

# Hot Weather Health Plan

# The Society for Acute Medicine has produced the following guidance to support clinicians working in acute services to:

- 1. Work safely during hot weather conditions.
- 2. Know who is at risk and adapt individual care plans to respond to hot weather.
- 3. Be aware of medications that increase patient risk during hot weather.
- 4. Know how to treat heat related illnesses including increased cardiovascular and respiratory complications.
- 5. Be familiarised with the advice from public health to share with patients.
- 6. Promote environmental and behavioural changes that could reduce the risk of hot weather.

#### Hot weather mitigation and adaptation

UK heatwaves have increased in frequency, intensity and duration due to anthropogenic climate change. In 2022, the highest recorded temperature in England was 40.3°C with an associated 2985 deaths <sup>[1]</sup> – the highest number of heat-associated deaths since recording began. Multiple factors mean the majority of NHS hospitals are currently poorly equipped to deal with extreme heat. Hospitals are often located in built-up areas, which are exposed to the urban heat island effect <sup>[2]</sup>. A third of the NHS estate was built before 1965 with 14% (over 2000 buildings) built before the foundation of the NHS in 1948 <sup>[3]</sup>. NHS estates are well recognised to have had a lack of ongoing investment and maintenance which was highlighted again in Lord Darzi's report on the state of the National Health Service in England 2024 <sup>[4]</sup>. An estimated 90% of hospital buildings are vulnerable to overheating <sup>[5]</sup>. In 2016/2017 some NHS hospitals were found to have internal temperatures above 26°C, even reaching 30°C at times <sup>[6]</sup>.

In the Evaluation of the Heatwave Plan for England's 2019 national survey many frontline staff were unaware of any local heatwave plans and unfamiliar with the Heatwave Plan for England guidance<sup>[5]</sup>. Few or none of the staff surveyed were able to enact the

recommended Heatwave Plan actions during an alert. In December 2024 the UK government published guidance for healthcare professionals to reduce the risks of hot weather to their patients in the community, care homes and hospital environments <sup>[7]</sup>. This included a brief statement regarding medication storage and the risk to staff.

#### Working conditions <sup>[7]</sup>

Employers have a legal duty to ensure workplaces are maintained at a reasonable temperature and the working environment is safe. There is no legal maximum temperature for workplaces, as this will vary according to the work environment; however, employers must be aware of the UK heat-health alert system <sup>[8]</sup> and have in place an appropriate heatwave plan or guidelines to keep staff safe and well in hot weather.

- 1. Promote regular hydration (both staff and patients), preferably water or fruit juice.
- 2. Reduce indoor heat production by turning off non-essential appliances and heating systems.
- 3. Close windows when outdoor temperatures are higher than indoor temperatures (e.g. during the day).
- 4. Close any external shutters or shades, blinds and curtains this keeps cooler air in, and hotter air out.
- 5. Close and shade windows early in the morning so that the heat does not build up.
- 6. Open windows (if it is safe to) when the air is cooler outside than inside, for example at night try to get air flowing through the building.
- 7. If air conditioning is used, keep the windows closed to keep the cooler air inside.
- 8. Check that fridges and freezers work properly to store cold chain medicines in the optimum storage conditions. Do not leave medications out on the ward directly exposed to sunlight or by the window sills.
- 9. Use fans (check local IPC guidance) if ambient temperature is below 35°C if temperatures are higher than this, fans can raise body temperatures.
- 10. Move the most vulnerable patients to the coolest rooms (a cool room should ideally be less than 26°C).
- 11. Reduce physical exertion, e.g. reschedule physiotherapy to cooler times of the day.
- 12. Promote regular cool showers, baths or body washes.
- 13. Advise staff and patients to wear light, loose-fitting clothes that absorb sweat and prevent skin irritation (staff to avoid wearing dark-coloured tights if possible).
- 14. For bed bound patients, sprinkle clothes with water regularly and splash cool water on individuals' faces and the backs of their necks.

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- 15. Serve cold food, particularly salads, fruit and ice-lollies which have a high-water content.
- 16. Prioritise civility in extreme heat humans become more irritable <sup>[9]</sup>; it is well recognised that civility saves lives and reduces medical complications <sup>[10,11]</sup>. Heat may influence clinical decision-making and contribute to increased conflicts among staff and/or patients due to discomfort or irritability caused by high temperatures.

#### Advice for all patients<sup>[12]</sup>

- 1. Minimise sun exposure between the hours of 11am and 3pm.
- 2. Promote sunscreen use with high SPF <sup>[13]</sup> if going outside, how often to reapply and sun safety. Counsel on risk of skin cancer and sunburn management.
- 3. Advise against alcohol use if individuals refuse to reduce alcohol intake, encourage alternating alcoholic drinks with water.
- Avoid storing medicines at home in places that get very hot e.g. in cars, on sunny window sills etc. Heat exposure may damage medication delivery devices and may degrade medications. Inhalers, for example, can burst in hot environments. EpiPens may malfunction or deliver less epinephrine when exposed to heat.
- 5. Do not sit outside in the sun for longer than 20 minutes.
- 6. Drink plenty of fluids.
- 7. Wear loose clothing and a hat.
- 8. Regularly check on relatives, friends or neighbours who might not be able to look after themselves.

#### Weather alerts

Adapted from Mersey and West Lancashire Teaching Hospitals NHS Trust Adverse Weather and Health Plan Version 2.0.

Heat alert	Green	Yellow	Amber	Red
Population at risk	Little impact observed on health, healthcare services and social care provision.	Increased mortality amongst vulnerable population groups (see page 5).	Observed increase in mortality across the population, particularly in high risk groups (see page 5).	Increased mortality expected across the whole population with significant mortality observed in high risk groups (see page 5).
Demand for and impacts on health and social care services	Heat-related illness and mortality increases within 1 - 2 days of high temperatures	Potential for increased usage of healthcare services by vulnerable populations. Internal temperatures in care settings (hospital, care homes) may become very warm increasing risk of indoor overheating. Increased risk of drowning due to outdoor water activities.	Increased demand for GP services, ambulances call outs, remote healthcare services (NHS111 or NHS24) likely. Impacts on ability of services delivered due to heat effects on the workforce possible. Many indoor environments are overheating, risk to vulnerable people living independently in community as well as in care settings. Staffing issues due to external factors (e.g. transport). Patient medication regime may lead to increased risk of dehydration.	Significant increased demand on all health and social care services. Impact on ability of services to be delivered due to heat effects on the workforce (e.g. technological failure, cancellation of surgeries <sup>[14]</sup> ). Indoor environments are likely to be hot making provision of care challenging and leading to increased heatstroke and dehydration.
Other sectors			Non-health sectors starting to observe impacts (e.g. travel delays)	National critical infrastructure failures – such as generators and power outages or major roads and rail lines closed due to melting roads or overheating rail lines.

#### **Vulnerable populations**

An individual's risk is related to a combination of factors relating to their health, behaviours and environment.

#### High-risk groups include:

- Older people aged over 65 years
- People living with underlying health conditions, particularly respiratory and cardiovascular diseases, dementia, diabetes, renal disease, obesity, Parkinson's or mobility problems
- People on certain medications (see page 6 8)
- People living with serious mental health problems
- People living with learning difficulties, disabilities
- People who are already ill and dehydrated (e.g. from diarrhoea and vomiting) monitor fluid input and outputs
- People living with alcohol or drug dependence
- Pregnant women
- Babies and young children under the age of 5 years
- people who are physically active and spend a lot of time outside e.g. gardeners, runners, cyclists and walkers
- People who work in jobs that require manual labour or extensive time outside
- People experiencing homelessness, including rough sleepers and those who are unable to make adaptations to their living accommodation such as sofa surfers or those living in hostels
- People who live alone and may be unable to care for themselves or socially isolated

Air pollution combined with hot weather can also worsen symptoms for people with existing breathing problems or heart conditions.

Hot weather and dehydration also increase the risk of infection and sepsis caused by Gram-negative bacteria, particularly *Escherichia coli* <sup>[7]</sup>. The risk is greatest in individuals aged over 65, emphasising the importance of ensuring adequate fluid intake in older people.

#### **Medications reviews during heatwaves**

The majority of medications should be stored under 25°C  $^{[17]}$ .

Clean utility areas and IV storerooms which contain medicines, and IV fluids must have their temperatures monitored and recorded daily. Pharmacy should have a risk assessment in place about medicines being exposed to temperatures over 25°C. Cold-chain medicines delivered to the wards from pharmacies should be stored in the ward fridges as soon as possible.

Advice regarding any changes due to hot weather to existing medicines, any newly prescribed medicines requiring caution and additional monitoring should be included in the discharge letter for the GP and relevant community teams (e.g. carers or staff in care homes).

Below is a list of medications to be reviewed in hot weather: <sup>[15,16]</sup>

Symptom & specific features	Drugs to review (below list is not exhaustive)
Reduced thirst	Angiotensin-converting enzyme (ACE) inhibitors, angiotensin-II receptor blockers (ARBs), neuroleptics, Parkinson's drugs
Dehydration, hypovolemia, increased thirst and urinary frequency leading to AKI or reduced renal function; Increased risk of drug toxicity Hyponatraemia	<ul> <li>Digoxin, lithium - consider checking levels</li> <li>NSAIDs, ciclosporin, ACEi, ARBs, metformin, statins - consider withholding</li> <li>SGLT2i or "flozins" - to discontinue if suspecting euglycemic diabetic ketoacidosis (DKA)</li> <li>Diuretics (worsened by excess fluid intake in hot weather)</li> </ul>
Vomiting and/or diarrhoea	<ul> <li>Colchicine, antibiotics, opioids</li> <li>Nintedanib</li> <li>GLP-1 receptor agonists or "weight loss jabs" e.g. tirzepatide (Mounjaro), semaglutide (Ozempic), liraglutide, dulaglutide</li> <li>Laxatives, chemotherapies</li> </ul>

#### 1. Medicines leading to electrolyte imbalances

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#### 2. Medicines affecting thermoregulations

Symptom & specific features	Drugs to review (below list is not exhaustive)
Elevated body temperature	<ul> <li>Antipsychotics - amisulpride, aripiprazole,</li> </ul>
as part of a group of side	clozapine, chlorpromazine, flupentixol,
effects or 'syndrome'	haloperidol, levomepromazine, olanzapine,
n.b. if suspected neuroleptic	prochlorperazine, paliperidone, quetiapine,
malignant syndrome (NMS) -	risperidone, zuclopenthixol
discontinue drugs as	<ul> <li>Parkinson's related - apomorphine,</li> </ul>
potentially fatal.	co-beneldopa, co-careldopa, rotigotine,
	entacapone, pramipexole, procyclidine,
Flushing or hot flushes,	ropinirole, donepezil
fever-like side effects, or	<ul> <li>Antiepileptics - carbamazepine, zonisamide,</li> </ul>
feeling hot, increased	topiramate
sweating	Gonadorelin analogues - goserelin, triptorelin
	<ul> <li>SSRIs, SNRIs, Tricyclic antidepressants -</li> </ul>
Impaired or decreased	amitriptyline, atomoxetine, clomipramine,
sweating leading to raised	duloxetine, sertraline, trazodone, venlataxine,
body temperature,	vortioxetine
decreased peripheral	Antiplatelets - aspirin, clopidogrel
vasodilation altering heat	Beta-blockers - bisoprolol, propranolol
perception	Calcium channel blockers - amioalpine,     wife clining
	alpyriadmole, levolnyroxine, nyoscine
	PEGinterferon
	Anastrozole, bicalutamide, cyproterone,
	letrozole, tamoxifen
	Methadone (chronic maintenance therapy)
	• Substance misuse - cocaine, amphetamine,
	MDMA
	Other - alcohol

Sedation, reduced GCS or altered cognitive effects of some drugs may reduce heat awareness and inhibit behavioural responses to promote cooling:

- Anticholinergic medications e.g. antihistamines, oxybutynin, solifenacin, antiemetics, muscle relaxants, antispasmodics)
- Opioids and benzodiazepines potential for misdiagnosis of opioid overdose *vs* heat stroke and thus delaying appropriate treatment.

**Insulin** - increased subcutaneous absorption in hot weather can lead to hypoglycaemic emergencies. See Diabetes UK for <u>further information</u>.

#### 3. Medicines affecting the skin

Symptom & specific features	Drugs to review (below list is not exhaustive)	
Cautioned in sun exposure or can cause photosensitivity	<ul> <li>Benzoyl peroxide, doxycycline, amiodarone, ketoconazole, tretinoin, voriconazole, demeclocycline, phenothiazines at higher dosages (e.g. alimemazine, chlorpromazine, prochlorperazine), methotrexate</li> <li>Certain chemotherapies, hydroxycarbamide</li> </ul>	
Direct exposure to heat or elevated body temperatures may increase the release of medicines from some transdermal formulations, potentially causing toxicity e.g. fentanyl or buprenorphine patches. Counsel patients to avoid sunbathing with these patches on.		
Similarly, excessive sweating may cause medicinal patches to come off		

unintentionally, increasing the risk of missed doses or withdrawal, so caution is advised. They may pose a hazard especially when around children.

While there is no official guidance on medications around periods of excessive heat, it can be useful to advise patients (if on any of the culprit medications listed above) on signs and symptoms of heat related illness possibly exacerbated by their regular medications. Should they experience these, a patient tailored approach can be discussed (i.e. omission of certain medications/relaxation of fluid restrictions) for hot days. See Page 3 for generic advice for all patients.

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# Health complications of extreme heat exposure <sup>[18]</sup>

Sunburn or Heat rash	Heat cramps	
<ul> <li>Advise patient to avoid sun exposure until skin completely heals</li> <li>Use OTC analgesia for pain management e.g. paracetamol</li> <li>Apply cool cloths to affected areas or take cool shower/bath</li> <li>Increase fluids intake</li> <li>Do not apply topical application on red skin that will block pores e.g. petroleum jelly as it can retain body heat and sweat, and increase risk of infections.</li> <li>Apply aqueous +/- calamine lotion (can store in fridge for cooling effect) or low dose steroids cream - cautioned in pregnant women and children&lt; 10 years</li> <li>Take antihistamines for itching</li> </ul>	<ul> <li>Symptoms:</li> <li>Normal cognitive state and still be able to sweat</li> <li>Painful muscular spasms</li> <li>Intense thirst with muscle cramps</li> <li>High heart rate</li> </ul> Management: Muscular overuse and neuromuscular activity causes fluid and electrolyte depletion, and vasodilation caused by hot conditions exacerbates vascular leak, leading to increased interstitial fluid and concurrent oedema. Often self-limiting and can be managed through adequate fluid replacement and regular access to sheltered areas.	
Heat exhaustion	Heat stroke	
<ul> <li>Symptoms:</li> <li>Headache or generalised fatigue</li> <li>Pale, moist skin and a fever (body temperature of &gt;38°C)</li> <li>Flushed and sweaty appearance</li> <li>Mild cognitive dysfunction with mild confusion, irritability, anxiety and poor coordination</li> <li>Decreased urine output, thirst</li> <li>Fainting, low BP after sitting down or standing up (orthostatic hypotension)</li> <li>Gl upset – nausea; muscle cramps</li> </ul>	<ul> <li>Symptoms:</li> <li>A very high body temperature &gt;40°C</li> <li>Hot, dry skin that is not sweating and might look red (this can be harder to see on brown and black skin)</li> <li>Hypotension, shock</li> <li>Hyperventilation, tachycardia</li> <li>Confusion and agitation</li> <li>Seizure, lack of coordination</li> <li>Loss of consciousness</li> <li>Gl upset - nausea and/or vomiting</li> </ul>	
<b>Management:</b> People with swallowing issues should be referred to the emergency department. If appropriately managed, symptoms of mild heat exhaustion should generally resolve within 2-3 hours.	Management: Manage with IV isotonic fluids, such as normal saline or hypertonic fluids (5% dextrose in 0.9% sodium chloride). Use hypertonic fluids with caution in patients with renal or heart failure, as this may precipitate fluid overload. Antipyrexials (e.g. paracetamol) should not be used in these patients. Use anti-epileptics as per local policy for seizure management.	



# Differential diagnoses <sup>[19,20]</sup>

While the clinical features of heatstroke have been described above, there remain important differential diagnoses to consider. Below is a summary of important differentials clinicians should consider where the diagnosis of heatstroke is in doubt:

Categories	Examples	Differentiating factors
Toxicology	Malignant hyperthermia - Hyperthermia, muscle rigidity, tachycardia after anaesthetic Neuroleptic Malignant Syndrome Serotonin syndrome Intoxication - Salicylate (e.g. aspirin) - Sympathomimetics (e.g. MDMA; cocaine; amphetamines) - Anticholinergics (e.g. TCAs; antihistamines; antipsychotics)	Precipitating factors/ingestion of causative medications
Endocrine	Thyrotoxicosis Adrenal crisis Phaeochromocytoma	Protracted symptoms unrelated to heat exposure
Infection	Infection less commonly causes protracted hyperthermia - may occur in sepsis, CNS infection	Localising signs and symptoms of infection
CNS dysfunction	Meningitis/encephalitis Hypothalamic dysfunction - acute presentations commonly due to CVA/haemorrhage	Clinical history and examination

It's important to consider the biochemical features that are commonly seen due to heat stroke, as these could all be seen in the conditions listed above <sup>[21]</sup>.

Pathogenesis	Findings
Increase in circulating pro-inflammatory cytokines	Elevated WBC Elevated CRP Elevated procalcitonin
Profound dehydration	Hyperkalaemia Hypernatraemia Polycythaemia Elevated creatinine Hyperglycaemia
Excessive perspiration leading to electrolyte loss	Hypokalaemia Hyponatraemia Hypophosphataemia/magnesaemia
Hypovolaemia leading to impaired tissue perfusion	Mixed acid base balance disorder (i.e. metabolic/lactic acidosis) Elevated liver enzymes Elevated urea and creatinine Elevated creatine kinase Increased in uptake of glucose to cells leading to hypoglycaemia





Any enquiries relating to the document can be sent to <u>ecosam@acutemedicine.org.uk</u> **Created by Eco SAM working group:** 

- Min Na Eii, Advanced Pharmacist Practitioner in Acute Medicine, South Tyneside and Sunderland NHSFT
- Dr Natalie Beveridge, Acute Medicine Consultant, Mersey and West Lancashire Teaching Hospitals NHS Trust
- Dr Bethan Griffith, Acute Medicine Consultant, Mid Cheshire Hospitals NHSFT
- Ekta Punj; Advanced Clinical Pharmacist for Acute Medicine, University Hospitals Birmingham NHSFT
- Dr Jamie Phillips, Acute Medicine Registrar, Mersey Deanery

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# MANAGING HEAT WAVES IN ACUTE CLINICAL AREAS





Heat awareness and mitigation for patients and staff - scan QR code for full guidance



# **VULNERABLE PATIENT GROUPS**

People over 65, those living with respiratory and cardiovascular diseases, dementia, diabetes, renal disease, obesity, Parkinson's or mobility problems, severe mental health conditions, learning disabilities or substance-dependence. People who are experiencing homelessness, work outside or are manual labourers. Pregnant women, children and people who are socially isolated are also at risk. *Vulnerable patients should be cared for in rooms with temperatures under 26°C.* 

### MEDICATIONS AND EXTREME HEAT

Most medications require storage at/under 25°C. Discuss with pharmacy team if >25°C. Many common medical drugs can cause harm in extreme heat - consider dosing adjustments.

- Dehydration / AKI / hypotension / falls diuretics, ACE-i, ARB, SGLT2i ('flozins), betablockers, CCB, laxatives
- Impair temperature regulation beta-blockers, CCB, anticholinergics (e.g. TCAs, bladder instability drugs), ADHD meds, SSRIs & SNRIs, opioids, anti-psychotics
- Toxicity common in dehydration lithium, digoxin, anti-epileptics - consider monitoring levels
- Impair judgement / mobility opioids, benzodiazepines, sedatives, anti-psychotics

# COMPLICATIONS OF EXTREME HEAT

See full guidance for detailed symptoms & management.

Air pollution and pollen interact to worsen symptoms

- Heat cramps: Fluid replacement (consider electrolytes).
- **Sunburn / heat rash:** fluids, cool flannels, OTC analgesia / antihistamines.
- Heat exhaustion: headache, fatigue, temp 38-40°C, dehydration, cognitive impairment, GI upset. Oral fluids (and electrolytes) if able.
- Heat stroke: temp >40°C, lack of sweating, shock, seizures, decreased consciousness. IV fluids, anti-epileptics, avoid paracetamol/ibuprofen.

**BE KIND** - extreme heat increases mental stress and irritability, as well as often worsening chronic health conditions. <u>Staying calm and being kind</u> is proven to <u>improve patient safety</u> outcomes and clinical team performance. For more information: www.civilitysaveslives.com

# **STAY HYDRATED: COOL DRINKS**

Promote regular hydration in both patients and staff with water or fruit juice, use ice if available. <u>Review local heat plan if drinks for staff are usually</u> <u>restricted in clinical areas.</u>

# EAT COLD FOODS

Eat regular meals even if not hungry: Salads, fruit and ice lollies have a high water content. Consider **salt** - some people may require additional salt replacement as it is lost in sweat.

# **AMBIENT TEMPERATURES**

Avoid using fans when indoor temperature is 35°C or hotter: fans do not cool body temperatures and increase the risk of heat-related illness. Close windows, blinds etc in daytime. If possible open windows at night when it is cooler outside. Wear light and loose fitting clothes, avoid dark coloured tights.

# PHYSICAL EXERTION

If possible arrange physiotherapy, manual handling and other physical activities for cooler times of the day.

https://www.acutemedicine.org.uk/wp-content/uploads/SAM-Hot-Weather-Health-Plan-2025.pdf