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CDC's website is being modified to comply with President Trump's Executive Orders.

# Heat and Medications – Guidance for Clinicians

## PURPOSE

A summary of how heat can affect medications and patient health.

## Heat and Medications

The heat and medication information and guidance presented in this document is intended to alert clinicians and patients to the impact that ambient heat may have on patients taking certain medications. This can facilitate the development of a medication plan for hot days.

### Medications and heat interact in three primary ways:

- Some medications interfere with thermoregulation and/or fluid balance, amplifying the risk of harm from hot weather (e.g., diuretics, some antipsychotic medications, some antidepressants, some antihypertensive agents).
- Heat can degrade or damage some medications, and patients can be counseled on how to best store their medications when temperatures are high (e.g., inhalers, EpiPens, insulin).
- Some medications can increase skin sensitivity from sun exposure, and counseling on skin protection can help protect patients (e.g., some antifungals, some antibiotics).

### What Clinicians Can Do:

Medication regimens can be reviewed with your patients, with consideration to their risk profiles related to heat. A plan can be made in advance of hot weather to adjust medication regimens as needed on hot days and for when to seek medical care. Patients can be reminded to avoid abruptly stopping any medications without having a plan in place. Plans can include the following:

1. Potential adjustments to medication doses or frequency based on an assessment of medication interactions with heat, with particular attention to medications most likely to interact with heat. This is especially important for patients, including older patients, who take multiple medications that may amplify risk of harm from heat via different mechanisms.
2. Potential adjustment to fluid restrictions on hot days, especially for patients who take medications that may lead to dehydration or affect electrolytes.
3. Identification by your patient of a point of contact to check on them if they take medications that may increase the risk of harm from heat, especially for older patients and patients with altered cognition.
4. A clear list of symptoms that may indicate drug interactions with heat, symptoms that constitute an emergency, and a clear plan for when a patient should seek care.

### Medication-Heat Interactions:

The table below lists medications, including over the counter medications, that can impact a patient's risk of health impacts of heat and the associated mechanism of action. This list is not comprehensive but includes many commonly used medications.

**Some commonly prescribed medications that increase risk from heat** include diuretics, anticholinergic agents, and psychotropic medications. Certain combinations of medications, such as the combined use of angiotensin converting enzyme (ACE) inhibitor or an angiotensin II receptor blocker (ARB) with a diuretic, may significantly increase risk of harm from heat exposure. Angiotensin Receptor-Nepriylsin Inhibitors (ARNIs) may carry the same additive risk. For children and adolescents, medications to be aware of include non-selective antihistamines (e.g., diphenhydramine), stimulants like methylphenidate for attention-deficit/hyperactivity disorder (ADHD), SSRIs and tricyclics, and diuretics.

### Medications can contribute to heat sensitivity in the following ways:

- **Reduced thirst sensation** (e.g., diuretics, ACE inhibitors, ARBS).

- **Interference with central thermoregulation** (e.g., antipsychotics, anticholinergics, stimulants).
- **Impaired sweating** and therefore impaired cooling (increased with Selective Serotonin Reuptake Inhibitors (SSRIs), Serotonin and Norepinephrine Reuptake Inhibitors (SNRIs), decreased with Tricyclic Antidepressants (TCAs), typical and atypical antipsychotics, anticholinergic agents).
- **Volume depletion, hypotension, and/or reduced cardiac output** with increased risk of fainting and falls, and potentially reduced renal blood flow and renal injury from nephrotoxic drugs, as can happen with non-steroidal anti-inflammatory drugs (NSAIDs) (e.g., diuretics, beta blockers, TCAs, laxatives).
- **Reduced blood vessel dilation** and impaired ability to dissipate heat (e.g., aspirin, beta-blockers, and clopidogrel).
- **Drug toxicity from reduced clearance of medications** in people who are dehydrated, especially for medications with a narrow therapeutic index (e.g., apixaban, carbamazepine, and lithium).
- **Electrolyte imbalance** (e.g., diuretics, beta blockers, calcium channel blockers, antacids, laxatives, lithium, and trimethoprim-sulfamethoxazole).
- **Sedation or cognitive impairment** with increased risk of falls and reduced thirst sensation (e.g., opiates, benzodiazepines, typical and atypical antipsychotic medications, antidepressants, anticonvulsants).

In addition, 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. Insulin, which should be stored in a refrigerator, may become less effective if left in the heat.

Some medications can increase the **sensitivity of the skin to the sun**. Antifungal medications like flucytosine, griseofulvin, and voriconazole and antibiotics like metronidazole, tetracyclines and fluoroquinolones can increase sun sensitivity and lead to a sunburn-like rash. For patients on these medications, sun avoidance, protective clothing and hats, and broad-spectrum sunscreen that filters out UVA and UVB rays, with an SPF of 30 or higher, are recommended.

#### Medications that may increase risk of harm on hot days

Medication Type	Drug Class	Examples	Mechanisms	
Cardiovascular medications	Diuretics	Furosemide Hydrochlorothiazide Acetazolamide	Electrolyte imbalance Volume depletion, dehydration and increased risk of fainting and falls  Reduced thirst sensation	
	Beta blockers	Atenolol Metoprolol  Propranolol	Reduced superficial vasodilation Decreased sweating  Reduced blood pressure, increased risk of fainting and falls	
	Antihypertensives	Calcium channel blocker	Amlodipine Felodipine  Nifedipine	Decreased blood pressure, increased risk of fainting and falls Electrolyte imbalance
		Angiotensin Converting Enzyme Inhibitor (ACEi) and Angiotensin II Receptor blockers (ARBs)	ACEi: Enalapril  Lisinopril  Ramipril  ARB: Valsartan  Losartan	Decreased blood pressure, increased risk of fainting and falls Reduced thirst sensation
		Angiotensin Receptor-Nepriylsin Inhibitors (ARNIs), combination drug including ARB	Sacubitril/Valsartan	See ARBs
	Anti-platelet medications	Clopidogrel  Aspirin	Reduced superficial vasodilation	
	Antianginals	Nitrates	Glyceryl Trinitrate, Isosorbide Mononitrate	Worsened hypotension
Psychiatric medications	Mood stabilizer	Lithium	Diabetes insipidus induced water loss and risk for fainting, falls Electrolyte imbalance  Risk for toxicity in setting of dehydration because of narrow therapeutic index	

		Antipsychotics	Haloperidol, Olanzapine, Quetiapine, Risperidone	Impaired sweating Impaired temperature
		Selective Serotonin Reuptake Inhibitors ( <b>SSRI</b> ) and Serotonin and Norepinephrine Reuptake Inhibitors ( <b>SNRI</b> )	<b>SSRI:</b> Fluoxetine, Sertraline <b>SNRI:</b> Duloxetine Venlafaxine	Increased sweating
		Tricyclic antidepressants ( <b>TCA</b> s)	Amitriptyline, Clomipramine	Decreased sweating
Antiseizure medications			Topiramate	Decreased sweating
			Oxcarbazepine	Increased sweating Increased urination
			Carbamazepine	Dizziness and weakness, especially after increased dose
Antihistamines with anticholinergic properties			Promethazine, Doxylamine, Diphenhydramine	Decreased sweating Impaired thermoregulation
Analgesics		Nonsteroidal anti-inflammatory drugs (NSAIDs)		Kidney injury with dehydration
		Aspirin		Increased heat production with overdose Kidney injury with dehydration
		Acetaminophen		Heat related liver injury increase risk for acetaminophen hepatotoxicity
Antibiotics			Sulfonamides	Kidney injury risk with dehydration
Antiretrovirals			Indinavir	Kidney injury risk with dehydration
Thyroid replacement			Levothyroxine	Excessive sweating
Stimulants			Cocaine	Reduced sweating Reduced dilation of skin blood vessels Impaired heat perception
			Amphetamine, Methylphenidate	Increased body temperature
Hallucinogens			Methylenedioxy-methamphetamine ( <b>MDMA</b> ) (and alternatives)	Reduced sweating Reduced skin blood vessel dilation Impaired heat perception
Alcohol				Increased sweating Increased urination Impaired heat perception

Medications that may increase risk of harm on hot days

#### SOURCES

##### CONTENT SOURCE:

[National Center for Environmental Health \(NCEH\)](#)