



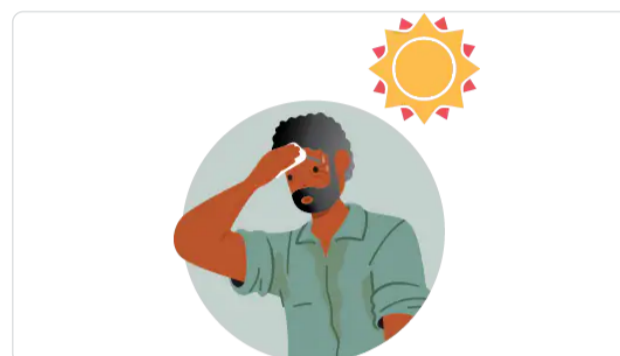
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CDC's website is being modified to comply with President Trump's Executive Orders.

Clinical Overview of Heat and Cardiovascular Disease

KEY POINTS

- Encourage your patients with cardiovascular disease (CVD) to check the HeatRisk forecast daily during warm months and take protective action when HeatRisk is orange or higher, since heat can worsen cardiovascular disease.
- There are several ways to stay healthy when it's hot outside. Create a Heat Action Plan with your patients with CVD.
- Hot days can worsen air quality and breathing polluted air can increase the risk of heart attacks, strokes, arrhythmias, and worsen heart failure. Exposure to increased concentrations of fine particulate matter over just a few hours to weeks can trigger cardiac events and CVD-related death.
- Because of the risk of CVD events associated with air pollution, encourage patients with CVD to also check the air quality index (AQI) daily and take protective action when the AQI is >100.
- Review medications commonly prescribed for cardiovascular disease, such as some antihypertensive agents, which may increase heat sensitivity. Periodic review of medications and patient education on risk reduction before and during the heat season may prevent harm.



Background

This guidance document is intended to help support your conversations with your patients with cardiovascular disease (CVD) on the impact of heat on CVD. The information provided can empower them to take protective actions on hot days. While not everyone may be able to take all actions, each action can help your patients stay healthy during hot days.

Heat and cardiovascular disease

Being outside can be good for the health of your patients. Exposure to heat, however, can lead to a range of heat-related adverse CVD health outcomes, including death. Heat stress can increase demand on the heart and cardiovascular system and promote dehydration, blood clots, and electrolyte imbalances that may all contribute to cardiovascular disease. This can worsen heart failure and precipitate acute coronary syndrome (ACS), acute myocardial infarction (AMI), arrhythmias, and stroke, and contribute to excess mortality from these causes. Extremely hot temperatures have been associated with heart failure deaths. The combined effect of humidity and hot temperatures can affect blood pressure and can increase hospitalizations related to CVD.

Heat, air quality, and CVD

Heat can worsen air pollution and air pollution can worsen CVD and trigger cardiovascular events. Air pollution, especially fine particulate matter (PM_{2.5}) but including ozone, sulfur dioxide and other air pollutants, can increase the risk of cardiovascular events such as AMI, arrhythmia, and death.

Hot and dry weather can increase the risk of wildfires, and wildfire smoke can provoke adverse cardiovascular and cerebrovascular events. During the warmest months of the year, exposure to multiple concurrent environmental hazards, including wildfire smoke, pollen, and mold from floods, can amplify risks to cardiovascular health.

Risk factors

Heat, medications, and CVD

Many [medications](#), including medications to manage CVD, and over the counter medications like antihistamines and analgesic medications, can impair heat tolerance and the body's ability to regulate its temperature. Medications can decrease the body's ability to sweat, and therefore to cool itself.

This can predispose people to heat illness during hot days.

Antihypertensive medications lower blood pressure and, in the setting of dehydration from heat, may be more likely to contribute to fainting. Antiplatelet drugs, such as aspirin and clopidogrel, can decrease blood vessel dilation and reduce the ability for the body to eliminate heat. Diuretics and heat can both promote electrolyte imbalance and dehydration, which can contribute to CVD risk. Dehydration can increase the risk for kidney injury from medications such as non-steroidal anti-inflammatory drugs (NSAIDs). Dehydration can also increase blood levels of medications which may result in adverse events.

Lastly, many medications, including certain antibiotics, can increase sensitivity of the skin to the sun, and direct heat can degrade or damage certain medications, such as insulin or inhalers used to treat chronic obstructive pulmonary disease.

Attention to heat exposure as a component of medication management for patients with cardiovascular disease may prevent harm. The [Heat and Medications page](#) provides more information on medications and heat that can inform patient guidance.

Patient management

Take these 5 steps to help your patients stay safe on hot days and document them in a [Heat Action Plan](#) with your patients.

1. Assess risk factors that may make heat or poor air quality more likely to worsen CVD.

- **Ask about baseline status of cardiovascular disease**, including blood pressure control and CVD symptoms. Poorly controlled blood pressure or heart disease may increase sensitivity to heat and poor air quality.
- **Use the [CHILL'D-OUT questionnaire](#)** to do a risk factor assessment. If your time is limited, ask the questions in bold.
 - **C – Cooling**
 - **Does your patient have working air conditioning?**
 - Can they check and control indoor temperatures where they live?
 - Do they have an electric fan?
 - Do they know how to locate a cooling center if needed?
 - **H – Housing**
 - **Does your patient have stable housing?**
 - Do they live on a higher floor of a multi-story building where they may be exposed to more heat?
 - Are they regularly exposed to indoor air pollutants such as secondhand smoke or mold?
 - Do they have a portable air purifier or a filter in their HVAC system?
 - **I – Isolation and mobility**
 - **Does your patient have a neighbor, friend, or family member who can check on them during hot days?**
 - Does their mobility limit their ability to seek cooling in their home or elsewhere?
 - **L – eLectricity**
 - **If heat leads to a power outage**, does your patient have a plan for refrigerated medications and/or electric medical devices, such as nebulizer machines, ventilators, or oxygen concentrators?
 - **L – Learning**
 - **Does your patient check the daily and hourly weather forecast to know the hottest time of the day? Can they access the HeatRisk tool?**
 - Where does your patient get information about how to protect their health from heat and what measures do they take to do so?
 - **D – Drugs**
 - **Does your patient take medications that increase risk from heat exposure?**
 - **Out – Outside**

- **How much time does your patient spend outdoors on hot days for work, sports, or recreation?**
- Are they exposed to outdoor air pollution at home, work, or elsewhere, such as a major roadway, construction site, industrial facility, or frequent wildfire smoke?
- Do they have allergies to grass, weeds, and tree pollens?

2. Educate your patients on how to stay cool during hot days.

- Review the [HeatRisk Tool](#) with your patients which outlines how commonly each color HeatRisk level may occur and provides suggested actions people can take at each color level.
- Most patients can take action beginning when the [HeatRisk](#) is **orange**.
 - Some people will be sensitive to heat when HeatRisk is **yellow** and will need to take action at the yellow level. Ask your patients to monitor their symptoms at HeatRisk yellow and orange and let you know if this applies to them.
- Review the signs of heat-related illness and signs of worsening CVD associated with heat exposure with your patients. Heat symptoms include heavy sweating, muscle cramps, weakness, light headedness, headache, nausea, and vomiting. Develop a plan with them for when to seek medical care.
- Advise your patients on how to stay cool outdoors at [each level of the HeatRisk tool](#). In addition, when outside, everyone can:
 - Wear light, loose-fitting clothing that covers arms and legs, a hat with a brim that shades the face, ears, and back of the neck, and sunglasses.
 - Apply broad spectrum [sunscreen](#) that filters out UVA and UVB rays. The sunscreen should have an SPF of 30 or higher.
- Remind your patients to try to schedule their activities during the coolest time of the day or evening, if possible.
- Talk to your patients about how to [stay cool indoors](#). They can:
 - Use an air conditioner if they have one or find a [location](#) that does. Even a few hours in a cool location can lower the risk for health problems from heat.
 - Use fans, but only if indoor temperatures are less than 90°F. In temperatures above 90°F, a fan can increase body temperature.
- Refer patients who need assistance with home energy costs to the [Low-Income Heat Energy Assistance Program](#) (LIHEAP).
- Direct your patients to information about public resources such as cooling centers, pools, and splash pads. The nearest cooling center locations can be located by calling 2-1-1, checking [public resources](#), and/or contacting your local health department and emergency management agency.

3. Educate your patient on how to stay hydrated.

- Review signs and symptoms of dehydration, which include:

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|---|-------------------------|
| Cold, clammy skin | Nausea |
| Dizziness or feeling lightheaded | Abdominal cramping |
| Rapid heart rate | Swelling in extremities |
| Excessive sweating or an inability to sweat | Darker color urine |
| Fatigue | Infrequent urination |
| Headache | Thirst |
| Muscle cramps or spasms | |

- Emphasize the importance of regular and consistent fluid and food intake throughout the day.
- Advise patients to consider limiting beverages higher in sugars, sodium, caffeine, and alcohol, if possible, which may lead to dehydration. See Guideline 4 of the [dietary guidelines](#) [PDF](#).
- Advise patients that water is usually the best choice, although sports drinks containing electrolytes may be necessary if sweating for several hours.
- Since patients with CVD may restrict sodium intake, remind them to look at the sodium content of beverages.
- Remind patients with heart failure or kidney disease to monitor for signs and symptoms of fluid overload and dehydration on hot days. Consider fluids with electrolyte supplements as needed.

4. Educate your patient on [air quality](#), since heat worsens air quality which impacts their health.

- Review the Air Quality Index (AQI) with your patients at on the [HeatRisk Dashboard](#), their phone's weather app, or at [airnow.gov](#). Ensure they know how to access, understand, and use the information including which action steps they can take based on the specific air quality level.
- Review indoor air quality measures.
 - **Steps to Take for Good Indoor Air Quality**
 - Remind your patients that [indoor air can be as polluted](#) as outdoor air.
 - Educate patients that cigarette and e-cigarette smoke, candles and air fresheners are indoor sources of air pollution.
 - If possible, bring outdoor air in when cooking indoors.
 - Encourage patients to allow clean indoor air inside when the AQI is less than 100 (or <50 for sensitive individuals).
 - **About Air Filters**
 - Discuss [air purifiers, also known as air sanitizers, air cleaners, and/or air filters](#) used in HVAC systems. While these devices cannot remove all air pollutants, they can improve indoor air quality for many pollutants when used properly. A list of portable cleaners can be found [here](#).
 - Some homes have HVAC systems with replaceable filters. These filters have [MERV \(Minimum Efficiency Reporting Values\) ratings](#) or are designated as [HEPA \(high efficiency particulate air\) filters](#). To effectively remove indoor air pollution, HEPA filters or filters with MERV of 13 or higher can be used.
 - Air filters should be replaced regularly. Replacement [frequency](#) depends on how much air pollution is present but can be done every 60-90 days.
 - [Do-it-yourself \(DIY\) air cleaners](#) may be a more affordable and accessible alternative to commercial versions to filter out smoke particles and can be constructed using a box fan and a high-efficiency home air filter.

Did you know?



About the Air Quality Index (AQI) and Actions to Consider at Each Level

The AQI reports air quality for common air pollutants such as ground-level ozone, particle pollution, carbon monoxide, sulfur dioxide, and nitrogen dioxide. Its value ranges from 1 to 500, with higher numbers corresponding to worse air quality and greater health concerns. When the number is above 100, outdoor air is considered unhealthy for sensitive groups including people with CVD. **On days with an AQI > 100**, it is okay for people with CVD to be outside, **but they can consider taking more breaks and do less intense activities. If they have symptoms such as palpitations, shortness of breath, or unusual fatigue**, this may indicate a serious problem and they should contact you. **Some patients with CVD may be sensitive to air pollution when the AQI is between 51 and 100.** Ask your patient to use the AQI to assess whether they have more symptoms when the AQI is between 51 and 100. If so, refer them to actions to take for people sensitive to poor air quality. Of note, **the Air Quality Index does not include pollen counts.** This means that on some days, the Air Quality Index may be low even though pollen levels in the air are high.

5. Make a plan for [medication management](#) on [HeatRisk](#) orange, red, and magenta days.

- Counsel your patients to take all medications as directed unless otherwise guided by you or another clinician.
- Review your patient's medication list with them, highlighting medications that may reduce their heat tolerance such as diuretics, or medications that may need to be adjusted because of interactions with higher heat. See the [Heat and Medications page](#) for more information.
- Provide guidance on proper medication storage, especially for medications that individuals may carry with them, such as inhalers which can malfunction or burst from high heat. Counsel your patients not to leave medications in a car or other places that can get excessively hot. Remind patients that insulin can be degraded by heat and should be refrigerated.
- Counsel your patients to limit sun exposure if they take a medication, such as a statin, that causes sensitivity to the sun. To avoid sunburn which can promote dehydration, recommend applying sunscreen of SPF 30 or greater, using a sun-protective hat and clothing, and trying to stay indoors during the hottest part of the day.
- Plan for what to do in the event of a power outage for medications requiring refrigeration like insulin, for medication delivery devices like nebulizer machines, and for electrical medical devices, like ventilators and oxygen concentrators.

SOURCES

CONTENT SOURCE:

National Center for Environmental Health (NCEH)