

Preventing Heat-Related Illness in Recreational Activities

Introduction

The purpose of this document is to assist officials and participants to recognize and manage potentially dangerous heat-related illness as a result of participating in recreational activities in hot weather conditions.

This is achieved by:

1. Alerting organizations and participants of the risk of heat-related illness from physical activity in hot weather conditions;
2. Providing a clear cancellation policy for organizations conducting events or recreational in hot weather conditions; and
3. Educating organizations and participants on methods of minimizing the risk of heat-related illness and the avoidance of situations that may worsen heat-related illnesses.

Definition of Recreation

Recreation is an activity that a person takes part in for pleasure or relaxation rather than as work (Internet: Encarta Dictionary, 2005).

What is Heat –Related Illness?

People suffer heat-related illness when their bodies are unable to compensate and properly cool themselves. The body normally cools itself by sweating, but under some conditions sweating just isn't enough. In such cases, a person's body temperature rises rapidly and very high body temperatures may damage the brain or other vital organs.

Several factors affect the body's ability to cool itself during extremely hot weather. When the humidity is high, sweat will not evaporate as quickly, preventing the body from releasing heat quickly. Other conditions related to risk include age, obesity, fever, dehydration, heart disease, mental illness, poor circulation, sunburn and prescription drug and alcohol use.

Heat-related illness can be further exacerbated with recreational and physical activity, regardless of the intensity resulting in overexposure to excessive heat with the potential for causing heat stroke, sunstroke, heat collapse, heat cramps and heat exhaustion due to water depletion or salt depletion.

Summer recreational activity, whether land or water based, must be balanced with measures that aid the body's cooling mechanisms and prevent heat-related illness.

HOT WEATHER POLICY FOR THE GENERAL POPULATION

DISCUSSION

The risk of heat-related injury from any recreational activity is significant in hot weather. It can range from cramps, through heat exhaustion to heat stroke, coma and death.

During a competition, a competitor may produce 15 - 20 times the heat they produce at rest. Dissipation of this excess heat is primarily achieved through sweating. If the body's ability to dissipate heat is compromised, core temperature in an average size individual may rise by one degree Celsius for every five minutes of exercise if no temperature regulating mechanisms are activated. If an individual's core temperature is above 40 degrees Celsius (normal 37 degrees) the risk of heat-related illness is significant.

Factors which impair the body's ability to dissipate heat are:

1. High ambient temperature
2. Solar radiation
3. Humidity (this compromises the efficacy of sweating) and
4. Dehydration

These factors significantly increase the risk of heat-related illness occurring.

STRATEGIES FOR REDUCING THE RISK OF HEAT-RELATED ILLNESS FOR THE GENERAL POPULATION

The following strategies are intended for the general population that does not fall into any of the listed 'At Risk' categories. 'At Risk' participants should consult the recommendations for their particular population sector.

Those most at high risk for heat illness include infants and young children, the elderly, and people who are overweight and those with chronic medical conditions, especially cardiac diseases and high blood pressure. People on certain medications that impair the body's ability to regulate heat or perspiration, especially people with mental health conditions, are also at high risk.

1. Timing of Activity

Recreational activities involving moderate to high intensity exercise should be scheduled to avoid conditions where it is likely to exceed 28 degrees Celsius.

In most parts of Australia participants are likely to be exposed to their highest risk of heat injury in the months of December, January and February, although in some regions this level of risk extends into March and April. This is in part due to high ambient temperatures that are prevalent during this period.

Where possible, especially in January and February, vigorous and strenuous activity should be scheduled to start before 9 a.m. or after 6 p.m. Early morning or night activity minimizes the risk of encountering unacceptable conditions at these times of year. This is especially so where these games are to be played in locations with a history of relatively high temperatures.

2. Acclimatization

If activities are to be conducted after long periods of cooler conditions participants should strive to be fully acclimatized prior to participation.

Physiological adaptations to exercising in the heat are rapid and can occur after 3-5 days in a hot environment. Full acclimatization can take 10-14 days or longer. The initial response is an expansion of the plasma volume, then over several days, it returns to normal and the sweat rate increases with sweating starting earlier and a more dilute sweat being produced.

There is evidence that exercising in sweat clothing to the point where heat strain is induced can give some degree of acclimatization. The training must induce heat strain over several days, and care must be taken that adequate hydration occurs during these training sessions.

Some level of acclimatization will occur in participants coming out of summer. What can be done easily is to educate participants to train themselves to play and train with copious fluids already on-board. Further it must be emphasized to the participants that they **MUST** consume fluids containing 6-8% carbohydrate - in warm/hot conditions, muscle glycogen utilization is much higher. The consumption of carbohydrate containing fluids such as Gatorade has been proven to improve performance in the heat and, more importantly, delay the onset of Exercise-Induced Heat Exhaustion and, hence, probably help prevent Heat Stroke.

3. Hydration

The more an athlete sweats, the more fluid must be consumed to avoid dehydration. High levels of dehydration may increase the risk of heat stress. To diminish the risk of heat stress fluid should be consumed before, during and after activity.

It is recommended participants drink at least 7-8ml of fluid per kg of body mass no more than 2 hours before exercising to promote adequate hydration and allow time for excretion of excess water.

During exercise it is recommended that participants drink fluid at regular intervals to replace water lost through sweating. Participants should aim to drink at least 3ml per kg of body mass (about 250ml for the average athlete of around 70 kilograms every 15 to 20 minutes). However, this may vary dependent on the rate of sweating. Fluid taken should be cooler than the ambient temperature.

Water is considered an adequate fluid option for activities lasting up to one hour although there is evidence that sports drinks such as Gatorade do provide a benefit for exercise that is less than one hour in duration. Participants in events or activities exceeding one hour are recommended to use carbohydrate based sports drinks such as Gatorade as a means of replacing fluids, carbohydrates and electrolytes lost during prolonged activity.

In high risk conditions players should be encouraged to drink fluids at scheduled drinks breaks and should be provided convenient access to fluids during activity without unnecessary interruption to the game or event.

Officials and event organisers should also consider including additional drinks breaks for players in conditions of high risk.

In regard to post-event rehydration, it needs to be remembered that this can take 24 hours or more.

4. Player Rest and Rotation

In conditions of high risk, participants should be provided opportunities to rest through the use of player interchange or substitution. The period of rest should be determined by the temperature at the time of the event or activity.

For events played in high risk conditions that do not have a specified playing time, players should be permitted to take rest breaks from activity equivalent to 3 minutes for every 30 minutes of activity.

The positive effects of rest breaks should also be maximised by employing the following strategies:

- Allowing players to rest in naturally shaded areas or providing portable structures that create shade where and when required;
- Providing fans and ice packs; and
- Providing additional fluids to allow participants to spray or douse themselves to assist cooling

5. Pre-cooling

Pre-cooling by cool water immersion or the wearing of ice vests has been demonstrated to increase athletic performance in endurance sports. This practice could be of benefit to many athletes. However, it must be noted that the effects of a pre-cooling maneuver are reduced rapidly by a warm up. Therefore, any pre-cooling strategy must be undertaken in concert with a vastly reduced warm-up if it is to be effective.

6. Clothing

Light colored, loose fitting clothes, of natural fibers or composite fabrics, with high wicking (absorption) properties, that provide for adequate ventilation are recommended as the most appropriate clothing in the heat. This clothing should further complement the existing practices in Australia that protect the skin against permanent damage from the sun.

7. Sunscreen

Sunscreen (minimum 30+ protection) should be applied liberally to face, arm, legs (any skin that is not covered) at the commencement of activity in the sun and repeated every hour.

8. Shade

Adequate shade should be provided for participants to rest in before and after activity. If possible there should be shade available for spectators.

9. Aquatic Recreation

Heat-related illness can also occur on water if participants are not suitably hydrated and wearing sun protective clothing and sunscreen. The reflective sun off the water significantly increases the risk of sunburn.

CHILDREN AND HEAT

The physiological and structural difference between children and adults places children at a greater risk of suffering from heat-related illness. These differences impact on a child's ability to respond to environmental heat and acclimatize to heat.

These differences include:

- A larger surface area/body mass ratio which affects their ability to dissipate heat when the environmental temperature is greater than skin temperature. This can be an advantage when heat loss is necessary, but is a disadvantage when radiant or convective heat gain occurs;
- Immature sweating mechanisms which require a greater increase in body temperature before the onset of sweating; and
- Fewer and smaller sweat glands which limits the production of sweat.

HOT WEATHER POLICY FOR CHILDREN

At ambient temperature greater than or equal to 34 degrees Celsius there is extreme risk of heat-related illness to all children and adolescents participants

Events and activities involving children and adolescents that are conducted or scheduled for times likely to present conditions where the ambient air temperature is greater than or equal to 34 degrees Celsius, should be postponed or cancelled.

STRATEGIES FOR REDUCING THE RISK OF HEAT-RELATED ILLNESS IN CHILDREN

The following strategies should be considered for physical activities involving children. These strategies should be considered in conjunction with strategies for reducing the risk of heat-related illness for the general population and the hot weather policy for children.

1. Shade and Drinks

Organisers of activities that are conducted under hot conditions must provide sufficient shade and regular drinking opportunities. This is particularly critical where the fitness and state of acclimatization of the young participants are uncertain.

It is recommended that water or sports drinks such as Gatorade are provided whenever children are being active. More fluid however, appears to be consumed by young people when the drinks offered are perceived as palatable to them. Therefore, for children and adolescents having trouble drinking adequate tap water, flavored drinks such as commercially available sports drinks may need to be considered. Conversely, the high energy content of some flavored drinks may be unnecessary during exercise in athletes who have a genuine rather than an aesthetic need to lower body fat levels.

It is recommended that young athletes begin regular drinking routines using water or sports drinks such as Gatorade during training and competition. Regular and effective drinking practices should become habitual to young athletes before, during,

and after activity. Individuals should monitor weight changes before and after workouts and know the amount of fluid that they are likely to require. The electrolyte content of some sports drinks consumed following activity may shorten the time taken to recover, particularly in well-trained young athletes who sweat considerably more than their sedentary peers.

2. Acclimatization and Overweight Children

In addition to the risks associated with activity in the heat for unfit and un-acclimatized young people, coaches/supervisors of overweight children and adolescents should take extra precautions to lessen the potential for heat gain. It is recommended that whenever activity in hot conditions is unavoidable with these children, coaches /supervisors decrease the volume and duration of physical activity, and increase opportunities for drinking, rest and shade as a matter of priority.

At the onset of hot weather, the young person may take longer to acclimatize. It is therefore recommended that training volumes (duration and intensity) decrease during the first few weeks of hot weather. Increased times for rest, using access to shade more frequently, and increasing the number of mandatory drinking breaks are recommended for the young athlete when the weather becomes noticeably hotter.

3. Clothing

In addition to the clothing recommendations made for the general population, it is recommended that summer based sporting organizations select uniforms that minimize heat gain and that coaches, teachers, and parents encourage children and adolescents to wear appropriate clothing in layers that can be easily removed during activity.

4. Heat-Related Illness Register

To improve the understanding of children and adolescents activity in the heat, it is recommended that a register of heat-related illness be established. This may comprise a system within which all aspects of heat related illness incidents are recorded. Items of note may include the individual afflicted and their symptoms, the time of the incident, the environmental conditions, the physical activity undertaken, the immediate treatment and subsequent action taken.

The system is recommended to aid in the identification of individuals that have previously experienced some form of heat-related illness and therefore may require additional attention to ensure prevention strategies are adopted by these individuals.

RECOMMENDATIONS

Recreation Industry

The following recommendations are provided as a means of identifying long and short-term objectives for the recreation industry in an endeavor to significantly reduce the risk of dangerous incidents occurring as a result of activities conducted in hot weather conditions.

Adoption of Policy for Children

All recreation activity involving junior participants should immediately adopt a policy for cancellation or postponement of events involving children that are likely to be played in ambient temperatures equal to or greater than 34 degrees Celsius.

All junior clubs or clubs involving junior participants are encouraged to purchase a standard thermometer to measure ambient air temperature on-site to ensure local conditions are accurately measured.

Adoption of Strategies

In the absence of accurate methods of measuring temperature, all organisations should develop a policy or rules which include responsibilities for officials to cancel events due to heat.
