Hypothermia and Cold Water Immersion

Information for Rowing Coaches and Clubs

*This is intended as a sister document to "**Cold Water – How To Increase Your Chances Of Survival**" ("Cold Water Survival" document) and should be read in conjunction with it. "Cold Water Survival" gives safety information and advice to individuals, but this document covers further information and advice for would be coaches, coaches and clubs. There are aspects of safety which need to be addressed at organisational level.*

We have included information at all levels from the fairly basic and obvious onwards, as we feel it is helpful to bring it all together for ease of reference.

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1 Background

Individuals may be adversely affected when rowing in a cold environment, whether wet or dry. These effects can reduce performance, cause temporary or permanent physical harm, or may even be fatal.

Cold can pose a risk to rowers all the year through. When rowing in winter, the cold can adversely affect individuals even if it is dry. Rain and wind (or a wet rower exposed to the wind) can produce significant body heat loss in much milder temperatures. Immersion in environmental water (i.e. the water you are rowing on) is a risk at any time of the year because cold water cools the body much quicker than air at the same temperature.

Hypothermia is when the body core temperature is reduced to 35°C or below (normal core body temperature is 37°C) and is a serious, possibly fatal condition.

The onset of hypothermia may be insidious and, as the body core temperature gradually falls, the early stages can go unnoticed by both the victim and those around them. Vigilance is required to spot the early signs, as once it is obvious someone has a problem it may have already reached the life-threatening stage.

In contrast, immersion in cold water is an obvious event, which should immediately raise awareness of the risk of hypothermia. The rate of onset of hypothermia in water is affected by several factors and is thus variable from person to person. It may occur quite rapidly. Because of these variable factors, tables showing survival times at defined water temperature can be misleading.

Immersion also bears additional risks due to the body's reaction to the sudden reduction in temperature experienced at the moment of entering the water i.e. cold shock and 'dry' or 'atypical' drowning (See "Cold Water Survival" document). Cold water can also cause possibly life-threatening effects long before core hypothermia sets in, by reducing the ability to swim or perform self-rescue tasks.

The physiological effects of hypothermia on the body are the same if brought on by either cold air or cold water. However in cold water the outcome may be worse due to the added risk of drowning.

Much can be done to avoid or reduce these risks by both the club and the coach, as well as by each individual.

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2 How does cold affect the body?

How the body tries to maintain body temperature.

The body core (all but the arms and legs) contains the vital organs, which begin to malfunction as they are cooled. Once exposed to a cold environment the body responds with physiological changes aimed at preserving core body heat in order to keep these organs functioning normally:

i) The first reaction is the **reduction in circulation** of warm blood to the **extremities** where heat loss is greatest. The relatively stagnant blood remaining in the extremities becomes colder and colder and the hands and feet quickly become painful, weak and stiff as muscles become tense. This reduces dexterity and makes self-rescue tasks difficult or impossible.

A large temperature difference can be achieved between the body core and the limbs. The core can still be warm enough to keep organs ticking over, while the extremities are literally freezing (frostbite).

If the limbs are cooled below 12°C then motor and sensory paralysis ensues - this means numbness and inability to move. The hands and feet are affected first. This is usually reversible, but if cold immersion persists for some hours then the damage may become permanent.

ii) The body tries to **generate more heat** by shivering, which may start when the core temperature is only 1°C below normal (i.e. at 36°C). As hypothermia develops (at 35°C) the shivering becomes intense and can no longer be stopped voluntarily. However as core temperature reduces to around 33°C shivering is no longer effective, so it reduces and stops.
This is an important sign indicating the person is in imminent danger.
Body heat loss then accelerates.

iii) In **dry air**, in the early stages extra body heat can be produced by increased general physical activity. In mildly cold conditions this may be enough to prevent the onset of hypothermia *as long as the activity continues*. However, as with shivering, once the core temperature drops to around 33°C the body is no longer able to generate a net heat gain. At this point physical activity no longer makes you warmer - it makes you colder.

In **cold water** immersion, you cannot get warmer by physical activity at any stage. The opposite is true – any body movement increases heat loss and makes you colder, hastening the onset of hypothermia. This is because cold water conducts heat away from the body more efficiently - 25 to 30 times faster than in air at the same temperature.

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Symptoms and signs of hypothermia and their practical implications

Here is a general overview of the effects of hypothermia. In practice it is not necessary to remember all this detail, but it can be useful to have some background understanding.

The early signs are the most important ones to recognise, so that appropriate action can be taken. By the time someone is moderately hypothermic it is very obvious that something is seriously wrong.

i) Pre-hypothermic stage (core temperature 35°C to 36°C)

Physical

- Cold stiff hands and feet as circulation to the extremities is reduced.
- General increase in muscle tension, shivering may start but the person can stop it voluntarily.
- Onset of feeling weak and tired.

Mental

- Most (but not all) people will notice they are cold and say so.
- There is no confusion or adverse mental effects.
- Judgement capability remains normal.

Practical effects

- In air, at this stage it may be possible to prevent further cooling by increasing physical activity and improving insulation from clothing. However in cold water physical activity will increase heat loss, so if you can't get out of the water, keep as still as possible.
- In cold water it is important to complete self-rescue tasks as quickly as possible before the hands become too numb and stiff, and while able to think clearly.

ii) Mild hypothermia

Physical

- Shivering becomes vigorous and uncontrollable.
- Loss of fine movement control and numbness; can't grip hold of things effectively.
- General co-ordination starts to deteriorate.
- Speech may be slurred.
- The heart rate increases (associated with shivering).
- Breathing rate increases (associated with shivering).
- Metabolic rate goes up as the body burns more energy to produce heat.
- Urine production increases, as a greater proportion of blood volume remains central. This can lead to dehydration.

Mental

- Gradual onset of confusion and reduced ability to perform simple mental tasks e.g. remember a list of words, simple calculations, work out best action for rescue.
- Becoming emotionally flat.

Practical effects

- At this stage action must be taken to get out of the cold environment and to prevent further heat loss, as trying to keep warm by physical activity becomes less and less effective.
- In cold water, life is now endangered especially if not wearing a lifejacket (i.e. a pfd which will keep the wearer afloat, self righting to keep the nose and mouth clear of the water).
- Making the right survival decisions becomes more difficult.
- Holding onto something becomes harder, as hands become more and more useless.
- Swim failure is an increasing possibility (see "Cold Water Survival" document).

iii) Moderate hypothermia

Physical

- Shivering reduces and stops.
- Muscles become more and more rigid.
- Lack of co-ordination may cause stumbling.
- Speech slowed and slurred.
- Heart rate slows and the heart muscle becomes irritable, so that the slightest movement can trigger possibly life threatening rhythm irregularities.
- Breathing rate slows and less oxygen gets to the tissues (which further reduces heat production).
- The cough reflex is impaired so that an immersed person is more likely to breathe in (aspirate) water.
- Metabolic rate slows and lactic acid accumulates.

Mental

- Becoming drowsy and more confused.
- Amnesia.
- Apathy.
- Reduced awareness of surroundings and predicament, possibly resulting in bizarre dissociated behaviour.

Practical effects

- This is a very serious life-threatening situation.
- Body core temperature decreases more rapidly, so symptoms worsen more quickly.
- The will and practical ability to self-rescue both ebb away.
- In water the increased risk of aspiration may start a downward spiral to drowning.

- In water, without a lifejacket, decreasing consciousness makes drowning highly likely.

iv) Severe hypothermia

Physical

- Heart rate drops so that the circulation does not meet metabolic demand.
- Breathing becomes more shallow and erratic.
- Pupils dilate.
- Blood thickens.
- Gross metabolic disturbances and organ failure.

Mental

- Unconscious

Practical effects

- In cold water with no lifejacket you are probably dead by drowning.
- Wearing a lifejacket buys added survival time even when unconscious, by keeping the nose and mouth out of the water. However aspiration from spray and waves is still likely.
- At this stage the unconscious victim may appear dead, but this can be misleading. Death from hypothermia cannot be diagnosed until the victim has been rewarmed.

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Who is at most risk and why?

i) **Thin or small** individuals with a large surface area to volume ratio lose heat more rapidly. This includes juniors and lightweights.

ii) People with **low body fat**, i.e. with less built in insulation.

iii) Those **immersed** in cold water, as the body cools 25-30 times faster in water than in air at the same temperature. For those **moving** in water e.g. swimming or treading water, this rate of heat loss is further increased by approximately 40%. This is because limb activity draws warm blood (and therefore heat) away from the core into the limb muscles, increasing heat loss from the extremities. Also, movement agitates the water, so that each bit of water next to the skin and warmed by it, is constantly replaced by a new colder bit of water.

iv) Those not wearing **appropriate clothing**. We suggest the following:
The aim is to keep the skin warm and dry. Ideally several thin layers are required: an inner layer of wicking fabric, which draws moisture away from the skin, a layer or two of insulating fabric, and an outer layer of waterproof but breathable fabric, to keep water out and to allow sweat to escape. One of the layers must be windproof. When immersed this system will not keep the skin dry, but would delay cooling by trapping air and a thin relatively static

layer of water. This reduces the cooling effect of water agitation. It is also important to wear a hat as up to 50% of heat loss is from the head and neck.

v) Those who are **glycogen-depleted** by exercise e.g. near the end of a training session or race. Those who are **hungry or dehydrated**. Keeping warm requires burning body fuel. The body stores energy from food in the form of glycogen or fat. Glycogen is the most readily available energy store, but its supplies are limited unless replenished by intake of calories.

vi) Those affected by **alcohol or drugs**, including some prescribed medicines e.g. antidepressants. These may reduce awareness of feeling cold and can delay or abolish the shiver response. Thus, the early warning signs are delayed and hypothermia takes hold silently.

vii) In cold air, those who are **tired** are less able to keep active to keep warm or to shiver as effectively.

viii) In cold air, those who remain relatively **inactive** by design e.g. cox or coach.

ix) Those suffering from certain **medical conditions** affecting metabolism e.g. diabetes mellitus (especially if not well controlled).

x) The **elderly** have less efficient body thermoregulation, and also are less aware of their body cooling.

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3 What can be done to reduce the risk?

This is about knowledge, planning and vigilance.

i) Purpose of the lifejacket

- By 'Lifejacket' we mean a personal flotation device (pfd) which will keep the wearer afloat, self righting to keep the nose and mouth clear of the water, even when unconscious. We do not mean just a float / buoyancy aid which is designed to help only a swimming conscious person.

Many people think that only non-swimmers or poor swimmers (as tested in a swimming pool) need to wear a lifejacket, but this is an illogical assumption.

Rowing in the UK takes place on water which remains significantly cold all the year through.

☞ In cold water we are ALL poor swimmers ☜

Even champion swimmers succumb to swim failure. (See "Cold Water Survival" document).

How does a lifejacket aid survival?

- By helping to **preserve body heat**: Without a lifejacket you have to expend a lot of energy to keep afloat, even when you are holding onto something. Movement in water promotes body heat loss, reducing survival time by 50%. Wearing a lifejacket allows the victim to keep still, and to adopt the Heat Exchange Lessening Posture (HELP). This is basically the foetal position: cross arms across the chest, keeping the elbows close to your sides, and then draw your knees up to the chest. This protects the areas of high heat loss i.e. the armpits, groin and chest.
- By **keeping the nose and mouth out of the water** even when the victim is unconscious. In choppy water there is still a risk of inhaling spray and water, but this is minimised by keeping your back to the waves.

In an ideal world everybody who unexpectedly finds themselves immersed will immediately be able to climb out onto or into their boat, or will be pulled out by a nearby rescuer. But it is not an ideal world.

In rough weather you may become separated from the boat by the action of wind, waves and current. The boat may be drifting towards a hazard e.g. a sluice, bridge pier, a buoy or moored boats. Rescue may not be immediately on hand, especially during routine outings (rather than in competition). The rescue launch, if present, may not function well, especially in rough weather. The launch may only have enough capacity to rescue some of the crew in one go, so the others have to await its return. These examples are taken from genuine incidents.

The water may be so cold that conscious survival time is severely limited. But even in less cold water your hands quickly become numb and stiff, and you will become confused and exhausted well before loss of consciousness, so the actual time when you are able to self-rescue is still severely limited.

FISA recommends the universal use of lifejackets when boating on water below 10°C (FISA Minimum Guidelines for the Safe Practice of Rowing, Dec 2005 http://dps.twiihosting.net/fisa/doc/content/doc_7_1087.pdf). We believe this is good advice.
We would also recommend that those who are more prone to hypothermia, e.g. juniors, should wear a lifejacket at all times unless they are only boating on water which is shallow enough for them to stand on the bottom with their head and shoulders clear of the water, with rescue close at hand.

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ii) The Club

NB This is not intended as a safety manual for clubs!
We are limited to raising issues relevant to the subject of this document.

a) Equipment:

◆ **Boats**

Provide boats which help **avoid cold water immersion of rowers**:

- This may be caused by **swamping** in choppy water or by the wash from another boat. Small boats are usually fully buoyant even when swamped, but many fours and eights boats do not have enough inbuilt buoyancy to stay afloat and safely support their seated crew when swamped.

  FISA recommends that ALL boats should meet a **minimum flotation performance standard** thus:

  "When full of water a boat with the crew seated in the rowing position should float in such a way that the top of the seat is a maximum of 5 cm (2 inches) below the static water line. Older boats not designed to meet this requirement may use inflatable buoyancy bags, foam blocks or other materials".

  (FISA Minimum Guidelines for the Safe Practice of Rowing, Dec 2005) (http://dps.twiihosting.net/fisa/doc/content/doc_7_1087.pdf).

  It would be foolhardy for any club to ignore this ***minimum*** recommendation, which FISA has provided to all NGBs worldwide. The Buoyancy Performance Standard proposed by the Leo Blockley memorial campaign is more detailed, and we recommend it as a gold standard (see appendix).

- Immersion may also result from **collision**. When rowing in conditions of poor visibility, after dusk or before sunrise, boats are required to display **lights**. The ARA Water Safety Code suggests white lights fore and aft, visible through 360° but this would make it difficult to determine the aspect (i.e. whether you are looking at bow, stern or sideways on) and direction of travel of a shell when seen from another vessel.

  The PLA publication "Rowing On The Tideway" (Sept 2006) includes the recommendation that an additional flashing white light at the bow would remove confusion about direction of travel.
  (http://www.portoflondon.co.uk/pdfs/maritime/rowing_code_-_printers.pdf)

> "This means that all rowing boats should have a white light affixed to the boat by a secure permanent bracket or similar fixing in front of bow and behind the cox, visible from a minimum distance of 800m. It is recommended that lights designed specifically for rowing boats are used. An additional flashing white light can be used on the bow of the boat to indicate direction of travel, but only in conjunction with a fixed white light.
> **Note**: A torch with a directed beam is not suitable. It is required to be a light that is visible throughout the whole of at least 180º for the requisite distance." (p44-45)

The best solution would be to fit a red/green bow light and a white stern light. This pattern is recognised internationally. Other water users who may not be rowers and therefore not aware of ARA rules will then be able to tell which bit of the boat they are looking at and which way it is travelling.

◆ The launch

Many coaching launches are not suitable for use as safety / rescue boats. They tend to have a limited capacity and may be too small to accommodate an entire crew plus cox. It is often difficult to pull rowers out of the water onto a launch, especially a monohull type, when the launch itself may capsize as the weight of the rower and rescuer acts on one side. The launch may become unstable or unbalanced with additional passengers on board, especially in windy or choppy conditions.

It follows that clubs should make it clear to everyone exactly what their launches are intended for, and whether or not they are suitable for use as a safety/rescue boat. Many rowers mistakenly believe that any accompanying launch will be able to rescue them if necessary, and may therefore wrongly count the launch as part of their personal safety assessment and plan.

◆ Safety equipment

In addition to the ARA recommended safety equipment, (Water Safety Code paragraph 2.5.5.2)
(http://www.ara-rowing.org/Asp/uploadedFiles/File/Safety_code.pdf)
we also recommend launches are equipped with a mobile phone or two way radio in a waterproof bag.

Lifejackets (see purpose of lifejacket) must always be provided for launch crew and cox; also for rowing crew as appropriate.

◆ Maintenance and checking

We all know that boats and safety equipment should be regularly maintained, and must be checked before every outing – but **who does this?** If a rower goes out in a single without a coach, it is obvious they must perform the pre-outing safety check themselves; but what if it is an eight, or an eight with a coach? It is essential that clubs put robust systems in place so that everyone knows who is responsible for equipment maintenance and for each pre-outing safety check. Avoid the situation where everybody thinks that someone else is doing it.

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b) Safety training for beginners

All beginners and newcomers should undergo a **'capsize drill'** as soon as possible after joining. The drill should be carried out with regard to the fact that in real life (as opposed to the warm swimming pool) capsize will result in immersion in cold water.

It should include:

- **Cold water procedures**, with the emphasis on getting out of the water as quickly as possible and hypothermia avoidance. (see Cold Water Survival document).
- Swimming with rowing kit on – explaining the risk of **swimming failure**.
- That you should concentrate on **rescuing self, rather than the boat**.
- **'Buddy rescue'** techniques.
- Information that while most smaller boats will take the rower's weight when swamped and/or upside down, non-buoyant fours and eights will not. The latter offer no opportunity to get out of the water, but usually can be held onto while treading water.
- The purpose of the **lifejacket.**

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c) Ongoing safety awareness

Safety is sometimes seen as a bit of a nuisance, boxes to tick, hoops to jump through…and then to be forgotten while we get on with the business of rowing. Clubs should ensure this attitude is stamped out.

☞ **Safety is good in theory, but only works when put into practice!** ☜

Give safety a permanently high profile. This doesn't necessarily mean lectures and videos, which may not be well attended. It means a steady stream of little reminders which rowers can't avoid; for example, up-to-date safety stickers on lockers, posters, beer mats in the bar etc. Group emails and text messages can be used to send regular brief safety messages. Make it the first topic at every outing. All members should feel confident to ask organisers and coaches what is the safety plan for this outing?

The atmosphere and prevailing attitudes of the club should exemplify a strongly positive attitude to safety. Safety should be seen as the natural, normal thing, not something that only the control freaks get upset about.

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d) Provision of up to date safety information

Most sailing clubs display the local **weather forecast** for the day at the clubhouse – we see no reason why rowing clubs should not do the same. This could be on a blackboard, whiteboard or notice board. It would also be useful to display water temperature, and water state. The main purpose of this is to jog the consciousness of all those going out to consider the present and expected conditions, as a matter of course.

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iii) The coach

a) Safety and rescue plan

The safety of the crew(s) you are coaching is your responsibility. As well as planning each outing from the aspect of training, it is equally important to plan for safety. This means to plan to avoid avoidable risk as far as possible, and to plan rescue should

an unavoidable risk occur. Think through what could go wrong and how you would deal with each eventuality.

Involve the crew(s) with this process so that they learn safety planning for themselves, and know what you expect them to do in an emergency. Always do a last minute check through the safety plan with the crew(s) at the start of each outing.

Have regard to the present and expected weather, water state and water temperature. Even in 'perfect' conditions, consider that sudden unexpected changes in weather may occur, and be prepared.

Plan each session to avoid cold exposure and to minimise its effects:

- Plan to avoid immersion: **use buoyant boats**;
- Plan to avoid immersion: **avoid collision**. You and your crew(s) should know the relevant International Collision Regulations (colregs) as the default option (keeping a lookout by sound and vision at all times, keeping to the right, meaning of sound signals from other vessels, use of effective lights when visibility is impaired). Also make sure you are all aware of local navigation rules which vary from colregs. Be aware of local hazards and how to avoid them.
- Plan the training to **avoid periods of inactivity**.
- Adjust your plans with respect to **prevailing conditions**.
- Adjust plans with regard to the **participants** (experience, susceptibility to hypothermia etc)
- Ensure **lifejackets** are used appropriately. (See 'Purpose of the lifejacket')
- If coaching from a **launch**, is it any use as a rescue boat? If not, check if there will be a rescue boat on the water as well. If so, ensure that you would be able to summon it if necessary, and know how many crew could be rescued at once.
- If coaching from the **bank**, plan how you will respond if one or more crew becomes immersed.
- Consider **how far from dry land** the boats will go, and where the banks provide safe landing.
- Always **sign out**, so that others know when you set out, where you are going, and when you expect to return.

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b) Ensure appropriate equipment every outing

This means ALWAYS use equipment which will offer the best chance of survival should something go wrong. The unexpected happens. Things can change in an instant from being 'normal' to being catastrophic, and it is your duty to be prepared.

Always use a **buoyant boat** which at least reaches the FISA minimum flotation guideline. There is no downside to buoyancy, so no excuse.

Check the crew boats and launch are in good order and functioning properly.

If you are coaching from a launch always ensure there is a **safety bag** equipped as per the ARA Water Safety Code (http://www.ara-rowing.org/Asp/uploadedFiles/File/Safety_code.pdf). Open the bag and look inside to check all the contents are intact and usable. Be sure you know how to use all the items.

If you are coaching from the bank always have a **throw-line** with you (and be practised in its use) as well as **thermal wraps** ('space' blankets).

In every event carry a **mobile phone** (with relevant numbers programmed in) or suitable 2-way radio (with someone on the other end) so you can summon help if necessary.

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c) Ensure all individuals are adequately prepared, physically and mentally

- Consider all the factors which make individuals more **prone to** the effects of **cold** (see 'Who is at most risk and why' section) and adjust the intensity and length of the outing accordingly.
- Insist that **lifejackets** are worn by those more at risk, and by all when on cold water below 10°C as per the FISA recommendation.
- Insist that everyone is adequately **dressed** for the conditions (see Appropriate clothing)
- Be aware of the **experience** and training of each individual, and adjust the schedule accordingly. Practice new techniques close to the bank and/or close to adequate rescue.
- Ensure everybody on the water is aware of and **trained** in safety techniques e.g. collision avoidance, capsize drill, cold water procedures etc.

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d) Know how to recognise when an individual is adversely affected

Cold water immersion must always be considered as an immediate emergency as the effects of cold come on so quickly. Take rescue action and remove the victim from the water as soon as possible. Do not wait until the victim is showing any signs of cold.

In air, the adverse effects of the cold may come on insidiously and be unnoticed by the victim. This means that they will not necessarily complain of being cold. You must therefore be vigilant and actively watch for early signs:

In rough order of increasing significance (but not all may be evident):

- Shivering, which can be stopped voluntarily.
- Cold feet and hands and resulting loss of dexterity and grip strength.
- Taking more time to answer questions or comply with instructions.
- Going quiet and appearing more tired.
- Being unable to voluntarily stop shivering
- Slowing and stopping shivering in a cold person.

A **quick test** to check for the onset of hypothermia is to ask the victim to perform a simple mental task. Classically this would be counting back from 100 in sevens, but any similar task will do e.g. remembering a list of objects.

If in doubt assume hypothermia is present, so act, and act quickly.

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4 How to deal with an affected victim

What is safe for the coach to do and when to get help**:**

NB If in doubt, it is better to assume the victim is hypothermic. Better to be proved wrong than to delay essential medical treatment.

a) In air: pre-hypothermic signs (35°C to 36°C)
(voluntary shivering, mentally clear, complaining of feeling cold):

i) Take action to try and prevent the onset of hypothermia. Add another layer of clothing and increase activity.

ii) If things don't return to normal within a few minutes, then take action to get out of the cold environment.

iii) The aim is to prevent further heat loss from the body core (so wrap an extra layer around the trunk and neck), and to allow slow passive warming in surroundings at normal room temperature. Passive warming takes place at about 0.5°C per hour.

iv) Once in shelter get those affected to rest and take food (fuel to increase body heat production) and non-alcoholic, caffeine-free drinks (to correct any dehydration). Alcohol dilates blood vessels in the extremities and promotes further heat loss. Caffeine is a cardiac stimulant, and may increase the risk of heart rhythm disturbance.

v) Keep watch for developing signs of the onset of core hypothermia. If this occurs, call for an ambulance for transfer to hospital. This is called 'after drop' and is caused as the hands and feet start to warm and the blood vessels to the extremities open up, allowing cold stagnant blood to return to the body core.

vi) Keep watch for, and warn victims to report any signs of a drop in blood pressure. This may occur if the blood vessels to the extremities open up too quickly. The first sign would be feeling faint or dizzy. If affected get the victim to lie down and temporarily remove a layer or two. If symptoms persist in spite of this, call for an ambulance for transfer to hospital.

vii) If there has been an uneventful return to sustained normality, then no further action is required.

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b) In air: onset of core hypothermia (below 35°C)

i) Do not increase physical activity as this may not be effective and may make matters worse.

ii) Act quickly to get the victim out of the cold environment. Here you have to make a judgement about the best course of action:

- If shelter is nearby, and the victim is able to walk normally, then allow them to walk to the shelter with support.
- If shelter is nearby, but the victim is staggering or having any difficulty walking, get help to carry the victim to the shelter.
- If shelter is further away, or carrying is not an option, then do your best to create makeshift shelter for the victim on the spot. In particular arrange shelter from the wind and rain.

iii) Prevent further heat loss:

- Once sheltered, limit the victim's physical activity, and make them lie down.
- If the victim has reached warm dry shelter, remove any wet outer clothing and wrap in dry layers and a thermal blanket.
- If the victim is still outside, do not remove wet clothing. Quickly wrap in extra layers and a thermal blanket.
- DO NOT attempt to actively warm the victim i.e. do not rub or massage muscles, do not apply direct external heat, especially to the extremities. Active rewarming should only be done in hospital as dangerous side effects may occur.
- If medical assistance is significantly delayed, then body to body contact is relatively safe and can be very effective.

iv) At the earliest opportunity, call for an emergency ambulance to transfer the victim to hospital. **Hypothermia? - Hospital!**

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c) In cold water: special measures apply.

i) Get the victim **out of the water** as soon as possible.

- Where possible, remove the victim from the water in a **horizontal** position, especially if they have been immersed for more than a few minutes, or are showing any overt signs of hypothermia. This is to prevent circulatory collapse due to a sudden drop in blood pressure.

ii) If the victim has been immersed for more than a few minutes, or if there are any signs of hypothermia, continue to keep them **still** and **horizontal**. Treat the victim with utmost care and gentleness, as any jolt could trigger a life-threatening disturbance of heart rhythm.

iii) **Prevent** further **heat loss**.

- If possible with minimum disturbance to the victim, transport them to **shelter**. Otherwise provide makeshift shelter on the spot. Especially shield from the wind.
- **Wrap** the victim in extra layers. If in shelter, first remove wet clothing very carefully (e.g. by cutting off) or, especially if medical help imminent, just leave it in place to avoid unnecessary movement.
- **DO NOT** attempt to actively **warm** the victim. This should only be done in hospital as dangerous side effects may occur.

iv) If there are any signs of hypothermia, at the earliest opportunity call for an **emergency ambulance** for transfer to hospital.

v) If the immersion has been brief and the victim is voluntarily shivering, completely rational and there are no signs of hypothermia, get them to shelter, remove wet clothing, wrap up and avoid activity. They should be **observed** until there is return to sustained full recovery, as detailed in section 4a above. (In air: pre-hypothermic signs).

vi) It will still be necessary for such non-hypothermic immersion victims to be taken to **hospital** if they have **inhaled** (aspirated) any **water**. They may initially appear to be unaffected, but may develop acute respiratory distress after a variable length of time – usually a few hours.

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d) The unconscious hypothermic victim

i) At the earliest opportunity telephone for an emergency **ambulance**.

ii) **Monitor vital signs**. If there is a pulse and breathing, even if very slow or faint, do not commence CPR. Keep the victim horizontal and do not move them unnecessarily. If you have witnessed the circumstances leading to unconsciousness and are certain there has been no head or neck injury, gently place in the recovery position. Otherwise assume injury may be present and keep the head and neck stabilised, but protect the airway. As above, shield from rain and wind and wrap up. Observe closely.

iii) In hypothermia the heart muscle is very irritable and chest compressions (cardiac massage) can precipitate potentially fatal rhythm disturbance, so do **not** commence chest compressions until you are sure the heart is not active:

iv) Hypothermia slows the heart rate considerably, so check the **carotid** (neck) **pulse** for a full minute or more. Even if there is no palpable pulse, the cold heart is still considered to be active if there are any other signs of life – an occasional breath, any movement or sound, an audible heartbeat on listening to the chest.

v) If **no sign of respiration**, commence mouth-to-mouth breathing. If there is no sign of heart activity also commence chest compressions.

vi) **Mouth to mouth** breathing is safe, and may help to slightly rewarm the victim's body core by provision of warm humidified air.

vii) If the unconscious victim has been found face down in the water and there is no respiration, assume cold water near-drowning and commence **CPR** straight away.

viii) Always assume **survival is possible**. Continue CPR until you hand over to the paramedics. A victim is "not dead until they are warm and dead".

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5 Summary

- Hypothermia happens **all year round**.
- In **dry air** it may be possible to prevent hypothermia by increasing physical activity. In **cold water** physical activity will make you colder at any stage.
- Hypothermia comes on much **quicker** in water than in air.
- Some people are more **prone** to hypothermia. There are several contributory factors.
- Be vigilant – hypothermia can come on **unnoticed** by the victim or those around them.
- A **quick test** is to ask the victim to perform a simple **mental task** e.g. count backwards from 100 in sevens.
- If a cold person is vigorously shivering and then **stops**, this is a sign they are in **imminent danger**.
- The physiological effects of hypothermia on the body are the **same** whether brought on by cold air or cold water – but in water it also increases the risk of drowning, even in the very early stages.
- Wearing a **lifejacket** reduces the risks from cold and hypothermia in several ways.
- In cold water, we are **all** poor swimmers.
- FISA recommends the universal use of lifejacket when boating on water **below 10°C**.
- For each outing, have a **safety plan** to avoid avoidable risk, and a **rescue plan** in case the unavoidable happens.
- **Share** the plan with the crew(s) so that they know what you expect them to do in an emergency.
- Tailor your coaching plan to suit the **experience** of the crew(s).
- Before each outing, **check** all appropriate equipment is present and in good working order. Be familiar with its use.
- Always use **equipment** which will offer the best chance of survival should something go wrong e.g. use boats that (at least) meet FISA's minimum recommended buoyancy performance standard.
- Always carry the means to **summon help** e.g. a mobile phone.
- Always check prevailing and expected **water** and **weather** conditions before going out. Be prepared to alter the training plan accordingly.

- If you suspect someone is **hypothermic** get them to **hospital** as soon as possible. It is better that you are proved wrong than to risk delaying essential treatment. Remember hypothermia can disable and kill.

- While awaiting hospital transfer, act to prevent further heat loss: keep the victim **lying down**, **still** and **wrapped** up. Remove to shelter if possible, or improvise shelter on the spot.

- Do **not** attempt to actively re-warm the victim by rubbing or applying direct heat.

- Victims of cold water immersion require additional special measures. Get them out of the water as quickly as possible, remove them in a **horizontal** position to avoid circulatory collapse, and treat with utmost gentleness to avoid precipitating dangerous disruption of the heart rhythm.

- Those who are pre-hypothermic i.e. suffering from the cold but not hypothermic, may be safely managed without going to hospital – but there are possible pitfalls. **Watch** them until they achieve sustained full recovery.

- Know the special considerations for use of CPR for the **unconscious** hypothermic victim.

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6 Key points

Hypothermia is not just a winter thing.

You need a safety plan before you go out – and a rescue plan to make sure you get back.

Be vigilant. Hypothermia can creep up on you.

Keep warm in air by keeping active.
Keep warm in water by keeping still.

If your crew can't do their sums they may be cold, not stupid.

In cold water we are all poor swimmers.

You get -
dead cold in air slowly
dead cold in water quickly
If dead cold in water with no lifejacket – you get dead

Hypothermia? - Hospital!

Meanwhile - Keep still
Keep horizontal
Keep sheltered
Keep wrapped.

In hypothermia, let the hospital do the heating.

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Appendix

Buoyancy Performance Standard for Rowing Shells

proposed by the Leo Blockley memorial campaign

A shell with its rated crew seated & oars in place, plus 20% additional crew weight as a safety factor, **should when fully swamped** (water flowing in & out) –

1. **Float with no oarlock less than 125mm above the mean external water surface -** this is to allow the crew still to row to safety and to ensure a safe trim on the boat.

2. **Float with no sliding seat more than 25mm below the internal water level** - this is to keep the body core out of the water.

3. **Allow the cox, if any, to sit either on the aft deck or bow's slide-bed without compromise to 1 or 2 above and in that position be seated in not more that 25mm of water** – coxes should be at no greater disadvantage than rowers.

4. **Have at least one more independent buoyancy compartment than the total number of crew, each compartment is to be securely sealed or with a watertight hatch, no compartment to qualify which is of less than 40 litres enclosed air capacity or buoyant equivalent** - i.e. each qualifying compartment to give not less than 400N (40kgf) of buoyancy, after taking into account the weight of any filler.

Notes:

i. This standard defines how a boat should perform to offer significant safety for the crew, in the event of being swamped in rough water, or suffering localised hull damage. It is designed to allow the crew to remain safely seated in the boat. It is designed to prevent significant immersion of the crew within the boat, so as to reduce the risk of hypothermia. It is also designed to ensure that the swamped boat can still be rowed to safety.

ii. There is no definition of how each boat should be designed or structurally adapted to achieve this standard. This is for individual boat builders to decide.

iii. Each boat design should be tested with independent witness(es) present. The standard defines easily measurable parameters, so the witness(es) do not need to be technical experts. This properly falls within the remit of the NGB, so as to give guidance to their members.

iv. Once a boat design has been shown to meet this performance standard then rowers and clubs can buy with confidence. They will not individually need to have technical expertise in flotation or survival design to buy a safely buoyant boat.

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