



## Multiple Sclerosis and Heat Providers

Heat increases the risk of morbidity in patients with multiple sclerosis (MS). As many as 60-80% of MS patients may experience a transient worsening of their symptoms when their core body temperature rises either from physical activity or extreme heat.<sup>1</sup> A study of US veterans with MS between 2010 and 2013 found that a one standard deviation increase in daily ambient temperature was associated with a 1.6% increased risk of an MS clinic visit that same day.<sup>2</sup>

### Heat Exposure Risks for People with MS

Heat sensitivity resulting from thermoregulatory dysfunction in MS is well documented.<sup>3</sup> Transient flaring of symptoms in MS that occurs with a rise in core body temperature is known as Uthoff's Phenomenon. Heat vulnerability in MS may be due to partially demyelinated axons' temperature-sensitive conduction blockade and dysfunctional thermoregulatory centers in the CNS.<sup>1,4</sup>

Many patients with MS have bladder dysfunction which they may seek to control through fluid restriction. However, fluid restriction risks dehydration that may amplify risks for patients with MS from exposure to heat.

### Medication Considerations

Anticholinergics used to treat bladder dysfunction in patients with MS have been associated with an increased risk of heat-related hospitalizations.<sup>5,6</sup> Mechanisms of actions of anticholinergic medications include impaired sweating, cognitive impairment, and dizziness.<sup>7</sup> The literature suggests that certain comorbidities, including depression, anxiety, hypertension, and chronic lung disease, might have a greater prevalence among patients with MS.<sup>8</sup>

These MS comorbidities may result in medication prescriptions that can increase risk of harm with heat exposure. While more research is needed, several studies have found the following classes of medications to increase risk of hospitalization in heat: ACEIs, ARBs, beta blockers, diuretics, antipsychotics, and SSRIs.<sup>5-7</sup> However, no trials have been conducted to guide clinical decision making considering these increased risks.

### Temperatures of Concern

The temperatures that increase risk of harm for patients with MS may be far lower than those considered dangerous to many people. For most cities in the United States, the minimum mortality temperature (the temperature above which mortality rates increase) is often just below the 80th percentile of the annual temperature range for American cities.<sup>9</sup>

Temperatures tend to peak in mid to late afternoon. The time of day with the highest temperatures for your location can be found at [weatherspark.com](http://weatherspark.com).

The National Weather Service (NWS) issues heat advisories, excessive heat watches, and excessive heat warnings. To see if a heat alert has been issued for your location, check the weather app on your smart phone, or go to [weather.gov](http://weather.gov) and select your county or enter your zipcode. For more details on how to access NWS alerts for heat (and other weather extremes), as well as the differences between heat watches and warning, see the accompanying toolkit document titled "Accesssing Weather Alerts".

Even if there is not a declared heat advisory, watch, or warning, patients with MS should take care to protect themselves if they feel hot.

### **Built Environment**

The forecast temperature available to patients may not accurately represent the temperature they are exposed to in their home or community. The upper levels of multi-story buildings, especially those without air conditioning, may be much warmer than lower levels.

Urban heat islands can result in temperatures more than 4°F higher than reported due to factors such as fewer trees and parks, more asphalt and concrete, and more traffic. Black American, Hispanic, and lower-wealth communities often live in neighborhoods with greater heat island effects.<sup>10</sup> Homeless individuals are at particularly high risk of heat exposure.

### **Heat Action Plans for Patients with MS**

Appropriate guidance for people with MS should be based upon an assessment of the severity of their disease, comorbidities, occupation (especially if outdoors), access to air conditioning at home, and excess heat exposure from an urban heat island or the home environment.

Prior to a heat event, you can work with a patient's neurologist to develop a plan. We recommend that you familiarize yourself with the "Heat Action Plan" provided in the toolkit and review it with patients. The action plan can be provided during care visits and can be the basis for a discussion around safety planning and care management in the event of extreme heat. Action plans should be completed in advance of heat season in your locale.

For additional guidance, see the accompanying toolkit document titled "Establishing a Heat Action Plan".

### **Anticipatory Guidance for Providers to Give to Patients**

Anticipatory guidance for hot days may contribute to improved health outcomes. The strategies and resources below may be helpful for you to provide to patients who are at risk from excessive heat and reflect the "Heat Tip Sheet – MS" available in the toolkit, which we encourage you to share with patients.

1. Before going outside, check the weather forecast on your phone, television, radio, or online (e.g., at [weather.gov](http://weather.gov) or [weather.com](http://weather.com)).
2. If a patient does not have a thermostat or thermometer that measures room temperature in their home, they can be bought for a few dollars at hardware stores or online. Consider having inexpensive thermometers available in your clinic to distribute.
  - a. Indoor temperatures in the patient's home should ideally remain <80°F. If they cannot keep the temperature below 80°F, they should use a fan or consider moving to an air-conditioned space until the temperature cools.
3. When a heat advisory or heat alert has been announced by the NWS (see "Accessing Weather Alerts" for more information), advise patients to:
  - a. Follow their heat action plan (see "Establishing a Heat Action Plan" for guidance)
  - b. If a heat advisory is issued, patients with MS should preferably stay indoors in an air-conditioned space. If going outside is necessary, limit outdoor activities especially during the hottest part of the day (typically 11AM to 3 PM).
  - c. If an excessive heat warning is issued, patients with MS should remain in air-conditioned spaces until the warning expires.

## References

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