

Maximising the chances of survival in cold water

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With possibly less than 15 minutes to rescue somebody immersed in cold water before they become unresponsive, time is of the essence to save life. Understanding how the body reacts when you enter cold water and what you can do to delay its damaging effects can increase your chance of survival until help arrives.

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Seconds can save a life

When seafarers hear three prolonged blasts on the vessel's horn followed by call outs for "Man Overboard!" they immediately know that an emergency has occurred. A crew member or other person has accidentally fallen from the vessel into the sea, or the vessel could be responding to someone else's emergency, and a quick response is essential.

Analysis conducted by the UK Maritime Accident Investigation Branch ([MAIB](#)) has revealed that crew have, on average, less than 11 minutes to recover someone who has fallen overboard into cold water before they become unresponsive. Its analysis of 20 incidents that occurred between 2017 and 2021 shows that the time decreases as the water becomes colder or the sea state rougher. In some cases, crew had just 4 or 5 minutes to coordinate a complex recovery under extreme pressure.

Guide to cold water survival

Dangers related to man overboard and abandon vessel situations are normally included in emergency preparedness plans and procedures, both for vessels and offshore installations. And dedicated emergency training and drills focus on these

types of accidents. However, it is also important to continuously remind each crew member, as part of their training, what to do if they accidentally fall into the water or have to enter the water in an emergency. Individuals with an understanding of how the body reacts to exposure to cold air or water, and who know how to delay the damaging effects of cold stress on the body, will have a much better chance of staying alive. With an increasing number of maritime and offshore-related activities taking place in and near the Arctic and Southern Oceans, it becomes ever more important to focus on these issues.

The IMO has published a [Guide for Cold Water Survival](#) (MSC.1/Circ.1185) which is primarily intended for seafarers. The Guide highlights the importance of understanding that an individual is not helpless to affect his/her own survival in cold water, particularly if wearing a life jacket.

How the body responds to cold water

When the human body is suddenly immersed in cold water, the first issues the body needs to cope with are panic and shock. The initial cold shock places a severe strain on the body, with uncontrolled breathing and a rapid heart rate. After a few minutes the initial response normally eases off and the mental capacity and sufficient strength to act may return.

But immersion in cold water quickly numbs the extremities of the body to the point of uselessness, called cold incapacitation. Cold hands cannot fasten the straps of a life jacket, grasp a rescue line or hold on to a floating object. One can probably swim short distances, but any distance is easily underestimated in cold water. Severe pain may impair any rational thought within a very short time of immersion. And finally, after some time, hypothermia sets in and, without rescue and proper first aid, unconsciousness and death follow.

Hypothermia

Hypothermia is the result of more heat being lost by the body than is produced (through metabolism and shivering) and retained (through body fat, clothing and behaviour). Cold water is an especially effective heat conductor, which leads heat away from a body at a much faster rate than cold air.

- *Mild hypothermia*: A core body temperature between 32°C and 35°C. This phase is characterised by strong shivering, anxiety and a rapid pulse but most individuals are still conscious and able to act.
- *Moderate hypothermia*: A core body temperature between 28°C and 32°C. During this phase the shivering often decreases, and breathing becomes weaker and superficial. Movements are slow and laboured and the body temperature drops quickly. Drowsiness and disorientation soon lead to indifference and passivity.

- *Severe hypothermia*: A core body temperature below 28°C. The body's ability to produce heat ceases almost completely and vital signs are strongly reduced, and eventually lost.

Survival time predictions

Computer models exist that [predict cold-water survival times](#) and are used to aid search and rescue operators. There are also various charts and tables that show more simple estimates of survival times based on of water temperature. One such example is the Minnesota Sea Grant's [table on cooling effects of immersion in cold water](#). However, it is important to understand that such charts and tables are indicative only. The time a person can survive in cold water depends not only on the water temperature but also on a number of individual factors, some of which can be directly linked to each person's training and situational behaviour:

- *Individual differences*: body size, body fat, physical condition, swimming ability, cold tolerance
- *External factors*: clothing, flotation aides, weather conditions and sea state
- *Behavioural response*: activity, posture, psychological condition or "will to survive"

Summary and recommendations

The human body is very sensitive to cooling. If your core body temperature is reduced by 3-4°C, you can no longer take care of yourself and if it drops by 6-7°C there is a risk to your life. As seafarers in particular are at risk of being exposed to cold water, it is important for them to know how their body responds to cold water and what they can do to help ward off its effects.

IMO's "[Guide for Cold Water Survival](#)" is a valuable tool in this respect and Gard's Members and clients are recommended to carefully review the Guide, implement its relevant recommendations as part of the emergency preparedness training program and ensure that all crew members are familiar with its content. For ease of reference, some of the Guide's important tips about survival are summarised below:

Prior to abandoning vessel

- **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, life jacket, 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 a vessel, **put on many layers of clothing** to offset the effect of the cold. Wear an immersion suit if available.
- **Put on a life jacket** before taking on work tasks near or over the side of a vessel and as soon as possible in an abandon vessel situation - **and adjust it correctly**. In cold water you will quickly lose the full use of your fingers.
- When abandoning a vessel, **try to board the survival craft dry**, without entering the water.

Survival in water

- If you accidentally fall into the water, remember that the initial response to immersion in cold water will only last a few minutes: **rest until you gain control of your breathing**.
- If immersion in water is necessary but controlled, **try to enter the water gradually**.
- **Try to get as much of your body out of the water as possible**.
- 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 your legs if you can**.
- **If trying to reach a floating object, swim towards a point downwind of it** rather than straight towards it, letting the wind bring the object to you.
- If not swimming to a refuge, try to reduce your body's loss of heat: **float in the water with your legs together, elbows to your side and arms across your chest**. Blow a whistle or shout to attract attention.
- **If you are not wearing a life jacket, do not wave to attract attention**. You will lose buoyancy.
- **Force yourself to have the will to survive**. This can be the difference between life and death. Keep your mind occupied and focus on short-term objectives.

Rescue

- **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**. Maintain your determination to survive throughout.

Remember, putting on a life jacket is easy; recovering a man overboard is not! Without some form of flotation aid, even the best swimmer can drown in cold water, and it can happen in less than 15 minutes. Cold shock and cold incapacitation can

also quickly render a person incapable of assisting in their own recovery, so a quick emergency response is essential.

Additional information on hypothermia and drowning, including advice for medical officers, can also be obtained from the [Mariners Medico Guide app](#).