

# Exertional Heat Illness Prevention

## 1. Minimizing exertional heat illness in triathlon:

- 1.1. The incidence of exertional heat stroke (EHS) varies from event to event and increases with rising ambient temperature and relative humidity.
  - a.) Event should be scheduled to avoid extremely hot and humid months, based on the historical local weather data.
  - b.) During summer months all events should be scheduling during the cooler hours of the days (early morning or late afternoon).
- 1.2. The LOC and the Medical Staff must provide the following in any case:
  - a.) Tent with fans and air conditioned;
  - b.) Tents, awnings, umbrellas, etc;
  - c.) Water (1 liter / 4 athletes);
  - d.) Sports drink cooled;
  - e.) Towels immersed in ice water;
  - f.) Ice (1kg / 4 athletes);
  - g.) Ice buckets, ice water tubes, inflatable bath with water and ice;
  - h.) IV fluids (NS or 5% dextrose in NS, 3% NaCl);
  - i.) Improve the aid/drink stations numbers during the run course. The distance between the run course aid stations should be a maximum of 1.25 km unless otherwise ruled by the TD and considering the number of laps in the run course;
  - j.) Trained medical personnel should be positioned every 500m on the run course.
- 1.3. The TD and the Medical delegate must work with the Race Medical Doctor (RMD) and the LOC to ensure that during competitions, adequate shelters (tent, awnings, umbrellas, etc) are provided for athletes and officials in the field where prolonged exposure is likely to occur.
- 1.4. Practice and competitions could be modified on the basis of air temperature, relative humidity, sun exposure, heat acclimatization status, age and equipment requirements by decreasing the duration and intensity of exercise.
- 1.5. The risk of heat related illness is greatest when high-environmental temperatures occur early in the competitive season when participants may be inadequately prepared and have not yet acquired natural acclimatization to heat. EHS also can occur with other temporary factors like viral illness or medications.

## **2. Monitoring the environment:**

- 2.1. The LOC shall work with local meteorology sources to provide statistical information on prior weather patterns, in order to assist competition organizers in developing the competition schedule. Event organizers should monitor the weather conditions before and during practice and competition. Factors that affect heat illness risk include ambient temperature, relative humidity, wind speed and solar radiant heat.
- 2.2. Environmental heat stress can most reliably be estimated by using the wet bulb globe temperature (WBGT) index. The WBGT is an index of environmental heat stress and is used to estimate the risk of heat related illness. Variables measured are ambient heat, humidity and radiant heat stress from direct sunlight. The measuring device is commercially available and when WBGT is not available on site the race organizers can obtain WBGT readings from their local weather service during hot weather months or with standardized algorithms or charts to estimate heat risk. It's important to know that the local weather reports are taken in the shade, not in direct sunlight and this can therefore underestimate the radiant heat from the sun.
- 2.3. WBGT is a standardized method to determine environmental heat stress that does not take in account individual characteristics and responses, heat acclimation or lack of acclimation. The WBGT is an environmental heat stress index and not a representation of human heat strain. The WBGT might underestimate heat stress when sweat evaporation is restricted (i.e high humidity) and does not account for metabolic heat production.
- 2.4. All the measurements with the WBGT tool should be taken at the finish area.

## **3. Activity modification in high-risk weather conditions:**

- 3.1. Using the WBGT index to assess on-site environmental heat stress at regular intervals and the appropriate announcement of its readings is an important starting point to decrease the incidence of heat related illness.
- 3.2. If WBGT index is between 27.9°C - 30°C and 30.1°C - 32.2°C the EHS risk for unfit, nonacclimatized individual is high / very high. Caution should be taken and athletes should be advised of the danger and to increase their normal fluid intake, limiting intense competition between 30.1°C - 32.2°C WBGT index.
- 3.3. If WBGT index is above 32.2°C the level for EHS risk is cancelled and uncompensable heat stress exist for all athletes.
- 3.4. Difference of local climate and individual heat acclimatization status may allow activity at higher levels than outlined above in acclimatized fit and elite athletes.
- 3.5. The ITU TD and Medical Delegate, the RMD and the LOC should work together to monitor weather conditions and a specific contingency plan should be implemented to consider the scenario of extreme meteorological situations that could force to modify (reducing race length), to rescheduling the event until less stressful conditions prevail, or even cancel the competition.

- 3.6. In case the decision must be taken considering also the level of medical assistance, the facilities in the medical tent, the evolution of the weather conditions following the forecast, the period of competitive season, the race distance, and the category, fitness and age of the athletes. Event organizers should pay particular attention to the mass participation event in case of unexpected or unseasonably hot weather considering that the unacclimatized participants or the participants without a sufficient level of training are at higher risk for heat illness.
- 3.7. In general better performance and less adverse results are obtained when the environmental conditions are going to improve, rather than worsen, during the event.
- 3.8. During the ITU WTS and World Cup races weather information and the WBGT index should be provided at the Sport Informations Centers and at the athletes' lounge. The information should be posted by the time that the athletes' lounge is open for the athletes' check in. The WBGT index is converted in a colored flag system to visually signal the heat illness risk of current weather conditions to athletes in **four (five)** levels. The information can be delivered in a form of written announcement (sample below).
- 3.9. Wet-bulb globe temperature (WBGT) levels for modification or cancelation of workouts or competition for healthy adults based on the American College of Sports Medicine (2007).

Risk Categories in Wet Bulb Globe Temperatures Readings.			Recommendations	
Flag colour	WBGT Heat index	Risk	Acclimatized, fit, low-risk triathletes	Non-acclimatized, unfit, high-risk individuals
Black	> 32.2°C	Extreme	Cancel competition as uncompensable heat stress exists for all athletes	Cancel competition
Red	30.1°C – 32.2°C	Very High	Limit intense competition and total daily exposure to heat and humidity. Watch for early signs and symptoms	Cancel competition
Orange	27.9°C – 30.0°C	High	Plan competition with discretion, watch at-risk individuals carefully	Limit intense competition. Watch at-risk individuals carefully
Yellow	25.7°C – 27.8°C	Moderate	Normal activity monitor fluid intake	Plan races with discretion, watch at-risk individuals carefully
Green	< 25.7°C	Low	Normal activity monitor fluid intake	Normal activity monitor fluid intake

- 3.10. Considering that the ITU has the upper water temperature limits for cancelling the swim, the cycling and running leg require the most attention with regards to heat illness. Although cycling may provide greater air flow and possibly a greater potential for heat loss than running, athletes may be at risk of exertional heat illness based on the environmental conditions, but also the race tactics and course geography. When running at a high intensity a large amount of metabolic energy is released at heat. With a decrease in heat loss capacity relative to cycling, the run leg of the triathlon should be considered the section of the race in which heat illness has the highest likelihood to occur.

- 3.11. In case of Very High Risk (WGBT index 30.1°C - 32.2°C Red Flag) based on these considerations we recommend for the Standard distance events and belows:
- a.) the run distance must be shortened to 5 km in all the competitions. The run distance remain the same in Sprint distance triathlon and mixed relay.
  - b.) if the LOC and the Medical Staff are not able to provide the medical assistance respecting all the rules of ITU Event Organizer Manual Medical Services and the Exertional Heat Illness Prevention, particularly in the large mass participation event the competition must be cancelled or rescheduled.
- 3.12. In case of Extreme Risk (WGBT index > 32.2°C Black Flag) the competition must be cancelled.

#### **4. The upper water temperature limit:**

- 4.1. The IOC/FINA/ITU research "*Thermal stress in open water swimming: establishing competition parameters for athlete safety*" concluded that because no intolerance or unusually high exercising core temperature were observed in maximal effort swims in lab test at 30°C - 32°C water T° such temperature are to be considered safe.
- 4.2. Considering the potential variability in physiological responses to thermal stress exists between swimmers subjected to lab test versus the race environment the research suggests a more conservative upper limit water T° of 31°C (87.8°F), because swimming in open-water competition might produce higher core temperature than is produced in lab trials. Between 31°C and 31.9°C the swim distance is shortened to 750m, and between 32°C and 32.9°C the swim is allowed only up to 300m for the mixed relay triathlon.

#### **5. Return to play after heat illness:**

- 5.1. Athletes who have a significant heat related illness appear to be at increased susceptibility for subsequent events. An athlete's return to sports depends on the severity of heat related illness and the clinical course of the recovery. In milder cases with rapid recovery, return to sports is recommended only after an evaluation of potential risk factors, complete resolution of symptoms, and normalization of all vital signs and laboratory tests. After treatment of the acute heat stroke event it has been suggested that an athlete wait at least 1 week to return to practice sports, with a gradual and closely monitored return to activity.
- 5.2. Heat stroke is not necessarily caused by high environmental temperature per se, and is not predicted by any particular core temperature, which again puts some responsibility on the coach and athlete to be cognizant of their health status and make decisions appropriately.

## HEAT STRESS ILLNESS PREVENTION

**Date:**

**Time:**

**Air Temperature:**

**Humidity:**

**WBGT:**

**Colour code:**



**Risk: Extreme**