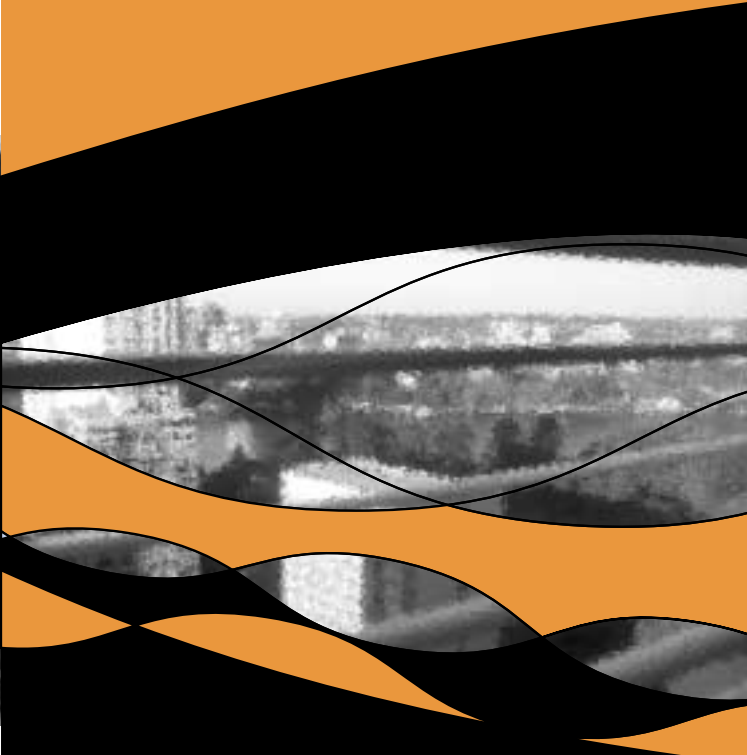


Workplace Health and Safety Queensland

# Heat Stress managing the risk



**Queensland Government**  
Department of Industrial Relations

## What is heat stress?

Heat stress occurs when heat is absorbed from the environment faster than the body can get rid of it. The resulting strain on the body comes from the combined contributions of job (e.g. work activity), environmental factors (e.g. air temperature, humidity, air movement, radiant heat), and worker factors (e.g. extent of acclimatisation and hydration).

In Queensland, especially between October and April, sudden hot spells are responsible for most cases of heat illness and discomfort. Workers returning from holidays have lost the benefits of acclimatisation and humidity levels can be high as well. When humidity is high sweat will not evaporate as quickly, so our ability to lose heat is reduced.

## What can heat do to workers' health?

The human body maintains a fairly constant internal temperature, even though the body may be exposed to varying environmental temperatures. To keep internal body temperatures within safe limits in hot conditions, the body must get rid of its excess heat. It does this by varying the blood flow to the skin and by the evaporation of sweat. These automatic responses usually occur when the temperature of the blood exceeds 37°C and are controlled by the brain.

Evaporation of sweat cools the skin eliminating large quantities of heat from the body. Sweating does not cool the body unless the moisture is removed from the skin by evaporation. Cooling efficiency is greatly reduced and dehydration is increased when sweat drips from the body. As humidity increases, the body's ability to cool through evaporation decreases. Much of the blood flow within the body is re-directed towards the skin to assist heat loss from the body. This reduces the availability of blood in active muscles, the brain and other internal organs. Consequently, working in hot environments causes strength to decline, and fatigue occurs sooner than it would otherwise. Alertness and mental capacity also may be affected.

When conditions become increasingly hot the most common health problems to occur are fainting, transient heat fatigue and heat rash. However, with excessive exposure to heat, especially for those who are overweight, elderly or those on specific medications, more serious heat illnesses such as heat cramps, heat exhaustion and heat stroke may occur.



## Heat illnesses

**Prickly heat** – This is an intense, itchy red skin rash caused by blockage of the sweat ducts from prolonged wetting of the skin.

It should be treated by keeping the skin cool and dry, wear suitable clothing and stop hot work until it has settled down.

**Heat fainting** – Blood vessels in the extremities, particularly the legs, dilate to increase heat transfer to the skin causing reduced return blood flow to heart. In turn this temporarily reduces the blood flow to the brain and the person faints.

**Heat cramps** – These painful muscle cramps can occur alone or in combination with other heat disorders and usually occur in un-acclimatised workers.

**Heat exhaustion** – A serious heat illness which may progress to heat stroke if not promptly treated. This is most common in un-acclimatised individuals.

A person may complain of weakness and/or nausea and/or giddiness and appears pale, breathless and exhausted. The skin is usually moist (sweating).

First aid treatment for fainting, cramps or exhaustion include:

- laying the person in the shade
- discard clothing
- provide cool water and
- fan vigorously.

**Heat stroke** is a true medical emergency. It is caused by a rise in core body temperature.

The person becomes confused, staggers and may collapse. The skin may be moist or dry (no sweating, in which case cooling does not occur).

Anyone doing hot work who exhibits confusion and odd behaviour should be treated initially as having heat stroke.

**Treatment for heat stroke: urgent first aid is required. Remove clothing, wet skin and fan vigorously to increase evaporation. Call an ambulance. These cases require intravenous fluids urgently.**

## Are there any laws about working in heat?

The *Workplace Health and Safety Act 1995* (the Act) requires obligation holders (employers, persons conducting a business or undertaking, persons in control of workplaces, principal contractors, etc.) to ensure the workplace health and safety of workers and other people. This includes the control of heat stress at workplaces. The Act indicates that workplace health and safety can generally be managed by a risk assessment and control process. Information provided in this brochure will support this approach in your workplace.

Workers should raise any personal concerns about the work environment and working conditions directly with their supervisor, Workplace Health and Safety Officer (WHSO) or Workplace Health and Safety Representative (WHSR).

**It should be noted that various industrial awards and agreements may contain specific provisions in relation to working under extreme temperatures.**

## What factors contribute to heat problems?

### 1. Job factors

- work of a strenuous nature
- work that is sustained for extended periods
- awkward or uncomfortable body posture
- inadequate cooling off or rest periods

### 2. Environmental and seasonal factors

- high air temperatures
- radiant heat from hot objects such as machinery
- radiant heat from working outdoors in the sun
- higher relative humidity levels
- low air movement

### 3. Worker factors

- excessive or inappropriate clothing, protective or otherwise
- incomplete acclimatisation
- dehydration. Poor diet, vomiting, diarrhoea, alcohol and caffeine (diuretics) consumption, and insufficient drinking can cause dehydration.

- medical condition e.g. heart problems, diabetes, hypertension, or fever caused by infections
- medication for conditions such as those above or tranquillisers, travel sickness remedies etc. may also cause impaired temperature regulation
- advancing age
- being overweight
- poor physical fitness
- inadequate salt in the diet
- tiredness or being run down

## How might heat-related illness be prevented?

One of the best ways to reduce heat stress on workers is to minimise heat in the workplace.

### Altering the work environment

Various engineering controls are effective for reducing heat in workplaces. Examples include:

- reducing the body's metabolic heat production using automation and mechanisation of tasks
- reducing radiant heat emissions from hot surfaces and plant e.g. by insulation and shielding
- using ventilation and air-conditioning
- humidity reducing methods e.g. install a dehumidifier (seek engineering advice)
- creating some shade (tarp, umbrella) or at least find a tree for outdoor workers' rest breaks.



## Hydration

Most heat illnesses are caused by dehydration. You can sweat about a litre an hour doing heavy work and most workers exposed to hot conditions drink less fluid than needed because our thirst response is insufficient and lags behind the actual level of dehydration. Therefore, instead of depending on thirst, the worker should drink 150 – 200 millilitres of cool fluids every 15 – 20 minutes (rather than downing a litre at less frequent intervals). Full re-hydration should be achieved before recommencing work on subsequent days.

Urine colour is a good indicator of dehydration – the darker it is, the more dehydrated you are.

**Normal coloured urine–pale yellow**

**A bit dehydrated–bright yellow–drink at least a cup of water or two**

**Very dehydrated–orange–drink at least a litre of water or more**

**The average diet contains enough salt for acclimatised workers and the kidneys are very efficient at conserving salt, even when sweat production is high, so sports drinks are usually not required. Workers acclimatising to hot conditions may require a little extra salt added to the food or via sports drinks. Salt tablets should not be used as they can make dehydration worse and cause other health problems.**

## Medications and fitness

Medications like sedatives, tranquillisers, antidepressants, amphetamines, antispasmodics, diuretics, or those affecting blood pressure may interfere with heat tolerance, so a doctor's advice should be sought if working in hot environments. Alcohol and caffeinated drinks should be avoided as they are diuretics. Physically fit workers will better adapt to and tolerate the heat.

## Adjusting administrative, work schedule and clothing controls

Some options include:

- limiting duration of exposure to hot work
- scheduling regular work/rest breaks in cool, shady areas with protective clothing removed



- scheduling hot jobs to cooler parts of the day and maintenance to cooler seasons
- isolate hot work practices to times/locations distant from other workers
- plan the work – do outdoor work on the western and northern side of structures in the morning and leave the eastern and southern sides for the afternoon
- consider job sharing/rotation or using extra workers
- screen workers for heat intolerance e.g. those with heart and blood pressure problems or previous heat illness
- wear a wide brimmed hat and loose, lightweight, light coloured cotton clothing which provides best air circulation and cooling from the heat while allowing a balance for protection from the sun. (Certain work requires insulated gloves, suits, reflective clothing, infra-red face shields etc.)

A range of garments for microenvironment control in extreme conditions are available e.g. cooled vests, liquid and air cooled clothing via open or closed loop systems.

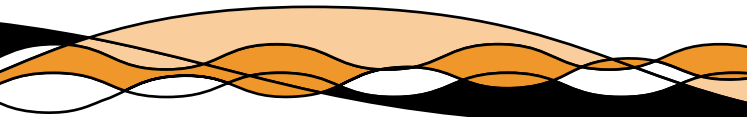
- develop a contingency plan for the treatment of affected workers.

### **Acclimatisation**

Manage the acclimatisation of new workers or the re-acclimatisation of those returning from holidays by adjusting their workloads to manageable rates. The full process generally takes six to seven days but often takes 12-14 days to complete.

### **Training of workers**

The key to preventing excessive heat stress is educating the employer and worker on the hazards of working in heat and the benefits of implementing proper controls and work practices. Workers should be aware of care and use of control measures for heat, including protective clothing. The employer should establish a program, designed to acclimatise workers who must be exposed to hot environments and provide necessary work-rest cycles and water to minimise heat stress. A 'buddy system', where workers and supervisors in hot work environments look out for early signs of heat illness in fellow workers, is recommended.





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For further information refer to *Working  
outside this summer? – A brochure for workers*

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