

RBS

Job One



Hypothermia, Cold Shock Response And Cold Incapacitation

WHAT PADDLERS AND AUXILIARISTS SHOULD KNOW

RBS *Job One*

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ON THE COVER: Paddlers need to be aware of the risk of hypothermia. Photo Courtesy of US Coast Guard Boating Safety Division

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Hypothermia, Cold Shock Response and Cold Incapacitation

General Principles for Paddlers

By Robin Pope, BC-HYA, BC--BPU



Canoeing in white water can subject a boater to cold water exposure.

(Photo courtesy of USCG Office of Boating Safety)

Cold temperatures can be a challenge for even the best prepared boater. This is particularly true for paddlers, who may be separated from cold water by only a thin boat hull; subjected to wind, spray, and cold air; and immersed or capsized by rough water. Even if they never capsize or fall overboard, paddlers may sit in cold water and be immersed by waves throughout their trip. After a capsize or swim, paddlers continue to be exposed to the elements even if they are able to get back in their boat. That exposure continues until the trip ends, placing paddlers at risk for both short and longer-term complications from

cold exposure. Cold air and water can make a paddling trip a miserable experience. For ill-prepared – or even well-prepared but unlucky paddlers, a miserable trip can become dangerous or fatal. Fortunately, paddlers can use a wide range of approaches to reduce risks when paddling in the cold, and to help ensure an enjoyable paddling experience.

What are the hazards?

To help manage the risks of cold water, paddlers must be prepared to face three primary cold hazards – hypothermia, cold shock response, and cold incapacitation. Paddlers might suffer from one, two or all three of these conditions, depending on weather and

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water conditions, their individual preparation, and their specific circumstances.

Hypothermia is defined as a core body temperature below 95⁰ F. What does it feel like as the body cools from normal temperature to the onset of hypothermia. As a person's body temperature cools down, they often say they feel cold, particularly that their hands and feet feel cold. If they continue to cool, victims begin to shiver and lose fine motor control. Tasks like zipping a life jacket or putting on a spray skirt become difficult as muscles in the arms and hands cool. At the same time, hypothermia impairs judgment. The combination of impaired judgment and decreased muscle function can lead to a capsize or swim. With further cooling, shivering becomes more violent. Gross motor skills (e.g., paddling, swimming, or walking) deteriorate and a capsize or a fall overboard becomes almost inevitable. Victims become disoriented and may only respond to painful stimulus. Eventually, victims become unconscious and shivering stops. Without flotation, unconscious victims will sink. Even with flotation, subjects may be unable to protect their air-

Cold incapacitation occurs when cold water immersion makes it hard or impossible for a swimmer to use their hands, arms and legs.

way from small waves. Ultimately, cooling leads to abnormal heart rhythms and death.

Hypothermia is clearly dangerous, but it doesn't happen suddenly. Even when swimming in ice water (32⁰F or colder), victims without warm clothing may take 30 minutes or more to lose consciousness. In 50⁰ F water, subjects may take an hour or more to lose consciousness. But, paddlers often are on the water for hours and may be repeatedly immersed by spray and waves. After a swim, they continue to be exposed to cold and wet conditions as they recover and re-enter their boat. Even the best prepared pad-



Even the most experienced paddler can develop hypothermia if exposed to cold, wet and windy conditions for a long enough time.

(Photo courtesy of USCG Office of Boating Safety)

dlers can develop hypothermia if they are exposed to cold, wet and windy conditions for a long enough time. Hypothermia will eventually become life threatening but before it does, the associated loss of strength, coordination and judgment might lead to dangerous situations. For example, a rapid that is challenging to run in warm weather might become impossible to safely run when a paddler is shivering and having trouble staying upright. Poor judgment, associated with hypothermia, might keep a paddler from recognizing that hazard until too late.

The cold shock response (also referred to as cold water shock or cold shock) is the second cold water hazard paddlers face. It is an involuntary response to sudden immersion in cold-water, such as an unexpected capsize or swim, causing gasping, rapid breathing, elevated heart rate, and steep rises in blood pressure. Victims frequently panic. Panic and uncontrolled breathing can cause swimmers to inhale water and drown. Rapid increases in heart rate and blood pressure can stress the heart and potentially cause heart attack or stroke. Victims may be unable to swim and, if they're not wearing a life jacket, can quickly sink and drown. The cold shock response typically lasts for only a few minutes (although it may seem like much longer). After it resolves, subjects' breathing rate will slow and they will be better able to participate in their rescue. It is most likely to occur in wa-

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Through proper planning and preparation, paddlers can take many steps to prevent and manage cold-related problems.

(Photo courtesy of USCG Office of Boating Safety)

ters 60⁰ F or colder, but can occur in warmer water, particularly if air temperatures are much warmer than water temperatures.

Cold incapacitation occurs when cold water immersion makes it hard or impossible for a swimmer to use their hands, arms and legs. Victims lose both strength and sensation because cold muscles and nerves simply don't work as well as warm ones. Victims have difficulty swimming and eventually are unable to even hold on to a rescue line. If victims are not wearing a life jacket and have no other means of flotation, they will sink and drown once cold incapacitation occurs. Cold incapacitation can take an hour or more to occur in water 60⁰ F or warmer. However, the colder the water is, the faster cold incapacitation develops. In 50⁰ F water, cold incapacitation can develop in as little as 10 to 20 minutes.

Well-prepared paddlers should be familiar with all these conditions because all can be mitigated or even prevented. Cold shock impacts the first few minutes of

a swim and is a direct result of sudden cold-water exposure. Cold incapacitation can occur after as little as 10 to 20 minutes of immersion. Hypothermia is more likely to occur after longer exposures to cold air and water. Both cold incapacitation and hypothermia can affect paddlers before, during and after a swim. Fortunately, there are many things paddlers can do to manage these problems.

The most important step is to wear a life jacket. It can keep you afloat even when incapacitated by cold.

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Paddlers are sometimes referred to as “swimmers who periodically sit in boats” and should be prepared to end up in the water.

(Photo courtesy of USCG Office of Boating Safety)

Preventing and Managing Paddling Related Cold Injuries

Paddlers can take steps to prevent and manage cold-related problems. Some of the steps suggested below are general safe-boating principles, others are specific to cold water. All of them can help create a safer and more fun paddling experience.

- The most important step is to wear your life jacket whenever you paddle. Not surprisingly, most people who drown when boating aren't wearing a life jacket. Life jackets keep you afloat even when you're incapacitated by cold or injury. But, life jackets are like seat belts – they don't work if they're not worn.
 - When you paddle, wear clothing and equipment appropriate for the conditions. Evaluate the conditions first, and then decide what you'll need.
 - Consider not boating when it's cold. This doesn't mean you shouldn't boat just because it's cold. It does mean you should take a moment, consider the risks, consider how you're preparing for them, and not be afraid to cancel or modify the trip if you're not prepared for the conditions.
 - If you do boat when it's cold, boat conservatively. Paddle on more protected waters to reduce the risk of a swim. Take shorter trips at the warmest part of the day to help stay warm. Boating conservatively reduces the risk of capsizing or swimming.
 - Always boat in a group. If you're alone and have a
- problem, there's no one to help you. When a person in your group has a problem, take immediate steps to help them.
 - File a float plan. If you do have problems on the water, a float plan helps ensure someone will come looking for you.
 - Make sure you eat and drink while boating. Calories and hydration keep you warm.
 - Avoid alcohol when boating.
 - Medications and medical conditions may affect how you respond to cold conditions. Speak with your health care provider about your health and how it might affect your paddling in strenuous conditions.
 - Dress for the water temperature and plan to swim. Paddlers really aren't boaters – they're swimmers who periodically sit in boats. Every paddler swims. Plan on it happening and be prepared for it. Even water temperatures above 70⁰ F can be problematic for prolonged swims. That doesn't mean paddlers need to wear drysuits or 7 mm wetsuits every time they paddle. It does mean taking a moment to consider what happens if you swim, and how best to prepare for it.
 - Have basic survival equipment, including signaling devices and rescue gear, on your person. You may have additional equipment in your boat but it doesn't help if the boat drifts away.
 - Practice using your equipment on the water, before you really need it. It's harder to use the equipment in the water in emergency conditions than on land under ideal conditions. Practicing in controlled conditions beforehand helps strengthen skills, reduce panic and build confidence.
 - Wear proper warm clothing designed for paddling. Proper clothing will increase your survival time and reduce your risk of developing cold shock, cold incapacitation and hypothermia.
 - Wear hats or hoods to keep your head warm. Fleece liners or wool hats can be used under a helmet or waterproof hood. Otherwise, neoprene hoods are a good choice.
 - Use pogies (mittens that strap around paddles), mittens or gloves to keep your hands warm and to help preserve your grip strength.
 - Practice swimming with your cold-water clothing so

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you know how much clothing you need to stay warm in a given situation, and what it feels like to swim with it on. Learn what you personally need to wear for different conditions.

- When you start to feel cold, immediately take steps to warm up, before problems develop. If possible, have clothing layers that you can put on while you are

face). Control your breathing and wait for it to slow down. Understand that rapid breathing and a sense of panic are normal and will pass in a few minutes. Once you've regained control of your breathing, you can focus on self-rescue and assisting others.

- As soon as possible after entering the water, take immediate steps for self-rescue. Prioritize what you do based on your situa-

longer able to effectively self-rescue, so make good use of the time you have.

- If you're not able to get out of the water, your body temperature will continue to drop and eventually cold incapacitation will set in. If you're no longer able to swim, get in the Heat Escape Lessening Posture (HELP) position by drawing your knees up to your chest, if you're by yourself, or the HUDDLE position



A kayaker assists a capsized kayaker to get out of the water to safety.

(Photo courtesy of USCG Office of Boating Safety)

boating. Don't hesitate to go to shore and add layers if necessary.

- If you fall into the water, focus on staying afloat, getting to the surface, and protecting your airway. In a river, get into a defensive river swimming position (on your back, nose and toes out of the water, floating at the sur-

tion and do the most important things first. Make sure your life jacket is snug. Try to get back in your boat or out of the water. Signal for help. Consider swimming to shore, if you're very close to shore, but recognize that swimming any distance in cold water is challenging. In very cold water, you may have ten minutes or less before you're no

(huddling with others) in a group. Huddling with other people in the water lessens the loss of body heat and is good for morale. Also, rescuers can spot a group more easily than individuals. It's hard to get into a HELP position in some lifejackets, so practice the positions before you need it. Both positions reduce heat loss and increase survival

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time, but both also are passive positions that depend on someone else rescuing you. If you didn't file a float plan, didn't signal for help and aren't with a group, you'll need a lot of luck to be rescued.

- Remember the 1-10-1 principle. If you swim in cold water, be prepared for one minute or more of cold shock response. In the next ten minutes, take the most important survival step based on your individual situation. Finally, recognize that it will likely take an hour or more to become unconscious from hypothermia, so don't give up on trying to rescue a boater in the water.
- Once a swimmer is rescued, do everything you can to warm them up. If they are no longer alert, be sure to keep them lying down and inactive as they're being warmed, to reduce the risk of complications. Consider how people lose heat and take whatever actions you can to stop heat loss. Action steps can include building a fire, creating a wind break, adding insulation, or setting up a shelter. When in doubt, seek professional medical care as soon as possible and practical.
- Take a first aid class such as Wilderness First Aid that covers care for cold related illness.

Develop your paddling and emergency skills. Better paddling skills reduce the risk of a swim. Better emer-

Paddlers should always be prepared to end up in the water.

(Photo courtesy of USCG Office of Boating Safety)

gency skills make you better able to manage the consequences of a swim by yourself or someone else.

Summary

Cold temperatures can be a challenge for all boaters. This is particularly true for paddlers because they are close to the water and often directly exposed to splash and spray. If a paddler swims and is ill-prepared or unlucky, cold shock response and cold incapacitation can quickly lead to drowning.

Even if a paddler doesn't swim, exposure to cold and spray can lead to hypothermia. On the other hand, well-prepared paddlers can survive for hours or days after an unexpected swim, allowing time for self-rescue or rescue by others. Wear your lifejacket, dress to swim, be familiar with your equipment and practice your skills before you need to use them in an emergency situation.

A video about what to wear when paddling to help prevent hypothermia is available here:

<https://www.boatingsafetymag.com/boatingsafety/boating-safety-videos?video=x4kqgiu>

Federal Law Requires Boating Accidents to be Reported

Reprinted with permission from USCG Boating Safety Magazine.

Federal law requires that boat operators report recreational boating accidents to state reporting authorities when the accident involves the boater's vessel or its equipment. If the operator is unable to submit the report then the owner must submit it.

An accident report is required if:

- A person dies
- A person disappears from the vessel under circumstances that indicate death or injury
- A person is injured and requires medical treatment beyond first aid
- Damage to vessels and other property totals \$2,000 (lower amounts in some states and territories).

- The boat is destroyed.

The information provided is used to establish regulations and safety standards, identify and remedy boat defects, educate recreational boaters, capture statistical data, investigate accidents, and measure the effectiveness of boating safety programs.

Accident reporting forms (CG-3865) may be found at <https://www.dcms.uscg.mil/forms/>

Most states and territories accept this form, although some have their own. In the event of an accident, a boater or boat owner should file the form within 48 hours for a fatal accident or within 10 days for a non-fatal reportable accident.

A listing of contacts for the state's primary boating authority may be found at <https://www.nasbla.org/about-nasbla/boating-contacts>.



An accident involving damage to vessels of \$2,000 or more (lower in many states) must be reported to proper authorities.

(Photo courtesy of the Coast Guard Auxiliary)

Choosing the Correct Visual Distress Signals for Your Boat

By Joe Friedman

Reprinted from USCG Boating Safety Division Website



Handheld smoke signals, such as this one being tested by a Coast Guardsman, are highly effective attention-getters in the daytime.

(Photo courtesy of USCG Office of Boating Safety)

With few exceptions, the U.S. Coast Guard requires vessels over 16 feet length overall with mechanical power to carry readily accessible, serviceable visual distress signals (VDS) on board for both daytime and nighttime uses. These include pyrotechnic and non-pyrotechnic devices, such as flags, flares and lights. Here's what's on the market today and a glimpse of things to come. Thanks go out to Marty Jackson, staff engineer with the U.S. Coast Guard, who works for the Office of Design and Engineering Standards, Lifesaving and Fire Safety Division, who helped in preparing this story.

Non-pyrotechnic

Flags

The Coast Guard-approved flag for daytime use only is a 3-foot by 3-foot orange background displaying a black square and a black circle. Deploy this flag by tying it to a mast, antenna, boat structure, boathook, fishing rod, etc. These flags are inexpensive, stow well and never go out of date. The downside is they don't scream for attention quite as well as other daytime signals, such as smoke signals.

Electric Lights

There is only one Coast Guard-approved light, and it is

for nighttime use only: the Weems and Plath SOS Distress Light (Model C-1001).. You must carry a distress flag or other approved daytime signal for the light to be compliant. This floating light fits in a rod holder and flashes a continuous SOS for hours. Its long-lasting signal time eliminates the need for short-lived, potentially dangerous pyrotechnics. On the other hand, this bright-white flasher might not grab the attention of boaters trained to look for a burning red flare. Therefore, while this light fulfills your nighttime-carriage requirement, I recommend using it in conjunction with pyrotechnics.

Others

Flying a national flag upside down, displaying international code flags C and N ("Charlie" and "November"), three shots from a gun, prolonged horn blasts and more are also ways to signal distress, but they do not meet approval requirements for what must be carried aboard.

Pyrotechnics

Flares

Pyrotechnics fall into three classifications: floating, handheld and aerial (meteor and parachute). Floating and handheld red-smoke flares are approved for daytime use only. Red flares, whether handheld or aerial, are for daytime and nighttime uses. The notable difference among them is the distance from which they are visible to a rescuer at sea level.

All these pyrotechnics have the advantages of economy, reliability and high visibility, as well as recognition as the traditional distress signals, but they have been known to cause physical injury (burns) and, rarely, onboard fire when not properly ignited or handled. Another disadvantage is their limited shelf lives, which means they must be replaced periodically to meet Coast Guard requirements. Disposing of outdated flares is difficult because local ordinances vary from jurisdiction to jurisdiction. Check your local EPA office or the nearest Coast Guard facility for current rules.

Coming Up

Pyrotechnics are pretty much fully developed. The Coast Guard is currently working with the Radio Technical Commission for Maritime Services to develop better battery-operated electronic visual distress signal devices (eVDSs). The goal is to meet the existing signal characteristics and intensities of present pyrotechnics while providing much longer operation times and greater user safety. A video about selecting the right flares is available at:

<https://www.boatingsafetymag.com/boatingsafety/boating-safety-videos?video=x3a7fle>