Information on heat health for health providers and professionals

Vulnerable community members are susceptible to adverse effects caused by heatwaves (extreme heat). Health personnel, specifically those employed in emergency departments, pharmacies, and general practise, have a critical responsibility in the prevention and management of heat-related illnesses. Health personnel have the ability to assist their patients in effectively managing their health during periods of high temperature and, if required, refer them to clinical care.

By planning in advance for specific patients who are susceptible to heat, it is possible to mitigate the adverse effects that heat can have on these patients. Contingency planning within a practice or department may encompass considerations such as potential interruptions in electrical supply and an increase in the number of patients. Therefore, it is strongly advised that healthcare facilities situated in remote and urban areas formulate action plans and implement protocols to direct their readiness for and response to instances of extreme heat.

# **Heatwave Definition**

A heatwave (or extreme heat event) occurs when maximum and minimum temperatures for a location are unusually high during a three-day period.

# **Heat Regulation in the Body**

Extreme heat can be extremely stressful on the body. When temperatures near or exceed the body temperature of 37 degrees Celsius, the human body can get overheated. Heat illness can occur if the body's temperature is not sufficiently decreased by evaporation of perspiration or shifting to cooler surroundings.

A healthy individual can shed heat by conduction, radiation, and convection. However, when the ambient temperature is higher than the skin temperature, the only way for the body to remove heat is by sweating (evaporation).

The body can lose heat by:

* conduction (direct contact of a cooler object with the skin)
* radiation (via infrared rays)
* convection (through water or air circulating across the skin)
* evaporation of sweat

However, certain conditions might hinder perspiration and the body's capacity to regulate heat. Some examples are:

* Heart disease
* Renal disease
* Extremes of age
* Skin disorders (sunburn, prickly heat, extensive scarring)
* Cystic fibrosis
* Quadriplegia
* Scleroderma
* Congenital impairment of sweating
* Effects of anti-cholinergic medication
* Dehydration (e.g. gastroenteritis, diarrhoea from other causes)
* Infection, especially with a fever

# **Heat-related Illness**

Some individuals are more susceptible to heat-related illnesses than others, although everyone must exercise caution in hot weather. There are certain attributes that are associated with an increased susceptibility to heat illness.

* Individuals aged 65 and older
* Infants and young children
* Individuals who are overweight or obese
* Pregnant women and those who are breastfeeding
* Individuals with compromised mobility
* Those with cognitive impairment
* Those with pre-existing chronic conditions such as cancer, diabetes, heart disease, or renal disease
* Those who are unaccustomed to high temperatures

In order to prepare for heatwaves, consider assisting these groups of individuals.

Additional risk factors for heat illness include prolonged physical exertion and direct exposure to high temperatures, including homeless individuals, residents of substandard housing, and workers in outdoor environments or excessively hot environments.

Overexposure to high temperatures can lead to a range of health complications known as heat stress, which includes heat cramps, heat rash, heat exhaustion, and heat stroke.

Table : Heat-Related Illness

| Heat Illness | Cause | Symptoms |
| --- | --- | --- |
| **Dehydration**   * Dehydration may precipitate or worsen altered mental state, cardiovascular impairment, electrolyte disturbances, renal impairment, urolithiasis, and falls. | | * Profuse sweating * Increase in body temperature * Lethargy and tiredness * Loss of appetite * Being thirsty * Irritability |
| **Heat Cramps** | Muscle relaxation is affected by presence of salt in sweat | * Muscle spasms * Painful muscle cramps in the limbs or abdomen * Twitching * Moist cool skin |
| **Heat Rash or Syncope** | Inflammation of the sweat glands | * Dizziness and Fainting * Erythematous papular rash, pruritus, secondary infection |
| **Heat Exhaustion** | Dehydration leading to poor blood flow affecting the brain and heart | * Profuse sweating, * Cold, clammy, pale skin, * Fatigue, weakness and restlessness * Headache, dizziness, nausea and/or vomiting * Weak but rapid pulse * Faintness * High temperature |
| **Heatstroke** | Core temperature rise leading to widespread organ injury | * Confusion, headaches, dizziness and nausea * Skin flushed, hot and unusually dry * Intense thirst * Dry, swollen tongue * Sudden rise in high body temperature (40oC+) * Disorientation, delirium * Slurred speech * Aggressive or bizarre behaviour * Sleepiness * Convulsions * Unconsciousness may develop rapidly * Seizures or coma |
| **Exertional heatstroke** | Core temperature rise precipitated by intense or prolonged exercise in hot weather | * As for heat stroke, plus rhabdomyolysis and renal failure |

For more information visit [Heat stress | nt.gov.au](https://nt.gov.au/wellbeing/health-conditions-treatments/heat-stress)

# **Heatwaves and Medicines**

Certain medications (e.g., those used to treat hypertension, depression, or insomnia) alter the body's response to heat. Additionally, exposure to high temperatures may diminish the efficacy or increase the toxicity of certain prescribed medications. Examples include antibiotics, Insulin, certain analgesics, sedatives, and adrenergic drugs, which are among the many medications that must be stored at temperatures below 25 degrees Celsius.

Table : Medicines that Increase the Risk of Heat-related Illness

|  |  |  |
| --- | --- | --- |
| Medicine class or subclass | Examples | Effects |
| Beta-blockers | Atenolol, metoprolol, propranolol | Reduce vasodilation  Decrease sweating |
| Triptans | Sumatriptan, Rizatriptan, Zolmitriptan |
| Anticholinergics– tricyclic antidepressants | Amitriptyline, clomipramine, dothiepin |
| Anticholinergics – sedating antihistamines | Promethazine, doxylamine, diphenhydramine |
| Anticholinergics –phenothiazines | Chlorpromazine, thioridazine, prochlorperazine |
| Other anticholinergics | Benztropine, hyoscine, clozapine, olanzapine, quetiapine, oxybutynin, solifenacin |
| Beta-blockers | Atenolol, metoprolol, propranolol |
| Antipsychotics | Clozapine, olanzapine, quetiapine, risperidone, Haloperidol, droperido | Increase heat production |
| Stimulants | Amphetamines, cocaine, thyroxine |
| Angiotensin-converting enzyme (ACE) inhibitors | Enalapril, perindopril, Ramipril | Decrease thirst |
| NSAIDS, Sulphonamides, Indinavir, Cyclosporin | Reduced renal function |
| alcohol, benzodiazepine, narcotics | | Altered state of alertness  Dehydration |
| Diuretics | | Frusemide, hydrochlorothiazide, acetazolamide, aldosteron |
| Stimulant laxatives | Senna extract, bisacodyl | Dehydration |
| All antihypertensives, particularly nitrates and calcium channel blockers | Nitrates: glyceryl trinitrate, isosorbide monnitrate  Calcium channel blockers: Amlodipine, felodipine, nifedipine |
| Digoxin, immunosuppressants, lithium, metformin, warfarin | Increased toxicity for drugs with a narrow therapeutic index in dehydration | Aggravation of heat illness by worsening hypotension in vulnerable patients |
| Digoxin, immunosuppressants, lithium, metformin, warfarin | | Increased toxicity for drugs with a narrow therapeutic index in dehydration |

# **Preparing for Heatwaves**

Medical professionals can help reduce the likelihood of heat illness by educating their patients, and providing the best possible medical care to those patients.

Healthcare practices and professionals can take the following steps to prepare for heatwaves.

* Review and improve your knowledge of mechanisms of thermoregulation, risk factors for heat-related illness, and early signs of heat stroke as it is a medical emergency.
* Be up-to-date on the potential side effects of medicines and consider optimal dosing during periods of hot weather. Keep in mind that severe and extreme heat can adversely affect the potency of some drugs.
* Pre-emptively support vulnerable patients to plan for a heatwave.
* Plan how you will respond to extreme heat.
* Discuss response measures with staff during the heatwave season (October to March).
* Review triage policy.
* Develop and implement a communication policy to keep staff updated of heatwaves.
* Plan for staff shortages during heatwaves.
* Have a plan in place to deal with power outage during a heatwave event; for example, what to do with fridges storing vaccines and medicines.
* Ensure the health facility/practice is heatwave-friendly for patients and staff with a cool waiting room, available water, blinds closed to block the sun.

# **General Hospital/Clinic Management during Heatwaves**

* Hospital management including emergency departments should be alert at times of heatwave.
* Emergency departments should be a cool and safe environment for patients and staff.  Drinking water should be easily available for all patients in ED including the waiting room
* Emergency departments should keep records of the impact of heatwave events on the emergency department and resource utilisation to assist in resource planning for future events.
* Identify vulnerable patients (older persons, infants, socially isolated, those with chronic disease co-morbidity including psychosis) and consider the effects of heat stress when planning discharge from the emergency department. Cardiovascular and respiratory failure are common causes of excess deaths during extreme heat events
* Provide advice to all patients and carers on: adequate hydration, medications, minimising exposure to heat, access to air conditioning either in the home or public spaces such as shopping centres and libraries. Advise patients about early recognition of heat stress signs and symptoms.

# **In-Patient Management**

* Identify and actively monitor high risk patients during extreme heat events to identify symptoms associated with heat stress.
* Adapt pharmacological treatments, especially anticholinergic medications.
* Ensure bed availability including in emergency departments.
* Consider staffing levels as there may be an increase in hospital admissions.
* Activate procedures to guarantee an adequate health and social assistance for hospital discharge of high risk patients or postpone discharge till after the extreme heat event.
* Ensure high risk patients are placed in rooms with air conditioning.
* Less critical patients should have access to an area with air conditioning during the hottest hours of the day.
* Increase liquid intake of patients, noting heart failure and renal dialysis fluid restrictions.
* Adjust patient bedding and personal clothing.
* Be prepared for specific illnesses known to cause increased hospitalisations during heatwaves e.g. dementia, and mental health disorders.
* Ensure the well-being and safety of health staff.

# **Information and resources**

* Keep in contact with NT Health for extreme heat health alerts from the Chief Health Officer.
* Direct patients to [Heat stress | NT.GOV.AU](https://nt.gov.au/wellbeing/health-conditions-treatments/heat-stress) and [Heatwave | Secure NT](https://securent.nt.gov.au/prepare-for-an-emergency/weather-events/heatwave) for more information on coping with extreme heat
* For more information contact NTHealth Heatwave [NTHealthHeatwave@nt.gov.au](mailto:NTHealthHeatwave@nt.gov.au)