

Guidelines on Working in Hot Conditions

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Workers carrying out work in extreme heat must be able to carry out work without a risk to their health and safety so far as is reasonably practicable. It is important to distinguish between a condition that threatens health and safety, and a feeling of discomfort. The risk to the health of workers increases as conditions move further away from those generally accepted as comfortable¹.

Heat is responsible for much workplace discomfort but can also contribute to workplace health and safety risks and other problems in health, aged care and community services, for example:

- Symptoms of heat stress, dehydration and heat exhaustion leading to loss of productivity, nausea, fainting and accidents, e.g. injuries from fainting can affect nurses and patients when the person falls. Also, slippery hands from perspiration can prevent workers from getting a good grip on loads resulting in manual handling injuries.
- Contamination of sterile equipment, surgical fields and dressings by dripping perspiration resulting in unnecessary wastage of supplies and risk of patient infections.
- Hot humid environments encourage insect proliferation and may increase the growth of pathogenic organisms, bacteria and viruses and hence increase the risk of nosocomial and other infections.
- Compromised integrity and quality of medication that may not be stored at temperatures stipulated as per manufacturers recommendations.

A range of health effects are related to heat exposures including dehydration, heat cramps, heat exhaustion and heat stroke.

Other health effects include prickly heat rash, contact dermatitis, accelerated onset of tiredness, irritability, decreased efficiency and mental function.

Some health effects that have been reported but that are not well substantiated in literature include cardiac problems, and increased risk of miscarriage and infertility (possibly owing to higher body temperatures).

Responsibilities

A Person Conducting a Business or Undertaking (PCBU) is required by the *Work Health and Safety (WHS) Act 2011* to ensure, as far as is reasonably practicable, the health and safety of staff and others at work. This includes vehicles used for the purposes of work.

The WHS Regulation 2011 requires a PCBU to identify, assess and control of risks arising from heat including the provision of adequate ventilation and air movement, and appropriate systems of work and rest regimes to allow workers to be able to carry out work without risk to health and safety (clause 40(e)(f)).

Clause 43 requires a PCBU to ensure emergency plans are prepared in the workplace. Such plans must include all foreseeable risks including working in extreme conditions¹.



Officers must act to control risks that have been identified or reported by workers. The existence of heat related symptoms in workers, patients or visitors is a clear indication that a risk exists and needs to be controlled.

Workers are responsible for reporting potential risks arising from hot working conditions and for reporting symptoms of heat related illness in themselves or others.

Thermal Comfort

Work should be carried out in an environment where a temperature range is comfortable for workers and suits the work they carry out. Air temperatures that are too high can contribute to fatigue and heat related illnesses. Thermal comfort is affected by many factors, including air temperature, air movement, floor temperature, humidity, clothing, the amount of physical exertion, average temperature of the surroundings and sun penetration.

Optimum comfort for sedentary work is between 20°C and 26°C, depending on the time of year and clothing worn. Workers involved in physical exertion usually may prefer a lower temperature range. The means of maintaining a comfortable temperature will depend on the working environment and the weather¹.

Identification and assessment of risk

The identification and assessment of risk involves the measurement and consideration of contributing factors listed below.

Workers or patients with signs or symptoms and complaints of heat stress may indicate that risk exists.

One method of assessing the potential of risk is the Wet Bulb Globe Thermometer (WBGT) as it takes into account air temperature, humidity and radiant heat present. Alternatively the Natural Wet Bulb Thermometer (NWB) which takes temperature and humidity into account is may be used as an approximation where there is no source of radiant heat. The Natural Wet Bulb Thermometer is also easier to use and cheaper to obtain.

Where there is a potential risk to health from hot working conditions, the PCBU¹ should ensure that equipment for the assessment of risk is available, e.g. natural wet bulb thermometers. Where radiant heat is a factor, e.g. in theatres, cars and kitchens, the risk should be assessed using a Wet Bulb Globe Thermometer.

WBGT or NWB measurements need to be considered together with other factors including air movement speed, humidity and radiant heat.

Assessing risk

For general work environments, recommended WBGT readings for summer range from 21°C - 24°C, with air movement speeds of 0.15 - 2.5 metres/second depending on the temperature, humidity and work rate. In some specialised work environments such as, operating or endoscopy suites, the temperature range and air movements may need to be lower or higher. Protective clothing, radiant heat and physical activity levels must all be taken into account when assessing the risk.

Risk does not relate to temperature alone and may be increased by the following factors when conducting assessments:



Environmental

- High air temperature.
- High humidity.
- Low air movement.
- Sources of radiant heat (e.g. theatre lights, equipment that generates heat, sunlight).
- Failure of air conditioning and dehumidifying equipment including the retention of equipment past its useful life span.

Individual

- Poor health and fitness and/or lack of adaptation to heat.
- Personal factors that influence tolerance of heat include age; cardiovascular disease; physical condition; kidney disease; diabetes; illness causing fever; excessive weight; excessive alcohol or caffeine consumption; some types of medication, e.g. tranquillisers and antihistamines; and pregnancy.

Systems of work

- High work rate.
- Length of time working in a hot environment.
- Lack of opportunity/access to cool drinking water to maintain hydration.
- Clothing (including protective clothing and personal protective equipment (PPE) such as surgical gowns, theatre attire and lead aprons) that restricts air circulation and evaporation of perspiration.
- Lack of adequate rest breaks.

Options for risk control

Where risk cannot be eliminated, it must be minimised and controlled.

Reverse cycle air conditioning is the preferred option for workplace climate control. This includes for permanent and temporary structures and vehicles.

If building air conditioning fails or is not provided, the following risk environmental and systems of work should be reviewed as control measures to be implemented:

Environmental

- Installation of portable air conditioning units.
- Provision of other types of portable air cooling and dehumidifying equipment.
- Provision of fans, at least one per room depending on the size of the room.
- Local exhaust ventilation.
- Insulation or relocation of any equipment that generates radiant heat.
- Provision of cool rest areas, e.g. air conditioned staff dining/lounge rooms, and easy access to showers.

Systems of Work

- Provision of plentiful and easily accessible cool drinking water is essential. Arrangements should be made for water to be regularly taken around to staff who may be involved in long procedures. In hot conditions, water requirements can exceed 1 litre per hour. Community staff should be provided with a cooler box (Esky) or car refrigerator to carry water.



- Provision of appropriate clothing and uniform options, e.g. loose clothing styles and cotton or cotton-based fabrics.
- Where work in hot conditions cannot be avoided, scheduled rest breaks are necessary. For a moderate workload, continuous work is permissible at a WBGT of up to 28°C. At 31.1°C WBGT, the work rest regime should be 25% work, 75% rest. For more detail see table below.
- Administrative measures include rotating allocation of staff, slowing down the pace of work and alternating heavy work with light work¹.
- Workers and supervisors must have training in recognising the symptoms of heat stress.
- Extremes of temperature should be considered when planning first aid requirements in the workplace².

Individual

- Related controls for the management of individual personal risk factors of workers and others should be assessed alongside the associated environmental and system of work controls. This may include relocation or other alternative arrangements where reasonably practicable.

Additional recommendations

Air conditioning plant and equipment must receive regular preventive maintenance to minimise the risk of equipment break down. This also applies to other types of climate control equipment. Air conditioned facilities should, as part of the Disaster Plan, for the possibility of equipment breakdown by developing contingency plans for service delivery and/or climate control. Contingency plans should include temporary closure or relocation of services where possible. Where possible, workers should be allowed to work from home.

Such Disaster Plans may extend to alternative arrangements for Community Workers when working in extreme temperature heat waves. This may include such actions as deferring of non-critical visits or clinics or other alternative arrangements.

Symptoms of heat illness should not be ignored. Any workers with symptoms of heat stress must rest in a cooler environment, drink adequate quantities of water and have a cool shower if possible. First aid and/or medical attention should be provided to anyone showing signs or symptoms of serious heat-related illness.

Control strategies for service vehicles

Heat can build up to dangerous levels in closed vehicles. To reduce the risk of heat related illness PCBU's should:

- Supply cars fitted with factory air conditioning.
- Ensure the car and air conditioning systems are well maintained.
- Have car windows tinted.
- Supply sun shields (of the type that fit into the inside of the windscreen when the car is parked) to reduce heat absorption by the dashboard and steering wheel.
- Supply a car fridge for staff travelling long distances or at least a small cooler box (Esky) for cool drinks.
- Staff should not remain in a parked vehicle where temperatures are excessive. Windows should be rolled down and air-conditioning turned on prior to commencing journey in extreme and dangerous heat levels.
- Parked vehicles should be parked under cover or in shade where possible.



Work-rest regimes for moderate work rate³

(Table 1 is to be used as a guide only. It is based on approximations for fit, healthy people, acclimatised to hot conditions.)

| Allocation of Work in a Work/Rest Cycle | Acclimatised | | | |
|---|--------------|----------|-------|------------|
| | Light | Moderate | Heavy | Very Heavy |
| 75-100% | 31.0 | 28.0 | -- | -- |
| 50-75% | 31.0 | 29.0 | 27.5 | -- |
| 25-50% | 32.0 | 30.0 | 29.0 | 28.0 |
| 0-25% | 32.5 | 31.5 | 30.5 | 30.0 |

The exposure limits above are intended to protect most workers from heat-related illnesses. Where limits may be exceeded risk of heat stress illness is increased and controls should be considered to be implemented. The limits are higher than they would have been if they had been developed to prevent discomfort³. Exposure limits should be lowered if other environmental, individual or systems of work factors increase the risk.

References

1. Safe Work Australia (2011). Managing the Work Environment and Facilities Code of Practice.
2. Safe Work Australia (2016). First Aid in the Workplace Code of Practice.
3. Canadian Centre for Occupational Health and Safety.

Further resources and references

1. Queensland Heat Stress tool:
<https://fswgap.worksafe.qld.gov.au/etools/etool/heat-stress-basic-calculator-test/>
2. UnionSafe Fact Sheet:
<http://unionsafe.org.au/wp-content/uploads/2013/04/Heat-Stress.pdf>
3. Safe Work NSW: Working in Extreme Heat: The Facts
<http://www.safework.nsw.gov.au/health-and-safety/safety-topics-a-z/hot-and-cold-environments>
4. Safe Work NSW: Maintaining Thermal Comfort in Indoor Work Environments:
<http://www.safework.nsw.gov.au/media/publications/health-and-safety/maintaining-thermal-comfort-in-indoor-work-environments>
5. VTHC site:
<http://www.ohsrep.org.au/faqs/workplace-and-amenities/heat-when-is-it-too-hot>