

Training Guide for Heat-Related Illness

Use with WAC 296-62-095 through WAC 296-62-09570, Heat-Related Illness in the Outdoor Environment

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Introduction

This Helpful Tool can be used to help meet the employee training requirements in WAC 296-62-09560. The Training Completion Form in this Helpful Tool may be used to document completion of the training.

WAC 296-62-09560 requires that employees receive training, before initial assignment to outdoor work and at least annually, on the requirements of the heat-related illness rule and the employers heat-related illness prevention procedures. The following provides the basic information expected to be included in an effective heat-related illness training program.

Overview

WAC 296-62-095 through WAC 296-62-09570, Heat-Related Illness in the Outdoor Environment, requires employers to protect employees working outdoors from heat-related illness hazards. The primary requirements of the rule include the following.

- The employer is required to establish written procedures to identify, evaluate, and control heat-related illness hazards. Procedures are also required to ensure adequate response to signs and symptoms of heat-related illness, if it does occur.
- When heat-related illness hazards are present, your employer will provide at least 1 quart of water per hour for each employee. You may also bring your own water.
- If you are showing signs or demonstrating symptoms of heat-related illness, your employer is required to relieve you from work and cool you down. Your employer may also decide you need medical attention.
- You will be provided training on your heat-related illness prevention program. It is important to follow your worksite program. Contact your supervisor as soon as possible if you have any questions about the program, or your or your fellow employees' safety.

Employee Rights and Responsibilities

You will be provided training on the State's heat-related illness rule, WAC 296-62-095 through WAC 296-62-09570, and your employer's heat-related illness prevention program. It is important to follow your worksite program. Contact your supervisor as soon as possible if you have any questions about your rights under WAC 296-62-095, or you have concerns about your fellow employees' safety.

Types of Heat-Related Illness and Common Signs and Symptoms

Your employer is required to provide you information on the different types of heat-related illness and the common signs and symptoms of heat-related illness. This information can be found in the Identifying Heat-Related Illness Helpful Tool.

Environmental and Personal Factors for Heat-Related Illness

Heat-related illness is more than just feeling hot; it is a serious medical condition that may result in permanent disability or death. It is important to understand how your body cools itself and what happens to your body if you experience heat-related illness.

The body maintains normal temperature by releasing heat through the skin and lungs. Conditions such as working in abnormally high temperatures, performing physically demanding work, or not drinking enough fluids may result in significant increases in body temperature.

When the surrounding air approaches skin temperature (approximately 95°F) and body produces more heat than it can release, the body systems that regulate internal temperature may become overwhelmed resulting in the development of heat-related illness (e.g. fainting, heat exhaustion, or heat stroke).

The most important way that your body cools itself is to send warm blood to the surface of your skin. This aids in cooling through sweating (evaporation) and transfer of heat from warm skin directly to cooler air (convection). However, this also results in there being less blood available for your organs (kidney, heart), muscles, and brain.

Besides putting vital organs at risk, heat-related illness makes your muscles weaker and your thinking fuzzy. This is how heat-related illness increases your risk of a workplace accident.

Many factors can interfere with the body's cooling mechanisms and put you at risk for heat-related illness. When you understand how these factors affect your risk, you can be more aware of them and be better able to keep yourself or a co-worker from becoming dangerously overheated.

Environmental Factors

These factors are part of the working environment. Your employer is responsible for identifying, evaluating, and controlling the risks presented by these factors.

Definition:

Environmental factors for heat-related illness means working conditions that increase the susceptibility for heat-related illness including:

- Air temperature
- Relative humidity
- Radiant heat from the sun and other sources
- Conductive heat sources such as the ground
- Air movement
- Workload intensity and duration; and
- Personal protective equipment worn by employees

Air Temperature

Air temperature is a measure of how much heat is in the air.

When the air is cooler than 95°F, the body can send more blood to the surface of the skin. Blood vessels open to bring blood closer to the surface of the skin and the blood

is cooled by the surrounding air. This is one reason why fans make you feel cooler, but this only works if the air is cooler than your body.

The closer the air temperature gets to 95°F, the less heat the body is able to efficiently transfer to the surrounding air. This factor alone can make the body overheat. When you are working in hot temperatures, your body's heat production increases 5 to 10 times more than it normally produces.

Relative Humidity

Relative humidity measures the amount of water vapor in the air relative to the air's capacity to hold water. For example, at 100% relative humidity, all of the air's capacity to carry water has been used, and if any more water vapor was added into the air, it would come out of the air as dew or rain.

Warm air can hold more water vapor than cool air. Warm air that is dry can easily absorb sweat evaporated from the skin, which will cool the blood close to the surface of the skin.

Warm air that is already moist (high relative humidity) has very little water carrying capacity, so the moisture of sweat has almost nowhere to go. When the humidity level approaches 80%, little sweat evaporation occurs, this means little cooling happens. The sweat simply collects and runs off the skin, robbing the body of water (creating dehydration) but doing little to cool it. The higher the humidity, the less effectively your body can cool itself by evaporating sweat from skin.

If you don't drink enough water to replace what is being lost in liquid sweat, eventually the body protects itself from dehydration by narrowing the blood vessels in the skin. This makes sweating slow down or even stop, so water stops being lost. But when sweating stops, the body continues to overheat.

Radiant Heat

Radiant heat sources heat your body and the objects around you, but do not heat the air. This is why you immediately feel cooler when you step into the shade out of the sun.

If you hold your hand near an electric light bulb, you can feel the radiant heat it generates. When you move your hand away, you will feel the heat on your hand decrease. If you hold something between your hand and the light bulb, you will notice your hand immediately feels cooler.

This is because the object has blocked the heat rays and not because the air temperature has dropped. Because radiant heat does not heat the air, a measurement of air temperature can not fully account for radiant heat in the environment that can affect you.

Many things radiate heat. The sun is a primary source of radiant heat, but common surfaces and equipment such as asphalt and machinery can also be significant sources. Radiant heat sources should be considered when evaluating the worksite environmental heat hazards.

Conductive Heat

When a warm object is in direct contact with a cooler one, the heat transfers (conduction) from the warmer object into the cooler one. Examples of conductive heat sources in the workplace are the heat you gain riding on running equipment such as tractors, directly handling hot objects, or leaning or walking on hot surfaces.

Like radiant heat, heat-related illness can result when these conductive heat sources contribute to increase your body temperature. Sources of conductive heat can also be sources of radiant heat as well, a double threat.

Air Movement

Air movement increases how much heat moves between the air and an object (such as your body), because it increases the total amount of air that comes in contact with the object in a given amount of time.

If the air is cooler than the object, the moving air cools the object faster than still air. Moving air cooler than 95° cools you faster than still air. At this temperature, a fan helps cool you.

If the air is hotter than the object, the moving air heats the object faster than still air. Moving air that is 95° or hotter heats you even faster than still air. At these temperatures, moving air can increase your risk for heat-related illness.

This aspect of air movement is also affected by relative humidity. Moving air that is cool and dry exposes your body to a high volume of air that can absorb both heat and moisture, cooling you effectively.

Moving air that is humid cools you some by moving heat away from your body, but it doesn't cool you much by evaporation. Cool dry air, such as inside an air conditioned building or vehicle, cools you best.

Workload Intensity and Duration

How hard you work (intensity) and how long you work (duration) are important factors in determining how much the sources of heat in the environment will affect you.

Muscles use energy, which releases heat. The more we use our muscles, the more heat our body must get rid of. The longer we work, the more heat can build up in our bodies.

When you stop to rest, the muscles stop generating as much heat. The body then works to get rid of the excess heat your muscles built up. But environmental factors, along with individual physical differences, affect how quickly – or slowly – your body gets rid of built-up heat.

You need to rest longer and more often when the air temperature is hotter and the humidity is higher, because your body can't get rid of excess heat as quickly in those circumstances.

Working at a slower rate and for shorter periods of time between rests also help your body manage heat because you don't generate more heat while working than your body can get rid of when you rest.

Personal Protective Equipment (PPE)

Many types of outdoor work require you to wear protective clothing or PPE. This clothing and equipment protects you from injury, but it can also interfere with your body's natural cooling, which happens mainly through evaporating sweat.

About 50% of the sweat your body makes is made on your head, through the skin of your face and scalp. This means cooling your head is a vital part of cooling your whole body. PPE that prevents air from reaching your face and scalp can contribute to overheating.

Other PPE, and clothing fabrics, that don't "breathe" by letting air move freely through and around them can trap a layer of warm humid air next to the skin, or prevent air from reaching the skin at all. When little sweat can evaporate, little cooling can happen, contributing to heat-related illness.

When you will be working in heat-related illness conditions, wear "breathable" fabrics such as cotton or cotton-blends. Also, when possible, remove your PPE during your breaks to allow your body to cool itself.

Personal Factors

These are factors relating to your personal health status and lifestyle choices. Your employer does not monitor these factors. You, as the employee, are responsible for monitoring yourself.

Keep in mind, heat-related illness affects our ability to make good decisions. If you think you or another employee is showing signs of heat-related illness, it is critical that you immediately report the signs to your supervisor.

Heat-related illness can be fatal and symptoms are not always progressive. Also, symptoms such as weakness and dizziness can cause other workplace accidents.

Definition:

Personal factors for heat-related illness means factors including, but not limited to:

- An individual's age
- Degree of acclimatization
- Medical conditions
- Water consumption
- Alcohol consumption
- Caffeine consumption
- Nicotine use
- The use of prescription and non-prescription medications that affect the body's water retention; and
- Other physiological responses to heat.

Age

Age does make us more susceptible to heat-related illness. However, age does not protect us from heat-related illness. Younger, otherwise healthy workers are sometimes at greater risk of heat-related illness due to factors such as inexperience, machismo, and a sense of invincibility.

Degree of Acclimatization

Acclimatization means the body's temporary adaptation to work in the heat that occurs gradually as a person is exposed to it. All bodies need time to adjust to working in heat.

This adjustment time is especially important if:

- You're returning to work after a prolonged absence;
- You're returning to work after being off sick;
- You recently moved to a hotter climate from a cooler one; or
- The area of work is undergoing a heat wave bringing suddenly higher temperatures.

During adjustment times, closely watch yourself and co-workers for signs and symptoms of heat stress. If you think you or someone else is getting overheated, take immediate action.

When you work in the severe heat, it's important to gradually build up to a full day of work in those conditions. You can do this by working with your employer to gradually increase the amount of time you work in conditions that can cause heat-related illness.

Medical Conditions

Some medical conditions can contribute to your risk of developing heat-related illness. Examples include past episodes of heat-related illness, chronic cardiovascular disease, diabetes, and skin conditions.

If you have experienced heat-related illness in the past, you are at a higher risk for developing it again. Cardiovascular conditions and diabetes affect blood flow, and skin conditions, such as sunburn and psoriasis, can inhibit your body's ability to cool itself by sweating.

If you have a medical condition, check with your doctor to see if it causes you to be at higher risk for heat-related illness. Pay close attention to your body and immediately report any symptoms.

Water Consumption

The amount of water you drink is a very important factor in your risk for heat-related illness. Your employer is required to provide plenty of water for you to drink, but it is up to you to actually drink the amount you need. Working long and hard in hot temperatures may mean you sweat as much as 4 gallons by the end of the day.

It is best to arrive at work already well-hydrated. Consuming alcohol, playing strenuous recreational sports like basketball or soccer the night before, or not drinking enough water the previous day can leave your body already low on fluids the next morning. This can make your risk for heat-related illness higher than normal that day.

Don't rely on thirst to prompt you to drink water. People think if they're not feeling thirsty, they must have enough fluids in their body. This is not true. It takes a significant loss of fluids (2-5%) to make your body feel thirsty, and your body may need more water than the amount that quenches the thirst.

Drink water throughout your shift, not just during breaks. During heavy physical activity, you might drink as much as 8-12 oz. every 20 minutes. When drinking bottled water, remember 1 liter equals approximately 1 quart (4 cups). Not only does this keep enough fluids in your body, it breaks up your work flow so your body generates less heat internally. Drinking water that is cool may help you drink more.

Under the conditions that lead to heat-related illness, the body produces a large amount of sweat in an attempt to cool itself. Unless the water lost in sweat is replaced, your body temperature will rise.

Plain water is your best choice for replacing body fluids. Adding a little fruit juice to water to enhance flavor may help you drink more. If you choose to drink a sports drink, dilute it heavily.

Avoid drinks that have more than 6% sugar or carbohydrates. These drinks make you feel full or even sick to your stomach. Stay away from packaged drinks with refined sugar and high levels of carbohydrates – sugar and carbohydrates need water to be digested, which makes less water available for cooling your body, not more.

Sodas contain sugar or other sweeteners that can slow absorption of water. The gas produced by carbonated water will make you feel full and you will drink less water.

Avoid energy drinks when working in heat-related illness conditions. The ingredients in these drinks cause physiological responses in your body that lead make you more vulnerable to heat-related illness.

Is it possible to drink too much water? Yes, drinking more than 3 gallons of plain water in a day can upset your body’s balance of electrolytes, which are salts and minerals your body needs for basic cell functions. That’s why sports drinks containing electrolytes taste somewhat salty. The usual way people regain electrolytes is through meals.

Alcohol and Caffeine Consumption

Drinking alcohol and caffeine causes your body to lose more water than normal. This leads to dehydration. When you are dehydrated, your body can not sweat fast enough to lower your core body temperature. This can cause heat-related illness. During hot weather, avoid drinking caffeine and alcohol. Keep in mind that both alcohol and caffeine can stay in your body for up to 12 hours. After it has passed, your body may still be recovering from the processing. You will need more water to help your body through this process. Watch for any symptoms if you are in hot weather while your body is processing or recovering from alcohol or caffeine use.

Nicotine Use

Using nicotine tightens your blood vessels so the blood vessels in the skin can’t widen to let heated blood reach the surface to release heat. This can make you more susceptible to heat-related illness.

Medications

If you take prescription or over-the-counter drugs, check with your doctor to learn if they affect your body’s ability to regulate its temperature.

Some types of medications are known to do this. These include, but aren’t limited to, the following types:

Medication type	How it affects your body
Anti-motion-sickness drugs that contain atropine	<ul style="list-style-type: none"> ▪ Inhibits sweating; and ▪ Creates cardiac disturbances.
Diuretics (medications that increase urination)	<ul style="list-style-type: none"> ▪ Causes dehydration; ▪ Decreases cardiac output; and ▪ Inhibits sweating.
Stomach (gastrointestinal) drugs that contain atropine (such as Donnatal)	<ul style="list-style-type: none"> ▪ Inhibits sweating.
Tranquilizers and some over-the-counter sleeping pills	<ul style="list-style-type: none"> ▪ Affects ability to recognize increases in body temperature ; and ▪ Affect thirst thresholds.
Antidepressants and antipsychotics (such as Prozac, Thorazine, Haldol)	<ul style="list-style-type: none"> ▪ Affects ability to recognize increases in body temperature; and

	<ul style="list-style-type: none"> ▪ Increases body temperature.
Antihistamines (allergy medications such as Benadryl)	<ul style="list-style-type: none"> ▪ Constricts blood vessels; ▪ Inhibits sweating; and ▪ Increases body heat.
Heart (cardiovascular) drugs, including beta blockers (such as Blocadren) and diuretics (such as Diuril)	<ul style="list-style-type: none"> ▪ Decreases cardiac output and later blood flow; and ▪ Causes dehydration.
Parkinson's disease medications	<ul style="list-style-type: none"> ▪ Inhibits sweating; and ▪ Creates cardiac disturbances.

Other Factors

Other factors such as weight and lack of sleep or fatigue can affect your body's ability to cool itself.

Having excess body fat does affect a body's ability to cool itself, but not for the reasons you might think. It is the extra effort that muscles must make to move the extra weight that generates more internal heat, so there is just more heat to get rid of.

Also, excess body fat usually results from an inactive lifestyle, which lowers the level of work that will cause you to feel out of breath and makes it harder to get used to hot working conditions.

Lack of sleep, and fatigue, also affect how your body cools itself, since one of the things that happens during sleep is that the brain resets the point at which your body's cooling mechanisms (blood vessels widening, skin sweating, etc.) start to work. Without proper sleep and rest, these cooling mechanisms don't start working when they should, which allows too much heat to build up in your body.

Heat-Related Illness Procedures

Procedures for identifying, evaluating, and controlling exposures to the environmental and personal factors for heat-related illness

Heat-related illness is a serious hazard. However, the factors can be controlled. This worksite has specific procedures to protect you from heat-related illness.

1. Consider Personal Factors.

Your employer is responsible for providing you training on the personal factors of heat-related illness. Your employer does not identify, evaluate, or control these factors. You, as the employee, are responsible for monitoring yourself.

2. Consider Environmental Factors.

List environmental heat-related illness hazards that are present on the worksite:

Factor:	Description:
Air temperature	
Relative humidity	
Radiant heat	
Conductive heat	
Air movement	
Workload intensity and duration	
Personal protective equipment	

3. Evaluate environmental heat-related illness hazards.

Factor:	Evaluation Procedures:
Air temperature	
Relative humidity	
Radiant heat	
Conductive heat	
Air movement	
Workload intensity and duration	
Personal protective equipment	

4. Control environmental heat-related illness hazards.

When you are exposed to heat-related illness hazards, your employer will select controls for your workplace (see examples in the table below) and provide training on these controls.

After selecting the controls and work practices, your employer will also describe:

- **When** these controls would be used;
- **Why** these controls would be used; and
- What the *expected outcomes* of these controls are.

Examples of administrative and engineering controls:

Work practices	Controls:
Supervisory oversight	Clothing, uniforms
Provision of water	Cooling methods (fans, cooling vests)
Work/rest schedules	Sunscreen
First aid	Access to shade
Access to medical services	Hydration packs
Buddy system	Shielding

5. Follow Emergency Procedures.

When symptoms of heat-related illness are noticed	Follow these procedures
<p>If you or another employee is showing symptoms of heat-related illness, respond by:</p>	
<p>When needed, contact emergency medical services by calling this number:</p>	
<p>If the emergency services cannot easily access the worksite, move yourself or another employee to:</p>	
<p>Driving directions for finding the worksite are:</p>	

