



This document should be considered as an example for the development of a localised safety programme. Each national, regional or local rowing organization should have its own regulations for the safe practice of the sport of rowing which fully reflects local, regional or national laws, obligations and requirements. In this respect FISA accepts no legal liability.

FISA's Minimum Guidelines for the Safe Practice of Rowing

Introduction

Many accidents take place because uninformed decisions are made before leaving the boathouse. Weather and water conditions, time of day, equipment, and supervision are all critical components that must be considered to have a safe training session. FISA encourages all rowing programs to implement, at a minimum, the following guidelines to help make informed decisions and ensure the safe practice of our sport. The standards below are available to be used as a basis for establishing fundamental **guidelines** or to supplement existing ones.

I. Required Elements

A. General

These guidelines provide the minimum rowing safety standards generally appropriate for rowing organizations. Each organization is responsible for enforcing safety standards in their respective area and local laws may require more stringent regulations or policies as deemed appropriate. The following minimum guidelines may be freely used to create comprehensive safety regulations appropriate to the area.

B. Safety Adviser

Each rowing organization should appoint a Safety Adviser. The duty of the Safety Adviser is to ensure that the safety program is followed.

C. Code of Safety

Each organization should prominently post a "Code of Safety" or its equivalent, such as "Safety Rules and Regulations", including rules and information on:

- Safe Rowing Equipment
- Boathouse Rules
- Local Code of Practice and navigation rules
- Rowers', Scullers', Coaches' and Coxswains' Responsibilities
- Emergency Rules/ Capsize and Accident Drills
- Coaching Boats and Safety Boats
- Safety at Regattas
- Log book for unsupervised rowers
- Visual aids on; water safety, lifesaving, hypothermia, hyperthermia, resuscitation procedures

- Telephone number list, to include
 - Doctor/Ambulance/Police
 - Fire Department
 - Local hospital casualty department
 - Local, river or harbor police
 - If there is no telephone readily available at the boating area, clear directions to the nearest available telephone must also be displayed.

Safety and first aid equipment should be readily available in every boating area to include:

- First aid cabinet (to be fully stocked and regularly checked)
- Thermal blankets/exposure bags
- Life rings/buoys and rope line.
- Life jackets

Where possible, clubs should maintain adequate comprehensive insurance to cover personal injury to club members on and off the water and personal injury and damage to property or liability to third parties. There should be included in these policies adequate cover for the Safety Adviser.

II. Detailed Information

A. Safe Rowing Equipment

For the safety of all concerned, rowing equipment should be maintained in good working order. Particular attention must be paid to the following:

- Every boat must have a ball of not less than 4cm diameter on its bow. Where the construction or nature of the boat is such that the bow is properly protected or its shape does not represent a hazard then this requirement need not apply.
- Heel restraints and "quick-release" mechanisms must be in proper and effective working order in all boats equipped with fitted shoes.
- For rowing in reduced daylight, boats shall be fitted with lights as required by the local and national waterway authorities. At the least, all boats should have a light forward and aft.
- All oars and sculls should be checked to ensure that "buttons" are secure and properly set.
- Bow and stern compartments should function as individual buoyancy compartments and must be checked to ensure that they will function as intended.
- Boats should meet minimum flotation requirements:

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 below the static waterline.

Older boats not designed to meet this requirement may use inflatable buoyancy bags, foam blocks or other materials.

B. Local Code of Practice

Since conditions vary from venue to venue, each organisation should prepare and display a local code of practice, which should include a plan of the local water, drawing attention to local navigation rules, hazards and restrictions to water use. Attention should also be drawn to any variation in normal procedures that may be necessary due to the state of the tide or stream, high winds, or other climatic conditions. Local codes of practice should emphasize that safety is paramount.

C. Personnel Responsibilities

1. General

All participants in rowing and sculling, including coxswains, should receive proper instruction in watermanship and technique, including capsizing drills, from a qualified coach. No one should put him- or herself or others at risk when on the water. This applies particularly to beginners and to juniors.

Encouragement should be given to athletes to become fully aware of life-saving and resuscitation procedures by attending training courses. In particular, it is highly desirable that Safety Advisers and coaches should be so trained.

Rowing activities should be coordinated with those of other local water users to minimize clashes of interest and the possibility of creating additional water hazards.

There should be a required reporting structure for all non-trivial accidents to the Safety Adviser or higher authority where these events are recorded for further review. This information should be passed on to the regional or national authorities for a comprehensive overview of safety in the sport.

2. Rowers and coxswains

Any rower or coxswain going out on the water will be responsible for abiding by all local rules, regulations and traffic patterns. They should be in good health and properly attired for the present and potential conditions. All rowers and coxswains should demonstrate the ability to swim 50 meters in light clothing and to demonstrate within that test competence under water and in treading water. If a person cannot meet the requirements of the swimming test for physical or other reasons, an approved lifejacket or buoyancy aid should be worn when in a boat. In case of accident, stay with your boat rather than attempting to swim to the shore. Your boat, unless seriously damaged, is your life raft.

Coxswains should receive a full explanation on handling the boat, all relevant safety procedures and boat handling. Inexperienced coxswains should be allowed out in boats only if observed by an experienced coach, preferably in a fully equipped coach boat. They must also be familiar with navigation rules.

3. Coaches

Coaches must be responsible for those under their authority and should ensure that they are informed of safety procedures and abide by them. They must evaluate environmental conditions and determine if it is safe for rowers to go out on the water.

D. Coaching Boats

1. General

The presence of a coaching boat gives far better safety protection to a crew than a coach on a bicycle on the land. The coach must drive safely, always consider the safety of those on board, and consider the effect upon other water users.

2. Training Drivers

To take out an engine-powered boat without previous instruction is to put the driver, any passengers and other water users at risk. At the very least the club shall ensure that an experienced driver goes out with a new driver until he has shown that he is fully in control of the launch.

The manner in which coaching boats are driven may create unnecessary problems for other water users. Excessive washes and waves create difficult rowing conditions and can cause accidents to smaller boats. Thoughtless driving often causes damage to moored boats and to riverbanks. To use coaching boats for coaching, rescue and other purposes all on the same water, requires drivers to be fully aware of the effect of the wake they cause and the risk that the very sport they are seeking to assist cannot take place because their manner of driving their boat has made the water unusable.

3. Coaching Boat Requirements

All coaching and safety boats should carry the following safety aids:

- A bailer and, for inflatable rubber dinghies, a suitable pump and a spare valve
- A horn or similar warning device, capable of attracting attention over a distance of at least 200 metres.
- A grab line at least 15 metres (50 feet) long with a large knot tied in one end to assist throwing. Ideally a purpose made rescue/heaving line throw-bag.
- Thermal/exposure blankets to reduce wind-chill and counteract hypothermia. Make use of proprietary items but not woolen blankets that only absorb moisture and do not then retain heat. In the absence of recognised equipment, polythene sheet cut to the size of a commercially available exposure bag will provide the necessary level of heat retention until proper treatment can begin.
- Life buoys/Life jackets. These are essential when several people are in the water and the launch can attend to only one at a time.
- A basic first aid kit (list contents and check regularly as before).
- A sharp knife with carrying sheath.
- A paddle.
- Simple handholds fixed to the side of a launch to give help to any person being rescued, and provide self-help should the driver fall overboard.
- Engine, cutout lanyard device.
- An anchor and line.

4. Low Light Conditions

When it is necessary for outings to take place in the dark or in poor visibility the coaching boat must carry a waterproof flashlight and sound signalling system as a means of signalling for assistance. The boat must be fitted with lights as required by local/national authorities.

5. Lifejackets

It is advisable that buoyancy aids or life jackets be worn at all times by all on board a coaching boat and are essential when going out to sea or on very wide stretches of water. Life jackets that depend on oral inflation should be worn partly inflated; those that have auto inflation must be checked at intervals suggested by the manufacturers.

6. Coaching Boat Maintenance

Maintenance of the boat and its engine is vital since the possible consequences of failure are great. A tool/spare parts box should be kept dry and checked regularly (an extra can of pre-mixed fuel is also a vital spare). It is a wise precaution to check that the engine is securely fixed to the hull and that the secondary safety fixing exists and is properly effective every time the boat is used.

7. Coaching Boat Design

Choice of a coaching boat, its hull size and its shape must be matched to an engine suitable for the work it is to undertake and the load to be carried. In particular, boats to be used for coaching on rivers or enclosed waters must be of a design which will enable a launch to accompany a crew rowing at speed without creating a wash that makes the water unusable or unsafe for everyone else, or causes damage to banks or installations.

E. Accident Log

An accident log is to be maintained and be available for inspection at all times, giving time, place and nature of accident, injuries/damages sustained and names and addresses of witnesses. Accident logs should be made available to the proper national authority where required.

III. Cold Water Guidelines - Hypothermia

A. Background

Most experts in immersion hypothermia and cold water near drowning / drowning define cold water as temperatures below 20°C. It is also recognized that colder temperatures increase the rate of body cooling and increase the risk of cold shock and swimming failure. The majority of persons dying from immersion succumb in the early stages of the incident due to a range of physiological responses including gasping, hyperventilation and rapid peripheral cooling, resulting in aspiration, reduced breath-hold and incapacitation.

Preparation and prevention are essential to protect against the effects of the cold-water environment. This should include emergency drills with the equipment that would be used. Acclimatisation to the cold is also shown to lessen the negative physiological responses.

B. Guidelines

1. Conditions

Environmental conditions should be monitored, including water temperature, wind, precipitation and sea-state, and appropriate safety directions such as those set out in #3 below should be issued.

2. Clothing

Protective clothing should be worn which is appropriate for the conditions. The activity with the objective is to keep the body dry and to insulate against heat loss.

3. Precautions

When the water temperature is at 10°C or below or when the environmental conditions warrant, special safety precautions should be considered. Possibilities should include:

- Warning members against going on the water;
- Advising members to go on the water only if carrying a personal flotation device (PFD) or lifejacket of appropriate size for each member of the crew, a sound-signaling device and, if it is after sunset and before sunrise, navigation lights as set out in the Collision Regulations AND;
- Where appropriate, only if attended by a safety boat carrying a PFD or lifejacket of appropriate size for each member of the crew of the largest vessel being attended.

C. Hypothermia

Hypothermia occurs when the whole of the body has been chilled to a much lower than normal temperature, i.e. below 35°C compared with the normal body temperature of 37°C. This should be avoided at all costs.

- “*Dress to beat the cold*” - Layers of clothing are more effective than one warm garment. The outer layer should be wind and waterproof.
- Do not take or give alcohol in cold conditions. Alcohol accelerates heat loss as well as impairing judgment.
- Be alert to the warning signs of cold both in yourself and others.
- Coaches of young children must be particularly aware of the risks to their charges of exposure to cold. Exposed arms, legs and head heighten the risk.

If a person has fallen into cold water, their body will lose heat rapidly. To reduce heat loss, the person should keep his clothes on except for heavy coats or boots which may drag the person down.

Sudden immersion in cold water can have a shock effect that can disrupt normal breathing, reducing even a proficient swimmer to incompetence. Confusion and an inability to respond to simple instructions will become evident.

When hypothermia is suspected; try to prevent further loss of body heat and re-warm the affected victim.

Send for help. Hypothermia is a medical emergency whether the patient is conscious or unconscious.

If conscious the victim should be actively re-warmed under careful observation.

If unconscious the victim must get medical aid as soon as possible. Follow instructions given under Resuscitation.

D. Symptoms and signs of hypothermia

The following are the most usual symptoms and signs, but all may not be present:

- Unexpected and unreasonable behavior possibly accompanied by complaints of coldness and tiredness.
- Physical and mental lethargy with failure to understand a question or orders.
- Slurring of speech.
- Violent outburst of unexpected energy and violent language, becoming uncooperative.
- Failure of, or abnormality in, vision.
- Twitching.
- Lack of control of limbs, unsteadiness and complaining of numbness and cramp.
- General shock with pallor and blueness of lips and nails.
- Slow weak pulse, wheezing and coughing. A very dangerous situation is still present when a person who has been in the water for some time is taken out of the water. Further heat loss must be prevented. The victim should be protected against wind and rain if possible. Re-warming can be carried out by –
- Wrapping the victim in a thermal/exposure blanket.
- Others placing their warm bodies against the victim.

- Giving hot drinks (if conscious), but not alcohol.

PREVENTION IS ALWAYS THE BEST POLICY.

E. Resuscitation

To be effective, resuscitation must be started as soon as possible, even while the patient is in the water. Otherwise irreversible damage or death will occur within a few minutes. Many thousands of lives have been saved by ordinary citizens who have known what to do and have had the courage to do it at the critical time.

The saving of life during a medical emergency depends on the accurate assessment and proper management of the ABC of resuscitation:

A - AIRWAY

B - BREATHING

C - CIRCULATION

On finding a person requiring resuscitation:

1. Approach

Establish there is no danger to yourself or the victim. If you see someone in difficulties in the water, DO NOT go into the water after him. It is critical that the rescuer handle the emergency in such a way that he himself remains safe. Remember there may be neck or back injuries requiring extra care when moving the victims.

- Find something to help pull him out – a stick, a rope or clothing.
- Lie down to prevent yourself from being pulled in.
- If you cannot reach him, throw any floating object - football, plastic bottle - for him to hold on to, then fetch help.
- If you are in a safety launch carefully approach him if it is safe to do so.

REACH · THROW · TOW

HAVING RESCUED THE VICTIM - SHOUT IMMEDIATELY FOR HELP

2. Assess the patient

Responsiveness - Establish responsiveness by shouting "ARE YOU ALLRIGHT" loudly and gently shaking the shoulder. If the patient is unresponsive, i.e., not breathing with no pulse: leave the patient immediately and summon help. Return to the patient and commence resuscitation.

a) Breathing

Inspect the airway - remove blood, vomit, loose teeth or broken dentures but leave well fitting dentures in place.

b) Open the airway

The rescuer should place two fingers beneath the point of the patient's chin, lift the jaw and at the same time place the palm of the other hand on the patient's forehead. Tilt the head well back by pressing on the forehead and the airway will open.

c) Check for breathing

The rescuer should place her ear close to the patient's mouth looking down along the line of the chest.

- Listen for the sound of breathing.

- Feel for air movement indicating breathing.
- Look for rising and falling of the chest.

d) Circulation

Check for the presence of a pulse by feeling for the carotid artery in the neck. The artery lies along each side of the voice box (larynx).

If the patient is unresponsive - not breathing with no pulse - leave the patient immediately and go and telephone for help. Return to the patient and commence resuscitation.

If the patient is unresponsive, not breathing but with a pulse – perform ten “mouth to mouth” (expired air resuscitation) breaths, then leave the patient and telephone for help (dial 999). Return to the patient, check for breathing and pulse and continue resuscitation.

If the patient is unresponsive but is breathing and has a pulse then turn him on his side into the recovery position.

e) The Recovery Position

Kneel to one side of the patient. Take the nearest arm and place it at 90° to his body, elbow bent and palm uppermost. Take the farthest arm and place it with the palm outwards held against the casualty's cheek. Bend the far knee upwards to 90°, keeping the foot flat on the ground.

Supporting the hand on the face, pull gently but firmly on the bent up thigh to roll the patient towards you. Rearrange the far side, now upper leg to 90° and ensure the airway is still open by tilting the head and lifting the chin.

3. Resuscitation Procedure

This is the provision of artificial ventilation by mouth to mouth breathing, and an artificial circulation by external chest compressions.

a) Mouth to Mouth Breathing (Expired Air Resuscitation)

Lie the patient on his back. Kneel beside the head of the patient and open the airway by lifting the head and lifting the jaw. Open the patient's mouth and pinch the nostrils closed. Open your mouth, take a deep breath, seal your mouth firmly over the patient's mouth and breath out steadily into the patient.

Watch the patient's chest rise as if he is taking a deep breath 1-2 seconds.

Remove your mouth from the patient's mouth and allow the chest to fall (4 seconds). Give two breaths.

If mouth to mouth breathing is difficult, check and reposition the airway. Vomiting may occur if breathing returns, place the patient in the recovery position to prevent him from choking.

b) Mouth to Nose Breathing

If mouth to mouth breathing fails to give air to the patient mouth to nose breathing is an alternative method. With the patient placed in same position as described above the mouth is sealed firmly over the patients nose and you may breathe out steadily into the patient. Ensure that sealing of your mouth around patient's nose does not prevent airflow to the nose.

Watch the patient's chest rise as if he is taking a deep breath 1-2 seconds.

Remove your mouth from the patient's nose and allow the chest to fall (4 seconds). Give two breaths.

c) External Chest Compression

Place the patient flat on his back and kneel alongside the chest. Place the heel of one hand on the lower third of the breast bone. Place the heel of your other hand on top of the first hand. With your arms held

straight and the hands on the chest all the time, press down on the breast-bone to depress it 4-5cm, then release.

Compress the chest smoothly 15 times at a rate of approximately 80 compressions per minute. After performing 15 compressions give 2 ventilations. Continue the compressions and the ventilations until help arrives. Do not stop to reassess the patient's pulse or breathing until help arrives.

4. Training

Remember that effective resuscitation training is essential; the foregoing text is only a guide/aide to understanding the practice of resuscitation that you are strongly recommended to learn. Contact your Red Cross or other medical training group for practical instruction in First Aid and resuscitation.

IV. HOT WEATHER GUIDELINES - Hyperthermia

Where rowing training and racing take place in a warm climate, participants may be subject to health risks. Organizers and other responsible persons should be prepared to evaluate the potential risks and to take precautions. This section represents the conclusions reached by the FISA Sports Medicine Commission in their paper "Hot weather and safety guidelines" which gives more detailed information on heat related problems and safety measures.

The main medical problems in warm and hot environments are related to:

- Air temperatures
- Air humidity
- Heat Radiation from sun and warm environments
- Exercise induced heat production
- Impaired heat reduction (Clothing, ventilation, hydration)

The main strategies to prevent heat-induced illnesses are

- Acclimatization
- Adequate hydration
- Postponement of exercise to cooler time periods of the day.

A. BASIC MEDICAL ISSUES

High intensity exercise in a hot environment with associated fluid loss and elevation of body temperature can lead to:

DEHYDRATION - HEAT EXHAUSTION - HEAT STROKE

The heat related problems always start with dehydration and accompanied by an elevated body core temperature. Exercise further increases heat load on the body. With increased core temperature, energy demands for temperature regulation increase and this further depletes energy resources, particularly glucose stores. These conditions are prerequisites for the heat induced illnesses. However, it should be mentioned, in the case of excessive thermal load, heat exhaustion and heat stroke may occur without dehydration.

The main heat related illnesses are represented in Table 1 with the causes and physical problems, the indications and symptoms, and simple rules for treatment. **Any athlete with an elevated temperature above > 40 °C (104 °F) which does not resolve after 30 minutes of cooling and rehydration is to be considered a medical emergency.**

HOT WEATHER RISK EVALUATION

Taking into account the above mentioned factors, three levels of risk can be considered for hot, dry days according to the ambient temperature. When available, “**wet bulb globe temperature**” (WBGT) should be used to quantify environmental heat stress:

Table: risk evaluation related to ambient temperature or WBGT

AMBIENT DRY TEMPERATURE	WBGT	RISK OF THERMAL INJURY
25° – 31.9° C (77° - 89.4° F)	24.0 – 29.3 °C (75 - 85 °F)	Moderate
32° – 38°C (89.6° - 100° F)	29.4 - 32.1 °C (85 – 89.9 °F)	High
38°C and above (>100°F)	32.2 °C and above (> 90 °F)	Extreme

REGATTA CANCELLATION / POSTPONEMENT

In general, with proper planning and observation of local weather forecasts it should not be necessary to cancel a regatta. For the safety of participants the amendment of the regatta program to allow for events to be contested in the cooler parts of the day may suffice. When high or extreme thermal risk is indicated, special precautionary measurements are required.

B. SAFETY MEASURES

Hot weather safety measures:

1. Shade and Cooling facilities
 - a) For regattas in warm months, shaded rest areas (Buildings, tents, natural shade) need to be provided.
 - b) Cool or air conditioned rooms are recommended when warm weather with temperatures higher than 32° C (89.6°F) are expected.
 - c) Fans to enhance air movement in rooms and resting areas are recommended when room temperatures exceed 25° C (77° F).
2. Medical centre and first aid provisions
 - a) **Rescue and first aid teams** should be trained in diagnosis and treatment of temperature related illnesses and problems.
 - b) **Facilities for intravenous infusion and intravenous fluids** (e.g. Ringer Lactate solution) have to provided at the medical centre.
 - c) **For cooling, crushed ice, water and fans** should be provided at the Medical Centre.
 - d) The medical centre should be air conditioned when dry air temperatures higher than 32° °C (89.6°F) are expected.
3. Organization, training, racing and related measures
 - a) **Training times:** Teams should be advised to train in the morning and evening hours, when warm weather with temperatures higher than 32° °C (89.6°F) are expected.
 - b) **Course closed:** Racing course should be closed for training (usually during the hottest part of the day; 11:00am - 3:00pm), when dry air temperatures exceed 38°C (>100°F).
 - c) **Official and umpire rotation:** Rotation of volunteers should be considered when dry air temperatures exceed 32° °C (89.6°F).
 - d) **Clothing:** Clothing worn by umpires, officials and volunteers should also be adjusted to temperature.

- e) **Extra water:** Provision of extra water for wetting the face, clothes and hair should be provided at the regatta course when dry air temperatures exceed 32 °C (89.6°F) for athletes, visitors and officials.
4. Drinking water and fluid supply
- Drinking water:** At regattas in warm months, free access to drinking water should be provided to athletes.
 - Water hygiene:** If tap water is drinkable, an official certificate of health authorities should be provided specifying the hygienic quality.
 - Amount of water supplied: **Drinking water:** The total amount of free water provided by organizers should be at least 2 L / day, when dry air temperatures exceed 32° °C (89.6°F) , additional 1 L / day should be provided. 1 L can be provided at the meals.
 - Water for the crews:** Organizers are advised to find a suitable place for the coaches to give water to the crews after racing.
 - Water in rescue launches:** Organizers are advised to have water in the rescue launches but to be given out in case of emergency and to provide water near to the victory ceremony.
 - If the OCs would have a sponsor for mineral water then this water is available to the teams for free and distributed through a certain system.
5. Personal recommendations
- Hydration:** The base fluid need of athletes is 2 L / day and increases with exercise time (1L /hour) and air temperatures (1L / per 5 °C temperature increase above 25 °C). For hydration, water, hypotonic and isotonic fluids may be used.
 - Radiation:** Indirect radiation from the sun or from hot cars or in hot rooms enhances the negative effects of hot temperatures. Shade provides shelter.
 - Hats:** Athletes in direct sunlight should wear hats which should be wetted with water
 - Clothing:** Clothing should be made with fabrics that minimize heat storage and enhance sweat evaporation. Light coloured, loose fitting clothes, made of natural fibres or composite fabrics with high absorption properties that provide for adequate ventilation are recommended.
 - Rest:** Sleep and rest enhance temperature tolerance.
 - UV Sun block:** decrease radiation damage of the skin and reflect also radiation. This decreases thermal load.
 - Lying down after races** in warm environments may have negative effects on circulation and may provoke collapses. Rowers are advised to cool themselves with water after the races.
6. Acclimatisation
- Acclimatisation of the participants includes the rowers as well as the umpires, other officials and volunteers and is the most important measure to prevent heat related illnesses.
 - Preparation for exercise under hot conditions should include a period of acclimatisation to those conditions, especially if the athlete is travelling from a cool / temperate climate to compete under hot / humid conditions.
 - Acclimatisation to hot environments takes usually 7 to 10 days.
7. Information on health risks
- Participants or officials at a high risk of heat illness should inform the medical staff in case of extreme weather conditions.
 - Risk increases with medical conditions including asthma, diabetes, pregnancy, heart conditions and epilepsy. Some medications and conditions may need special allowances.

For more detailed hot weather risk evaluation during regattas, the “**Heat Stress Adviser**” (author: J.Coyle, Tulsa, OK; based on a Sports Medicine Australia (SA Branch) checklist for planning sports events) may be downloaded from the site: http://www.zunis.org/sports_p.htm and the FISA Medical Commission hot weather and safety standpoint.

Heat Stress Disorder	Cause and Problem	Signs and Symptoms	Treatment
Heat Cramps	<ul style="list-style-type: none"> ○ Failure to replace salt lost through sweating ○ Muscle problems ○ Wrong training time (e.g. noon) ○ Wrong training suit (e.g. no cotton, only lycra, only nylon) 	<ul style="list-style-type: none"> ○ Muscle cramps 	<ul style="list-style-type: none"> ○ Re-hydration ○ Supplementation of sodium chloride ○ Supplementation of calcium and magnesium ○ Avoidance of pre-race caffeine supplementation
Hyperventilation	<ul style="list-style-type: none"> ○ Overbreathing ○ Low blood CO₂ level ○ Low training status ○ Age 	<ul style="list-style-type: none"> ○ Dizziness, tingling around lips, carpedal spasm, fainting 	<ul style="list-style-type: none"> ○ Slow, deep breathing ○ Re-breathing from paper bag ○ Rowers trained on breathing techniques before training in heat and during warming up on water
Heat Exhaustion	<ul style="list-style-type: none"> ○ Excessive heat strain with inadequate water intake ○ Failure to replace water loss ○ Cardiovascular problems (inadequate venous return, filling time) ○ Reduced skin perfusion ○ Increased sweating ○ Orthostatic hypotension ○ Wrong training suit (e.g. no cotton, only lycra, only nylon) ○ Increased Humidity 	<ul style="list-style-type: none"> ○ Weakness, unstable gait ○ Fatigue ○ Wet, clammy skin ○ Headache > nausea > collapse 	<ul style="list-style-type: none"> ○ Rest in shade ○ Cooling with water, shower ○ Re-hydration ○ Pre-training proper hydration ○ Supplementation of magnesium and electrolytes ○ Very light meal in 1 hour-time
Physical Exhaustion and Dehydration	<ul style="list-style-type: none"> ○ Excessive work in heat ○ High T_c > 40 °C (104°F) 	<ul style="list-style-type: none"> ○ Excessive fatigue ○ Weight loss ○ Increased hematocrit 	<ul style="list-style-type: none"> ○ Rest in shade ○ Cooling with water, cold shower ○ Re-hydration ○ Use of right-material head cup ○ Use of sports sun glasses ○ Adequate Electrolyte and Carbohydrate replacement after every training session
<i>Heat exhaustion combined with physical exercise</i>			
Exertional Heatstroke	<ul style="list-style-type: none"> ○ Damage to or dysfunction of multiple organ systems is frequent ○ High T_c > 40 °C (104°F) 	<ul style="list-style-type: none"> ○ Shivering ○ Mental status changes ○ Irrational behaviour > delirium ○ Convulsions ○ Loss of consciousness 	<ul style="list-style-type: none"> ○ Rapid, immediate cooling <ul style="list-style-type: none"> ○ Cold-water immersion, ice packs ○ wrap in wet sheets and fan ○ Continue until T_c is < 102°F. ○ Intravenous Re-hydration ○ Cardiopulmonary
<i>Heat stroke is a medical Emergency</i>			
Classic heatstroke (rare in sports)	<ul style="list-style-type: none"> ○ Elderly and patients with serious underlying diseases ○ Closed rooms ○ Chronic dehydration 		

Table - Heat Stress Disorders: Cause and Problems, Signs and Symptoms, Treatment