery Techniques*.
- If the survivor's airway is under threat – as it may be if alongside a vessel of any size, even in calm conditions, because of side-splash – recover by the quickest method possible.
- Keep the survivor slightly head-down during transport to a place of safety. In a fast rescue craft, for example, this will mean laying the survivor with his feet towards the bows.
- If a rescue craft has been deployed, survivors recovered should, if possible, remain in the craft during its recovery.

Recovery from survival craft:

- In high seas beware of swamping of enclosed craft on opening the hatch.

- Beware of the possibility of rescue collapse on recovery. This is especially likely in survivors who have been adrift for a long time.
- To avoid collapse, employ the horizontal rescue procedures outlined above.

7 Treatment of people recovered from cold water

Check for vital signs. Is the casualty breathing? Are they unconscious (unresponsive) or conscious?

Begin appropriate first aid as described below. See also the flow diagram in appendix 1, page 18.

Always obtain medical advice as soon as possible, even if the casualty has not been in cold water for long and is conscious. Free advice may be obtained from a Telemedical Assistance Service (TMAS), which can be contacted via a Rescue Co-ordination Centre (RCC).

Unconscious casualty

Adopt standard first aid procedures.

If not breathing:

- Check/clear airway; if still not breathing give two full rescue breaths.
- Commence cardiopulmonary resuscitation (CPR) in accordance with first aid training.
- While awaiting medical advice, continue CPR at a compression rate of 100 per minute, with two rescue breaths every 30 compressions.
- Continue until exhausted, if acting alone. If assistance is available, interchange every two minutes to avoid exhaustion.
- If the cardiac arrest was not witnessed, if medical advice is still not available and none is imminent, and if there are

still no signs of life after 30 minutes, stop CPR but treat the casualty in accordance with the advice in section 9 below.

- If the cardiac arrest was witnessed, maintain CPR until you are either exhausted or receive medical advice.

If breathing but unconscious:

- Transfer to a sheltered location.
- Check for other injuries.
- Place in the recovery position.

- Beware of vomiting which is very common in seawater drowning.
- Seek medical advice.
- Monitor and record breathing and heart rate (neck/carotid pulse). An increasing breathing and/or heart rate may indicate the onset of drowning complications and, in a severely hypothermic person, cardiac arrest can occur at any time.

- Provide oxygen by mask, if available.
- Provide additional insulation to prevent continued cooling. To provide protection against evaporative heat loss, enclose in a large waterproof bag or sheeting.

Conscious casualty

Short exposure (less than about 30 minutes): survivor is shivering

- Survivors who are fully alert, rational and capable of recounting their experiences, although shivering dramatically, will recover fully if they remove their wet clothing and are insulated with blankets, etc. If their exposure has been relatively short, 30 minutes or so, they can be re-warmed in a hot bath, or seated in a shower* – but only if shivering and while being supervised for early signs of dizziness or collapse associated with overheating.
- Alternatively, for survivors who are shivering and alert, physical exercise will speed up re-warming.
- Seek medical advice.

Long exposure (more than 30 minutes): survivor is not shivering

- Insulate to prevent further heat loss through evaporation and exposure to wind.
- Avoid unnecessary manhandling. Enclose in blankets and/or plastic, including head (but not face), neck, hands and feet.
- Move to a warm, sheltered location.
- Lay down in a semi-horizontal or half-sitting position (unless dizziness develops, when a horizontal attitude would be best).

* The bath or shower should be at a temperature of 39–41°C (102–106°F). Much less than this and the survivor's body will continue cooling, even if the water feels 'warm'. If you do not have a thermometer, dip your bare elbow in the water: the heat will be tolerable at about the correct temperature, but not above it.

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- Oxygen should be given, if available.
- If water was inhaled, encourage deep breathing and coughing.
- Monitor and record breathing and heart rate (neck/carotid pulse) at five minute intervals for the first 15 minutes and then, if no change, at 15-minute intervals. (An increasing breathing and/or heart rate may indicate the onset of drowning complications. Remember that in a severely hypothermic person cardiac arrest can occur at any time.)
- Seek medical advice.
- When the survivor is alert and warm it is no longer necessary to maintain a semi-horizontal or horizontal position.
- Give warm sweet drinks but no alcohol.

If the survivor's condition deteriorates, refer to the treatment procedure above for the unconscious patient.

8 Treatment of people recovered from survival craft

Occupants who were exposed and dry for short durations (two to three days), and are fully alert, may require treatment for mild hypothermia, as described above for conscious immersion survivors.

Occupants who are wet and cold and less alert will need to be recovered in a semi-horizontal position and should be treated in the same way as immersion casualties at the same level of alertness.

Warm sweet drinks should be provided.

Obtain medical advice. Free advice may be obtained from a Telemedical Assistance Service (TMAS), which can be contacted via a Rescue Co-ordination Centre.

9 The apparently dead

What to do with people recovered apparently dead, showing no signs of life and extremely cold to the touch, is a very difficult question.

In all probability they will indeed be dead, especially if there are witness reports from other survivors that they have been in that state for many hours.

If, however, there are no such witness reports, the assumption must be that they may be alive but suffering from extreme hypothermia, that is, the heart may still be working, but at a very reduced level of activity, such that the pulse cannot be felt and the eye pupils are widely dilated.

Always obtain medical advice as soon as possible. Free advice may be obtained from a Telemedical Assistance Service (TMAS), which can be contacted via a Rescue Co-ordination Centre.

The apparently dead should be:

- Recovered horizontally, if possible, and handled as if seriously ill.
- The body should be gently placed in the recovery position in a warm sheltered compartment and well insulated.
- If still alive, the body can rewarm very slowly at an optimal rate to allow it to compensate, by itself, for the major internal fluid changes that occurred during the slow protracted cooling it endured.
- Monitor and record pupil size and rectal temperature at hourly intervals for 12 hours. If there is no change and there are still no other signs of life, then it can be assumed that the casualty is dead.
- If, however, pupil size decreases then, possibly, the casualty is alive. Commence monitoring and recording at 15-minute intervals, including checking for pulse and breathing.

- If any sign of life is detected, treat as for the unconscious immersion casualty. See section 7.

10 Summing up

This guide has briefly explained how your body responds to cold, what you can do to help ward off its harmful effects and, finally, how to aid people recovered from the water or from survival craft.

Let's sum up with some important reminders about survival. Follow them, for your life may one day depend on them.

- **Plan your emergency moves in advance.** Ask yourself what you would do if an emergency arose. Where is your nearest exit to the deck for escape? Where is the nearest available immersion suit, lifejacket, SART, emergency location beacon and survival craft? How would you quickly get to your foul-weather gear, insulated clothing, gloves, etc.?
- **Know how your survival equipment works.** The time of the emergency is not the time to learn.
- Even in the tropics, before abandoning ship **put on many layers of clothing** to offset the effects of cold. **Wear an immersion suit**, if available.
- **Put on a lifejacket** as soon as possible in an emergency situation and adjust it correctly.
- When abandoning ship, **try to board the survival craft dry** without entering the water.
- **Take anti-seasickness medicine** as soon as possible.
- If immersion in water is necessary, **try to enter the water gradually.**
- The **initial response** to immersion in cold water **will only last a few minutes**; rest until you regain control of your breathing. (This initial response will not always occur, but is more likely with lower water temperatures/less protection.)

- **Try to get as much of your body as you can out of the water.**
- Swimming increases body heat loss. Only **swim to a safe refuge nearby** if the likelihood of early rescue is low and you are confident that you can reach it. **Swim on your back, using only your legs**, if you can.
- **If trying to reach a floating object, swim downwind of it**, letting the wind bring the object to you.
- If not swimming to a refuge, try to reduce your body heat loss: **float in the water with your legs together, elbows to your side, and arms across your chest.**
- **If you are not wearing a lifejacket, do not wave to attract attention.** You will lose buoyancy if you have no lifejacket.
- **Force yourself to have the will to survive.** This can make the difference between life and death. Keep your mind occupied and focus on short-term objectives.
- **Do not over-exert yourself during the rescue process.** Let the rescuers do the work; they are in a better condition than you.
- Even while being rescued, **do not relax too soon.**

Advance knowledge, planning, preparation and thought on your part can be the most significant factors in your survival or in treating others who have been exposed to the cold.

Familiarize yourself with the contents of this guide.

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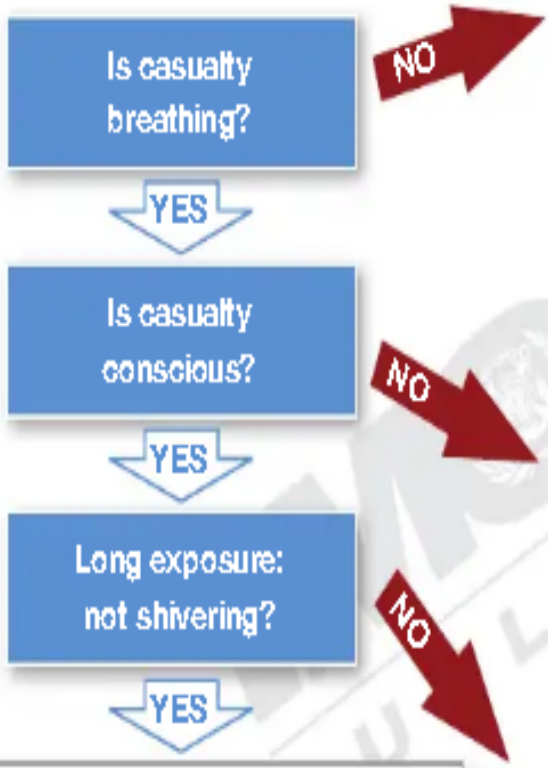
Appendix 1 Treatment of people recovered from cold water

Always obtain medical advice as soon as possible. Free advice may be obtained from a Telemedical Assistance Service (TMAS), which can be contacted via a Rescue Co-ordination Centre.



- Check/clear airway; if still not breathing give two full rescue breaths.
- Commence CPR at a compression rate of 100 per minute, with two rescue breaths every 30 compressions.
- Continue until exhausted, if acting alone. If assistance is available, interchange every two minutes.
- If cardiac arrest not witnessed, medical advice not available and none imminent, and no sign of life after 30 minutes, stop CPR but treat the casualty in accordance with the advice in section 9.
- If cardiac arrest witnessed, maintain CPR until you are either exhausted or receive medical advice.

- Transfer to sheltered location and check for other injuries.
- Place in recovery position; beware of vomiting.
- Monitor and record breathing and heart rate.
- Provide oxygen by mask, if available.
- Provide insulation to prevent continued cooling.

- Insulate to prevent further heat loss. Enclose in blankets and/or plastic.
- Move to warm, sheltered location and lay in a horizontal or semi-horizontal position until alert and warm.
- Oxygen should be given, if available. If water was inhaled, encourage deep breathing and coughing.
- Monitor and record breathing and heart rate. Give warm sweet drinks; no alcohol.
- If condition deteriorates, refer to the treatment procedure for the unconscious patient.

- Less than 30 minutes exposure and shivering: remove wet clothing and insulate with blankets, etc.
- Re-warm in hot bath or seated in a shower, but only if shivering and while being supervised for early signs of dizziness or collapse associated with overheating.
- For survivors who are shivering and alert, physical exercise will speed up re-warming.

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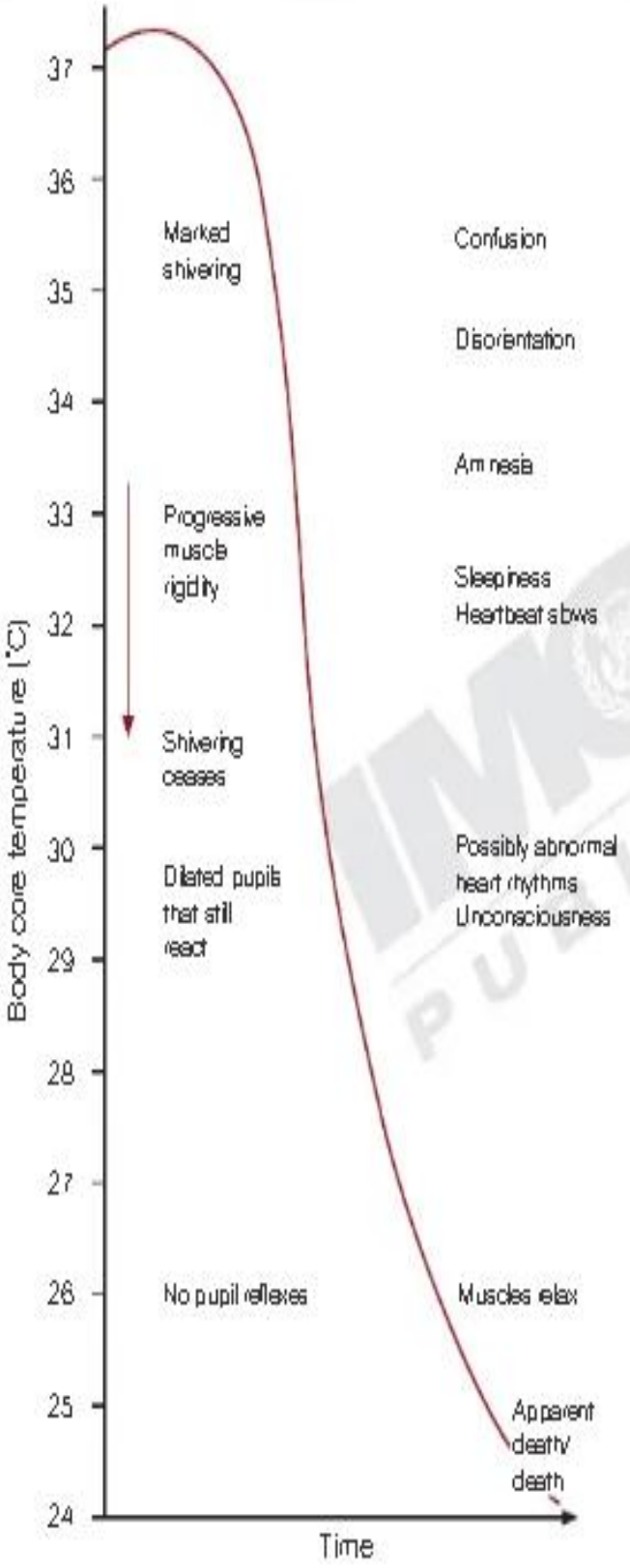
Appendix 2

Symptoms of hypothermia



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