



### » Ambient temperature

Easily understood, most useful on hot, dry days

Ambient Temperature °C	Relative humidity	Risk of Thermal Injury	Possible Modifying Action for vigorous sustained activity
15 - 20		Low	Heat illness can occur in distance running Caution over-motivation
21 - 25	less than 60%	Low - moderate	Increase vigilance Caution over-motivation
26 - 30	less than 50%	Moderate	Moderate early pre-season training intensity Reduce intensity and duration of play/training; take more breaks
31 - 35	less than 30%	High - very high	Limit intensity. Limit duration to less than 60 minutes per session
36 and above	less than 25%	Extreme	Consider postponement to a cooler part of the day or cancellation

OR

Further guidance might be gained from the Wet Bulb Globe Temperature (WBGT) index. The WBGT is useful when humidity is high.

### » WBGT

- Suitable for hot, humid days

WBGT	Risk of Thermal Injury	Possible Modifying Action for vigorous sustained activity
less than 20	Low	Heat illness can occur in distance running Caution over-motivation
21 - 25	Moderate to high	Increase vigilance Caution over-motivation Moderate early pre-season training intensity and duration. Take more breaks
26 - 29	High - Very high	Limit intensity. Limit duration to less than 60 minutes per session.
30 and above	Extreme	Consider postponement to a cooler part of the day or cancellation (allow swimming)

### » Check local weather conditions

The Bureau of Meteorology provides detailed information about temperature conditions (both ambient and WBGT) wind speed and relative humidity for many regions in Australia ([www.bom.gov.au](http://www.bom.gov.au)).

Check the weather conditions in your area (or find additional information on sport safety) by going to [www.sma.org.au](http://www.sma.org.au) and clicking on the hot weather icon.



## Playing and exercising safely in hot weather

Fact Sheet

### » What is heat stress?

Vigorous exercise in sport places some people at risk of heat illness. Even in cool weather, heat illness may occur in people exercising at high intensity for more than about 45 minutes.

The risk of heat illness is obviously greater in hot and humid weather because:

- during high intensity exercise in hot weather people may not be able to produce enough sweat for adequate cooling
- high humidity may prevent adequate evaporation of sweat.

Heat illness is not a trifling matter – if untreated, it can lead to the rare but life-threatening condition of heat stroke.

In hot weather, we need to take more precautions, especially as we need to exercise or play sport regularly to stay healthy.

This brochure will help you recognise and manage potentially dangerous situations that may arise during participation in sport or physical activity in hot conditions – **or where exertion levels are out of the ordinary.**

By understanding the causes of heat illness event organisers, coaches, officials, players and the general public can take common sense steps to enjoy sport and physical activity and minimise the extra risks arising during hot or humid weather. (For more details, download a copy of the Sports Medicine Australia Hot Weather Guidelines from [www.sma.org.au](http://www.sma.org.au))

### » Keep the “Fun” in Fun Runs

The highest incidence of sports heat illness occurs in fun runs of 10 km and longer.

Running at very high intensity much greater than training pace, entails a risk of heat illness. Setting targets helps achieve goals, but athletes pushing themselves close to exhaustion and who ignore the symptoms of heat illness to finish in a personal best can risk serious injury.

Run within personal limits. If feeling overstressed or unwell, slow down or stop. If you see other runners who appear unwell persuade them to stop and assist them.

### » How do you tell if someone has heat illness?

Heat illness may occur in strenuous sports, but may also occur in prolonged moderately strenuous physical activity in hot weather. During training and competition exercisers should “listen to their bodies.” If they start to experience any of the following conditions or symptoms and signs they should stop immediately.

**Symptoms of heat illness may include:**

- light headedness, dizziness
- nausea,
- obvious fatigue
- cessation of sweating
- obvious loss of skill and coordination/clumsiness or unsteadiness
- confusion
- aggressive or irrational behaviour
- altered consciousness
- collapse
- ashen grey pale skin

Serious heat illness in sport presents as heat exhaustion or heat stroke. Heat exhaustion is the more common sports-related heat illness. Heat stroke is rare, but it is a life threatening condition.

**Heat exhaustion.** Participants who collapse **after** exercise, are likely suffering heat exhaustion with low blood pressure (postural hypotension), but some may have heat stroke.

**Heat stroke.** Those who show signs of altered mental function, loss of consciousness or collapse **during** exercise are likely suffering heat stroke. Sports participants showing signs of confusion, loss of skill, loss of coordination or irrational behaviour should be stopped and removed from the field immediately.

#### Acknowledgement:

This brochure was produced by an SMA project team led by Dr John Brotherhood of Sydney University in consultation with SMA members.



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## Some Golden Rules for Training and Competition

- Achieve a high level of physical fitness before exercising strenuously in competition, or in warm weather.
- Exercise at moderate intensity in hot or humid conditions.
- Do not undertake hard exercise, or exercise in hot or humid weather if you feel unwell or are recovering from recent illness.
- Drink water before and during exercise.
- Stop exercise if you feel unwell when exercising hard, or if exercising in hot or humid weather.
- Stop other sports participants if they appear unwell, confused or show loss of skill and coordination.



### » Factors that increase the risk of heat illness include:

- High exercise intensity e.g. Exercising close to personal capacity
- Lack of fitness (due to insufficient training that includes some at competition intensity and duration)
- **Previous history of heat illness or heat intolerance**
- High air temperature (see table)
- High humidity (see table)
- Low air movement/ no wind, following wind in road running
- Solar radiation
- Heavy clothing and protective equipment e.g. padding
- Lack of acclimatisation (due to lack of recent training in warm and humid conditions)
- Dehydration (inadequate water intake before exercise and during activity longer than 60 minutes)
- Illness and medical conditions (current or recent infectious illness, chronic health disorders)

### » What steps can be taken to minimise the risk of heat illness?

#### 1. Acquiring adequate fitness and acclimatisation

Excellent physical fitness arising from regular endurance training, and acclimatisation to heat from regular training in warm conditions, markedly increase heat tolerance. Acclimatisation for sports activities requires at least 5 days of training in hot or humid conditions, progressing from moderate intensity and duration as acclimatisation develops. In summer, acclimatisation develops naturally as the weather becomes warmer and more humid.

#### 2. Adjusting training and competition intensity to conditions

Exercise intensity in training should be appropriate to current fitness and weather; for example, moderate intensity and duration for pre and early season training of unconditioned players in warm weather. In conditions of increased risk participants should be provided with opportunities to rest through the use of player interchange or substitution. In moderate risk conditions players should be rested for at least 10 minutes per hour. In high-risk conditions players should be rested for at least 15 minutes in an hour.

This strategy could include shortening the whole game or activity by the appropriate period of time.

The benefits of rest breaks should be maximised by:

- Reducing clothing and resting in shade provided by trees, buildings or portable structures
- Assisting evaporative cooling with fans; wetting the skin, applying ice packs to groin and armpits also helps
- Drinking cool water or sports drinks
- Players who feel unusually fatigued or who appear distressed should be withdrawn from the activity.

#### 3. Timing of games or activity

Schedule training and competition involving moderate to high intensity exercise to avoid the hottest part of the day between 11am and 3pm. Early morning or night games or exercise training reduce the risk of encountering stressful conditions.

#### 4. Clothing

Clothing for strenuous exercise, and sport in warm conditions, should allow easy **evaporation of sweat from the skin**. It should be light coloured, light weight and loose fitting, and provide protection against the sun.

#### 5. Modifying warm-up

In hot conditions, reduce duration and intensity of warm-up to minimise increase in body heat and temperature before competition.

### Children and Heat Stress

Children sweat less and get less evaporative cooling than adults. In warm and hot weather they have greater difficulty getting rid of heat; they look flushed, and feel hotter and more stressed than adults. Overweight children are particularly disadvantaged exercising in warm weather.

Children seem to be effective at “listening to their bodies” and regulating their physical activity. For this reason, children should always be allowed to exercise at their preferred intensity. They should never be urged to exercise harder or compelled to play strenuous sport in warm weather. If children appear distressed or complain of feeling unwell, they should stop exercising.

In warm weather wet sponging will make children feel more comfortable.

Drinks should be provided for children playing sport.

### 6. Drinking (Hydration)

Substantial amounts of water are lost through sweating when exercising vigorously in the heat. During strenuous exercise sports people often replace only half their sweat losses, but they tolerate moderate levels of dehydration well.

To minimise dehydration, drink about two cups of water in the 2 hours before exercising. During exercise lasting 60 minutes or longer, 2-3 cups (500-750 ml) of cool water or sports drink per hour are sufficient for most sports.

Dehydration is rarely the sole cause of sports heat illness, but maintaining an adequate water intake assists temperature control. Carbohydrate and electrolytes in sports drinks help to maintain performance in endurance events.

Water intake exceeding sweat loss in events lasting several hours can lead to the harmful condition of hyponatraemia (low blood sodium).

### 7. Heat waves, unusually hot weather and travelling

Extra caution needs to be taken during unseasonal heat waves or unusually hot or humid weather, or if travelling from a cool region to a hot or humid climate. In these circumstances athletes lack acclimatisation and are at increased risk of heat illness if they exercise at their cool climate intensity.

### 8. Other considerations

Medical Conditions:

- If you have recently experienced a high temperature, infection, diarrhoea, or vomiting you should NOT take part in strenuous exercise.
- People who suffer from a variety of medical conditions, who are taking medication or who are pregnant may experience difficulties exercising in the heat. Examples include, asthma, diabetes, heart conditions, epilepsy, overweight and obesity. Medication may also include those purchased over the counter. If you are unsure of their effect, ask your doctor or pharmacist.

### » Treating Heat illness

#### Heat Exhaustion

Sports heat exhaustion is characterised by low blood pressure at the cessation of exercise. Victims suffer a faint-like collapse with ashen-grey skin. Athletes with heat exhaustion usually recover rapidly on lying down with legs raised. Because the difference between simple heat exhaustion and the high risk of heat stroke is not always obvious, athletes who have collapsed following strenuous exercise should be cooled as outlined below.

#### Heat Stroke

Heat stroke is a condition in which body temperature control is impaired. Heat stroke can lead to devastating injuries and is potentially fatal. The severity of complications of heat stroke increases with the duration of high body temperature. Immediate first aid is essential and life-saving. The aim is to lower body temperature rapidly.

### » Dehydration is rarely the sole cause of sports heat illness, but maintaining good hydration assists temperature control

### If a sports participant is exhibiting signs of heat illness take the following action:

- remove from the field
- lay the person down in a cool place
- raise legs and pelvis to improve blood pressure
- remove excess clothing
- cool by wetting skin liberally and vigorous fanning (evaporative cooling)
- apply ice packs to groin, armpits and neck
- give cool water **if conscious**

### Persons suffering from heat exhaustion usually recover rapidly with this assistance

- If the athlete remains seriously ill, confused, vomiting or shows signs of altered consciousness call ambulance immediately and seek medical help. If in doubt, **treat for heat stroke**.

### Treat for heat stroke

- Continue cooling. If available, cool in a shallow canvas/ plastic bath of iced water (5-10 minutes)
- If necessary cooling should continue during removal to hospital.

Note: following exercise body temperature can be measured reliably only in the rectum because the mouth and armpit seriously underestimate true body temperature. **Rectal temperature greater than 41°C is dangerous**. Rectal temperature should only be measured by a doctor or nurse.

### » Hats and sunscreen

Wear well-vented broad brim hats and water-soluble sunscreen for sun protection. Caps do not provide adequate sun protection.

### Guidelines to Environmental Conditions and Risk

Remember, sports heat illness can occur with high intensity exercise in cool conditions and with well-hydrated participants.

Because sports heat stress is complex, and because individual responses to heat stress vary, it is not possible to provide overall recommendations about limiting conditions to cover all sports. Since heat stress increases with increasing exercise intensity, potential for heat illness may be rated according to the exercise characteristics of the sport. The following sports are rated by decreasing levels of sustained exertion and therefore decreasing potential for risk of heat illness.

1. Endurance running in competition or training (higher intensity/ higher risk)
2. Football codes and hockey
3. Tennis
4. Cricket (lower intensity/lower risk)

The tables below provide approximate guides to weather conditions and appropriate individual and organisational responses. Although temperature ranges are given there are not clear demarcations in risk between ranges.