

Coping with **Hot** Work Environments

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Many Texans work under hot, humid conditions. Summer heat is a particular hazard to agricultural producers who work long hours under the sun. However, other people working in hot yards, gardens, kitchens or industry jobs are also exposed to these conditions.

A hot work environment can impair safety and health. Both workers and their employers are responsible for taking steps to prevent heat stress in the workplace.

How Your Body Handles Heat

Humans are warm-blooded, which means they maintain a fairly constant internal body temperature regardless of external conditions.

Under moderate conditions, the brain automatically balances body heat by monitoring the warmth of the blood. However, when blood temperature exceeds 98.6 degrees F, the brain automatically takes measures to lower it. The heart pumps more blood; blood vessels expand to accommodate the increased flow; and blood begins to flow through bundles of microscopic blood vessels (capillaries) in the skin. As the blood circulates closer to the surface of the skin, excess heat is transferred to the cooler atmosphere.

When the air temperature is as warm as or warmer than the skin, blood brought to the body surface cannot shed its heat to cool the body. At that point, the brain signals the sweat glands to shed fluid in the form of perspiration, which in turn cools the body as it evaporates from the skin. In humid conditions, cooling the body by sweating is more difficult because high humidity slows evaporation. Wiping sweat from the skin with a cloth also prevents cooling from evaporation.

In hot, humid conditions, hard work becomes harder. The sweat glands release moisture and essential

chemical compounds such as salt onto the skin. Circulatory vessels enlarge, and the heart pumps quickly to cool the blood by forcing it close to the surface. That means less blood goes to the muscles. As a result, strength declines and physical and mental fatigue sets in.

Safety Problems

Certain safety problems are common in hot working conditions. Slippery, sweaty hands, dizziness and fogged safety glasses can cause workers to hurt themselves or others. They can also be burned by accidental contact with hot objects and surfaces in these environments. Workers and supervisors alike must protect themselves from heat-induced irritability, carelessness and distraction, which can impair their physical and mental performance.

Health Problems

Excessive exposure to a hot environment can bring about several physical disorders, including heat stroke, heat exhaustion, heat cramps, fainting, heat rash and momentary or transient heat fatigue.

Heat stroke is the most serious heat-related disorder and occurs when the heat-regulating system breaks down under stress and sweating stops. This condition can occur with little warning and robs the body of its most effective means of shedding excess heat. A heat stroke victim's skin is hot, dry and usually red or spotted, and the body temperature is 105 degrees F or higher. The person is confused and irritable and may complain of chills. If the victim is not cooled soon, unconsciousness, delirium and convulsions will occur and can lead to death.

When heat stroke is suspected, summon an ambulance immediately. Move the worker to a cool area and thoroughly soak his or her clothes with water. Fan the body vigorously to increase evaporation and cooling, and monitor the worker's condition until medical professionals arrive.

Recognizing and treating heat stroke is the only way to prevent permanent brain damage or death. Workers who are physically fit and acclimated can tolerate heat best, but no one is immune to heat stroke. Chronic disease, obesity, alcoholism and a history of heat illness are all risk factors for heat stroke.

Heat exhaustion is caused by loss of fluid in sweating, loss of salt, or both. A worker with heat exhaustion still sweats, but experiences extreme weakness, fatigue, giddiness, nausea or headache. In serious cases, the victim may vomit or lose consciousness. The skin is clammy and moist, the complexion is pale or flushed, and the body temperature is normal or slightly higher. Workers who are obese or unaccustomed to the heat are prone to heat exhaustion.

In most cases, treatment is simple: Have the victim rest in a cool place and provide plenty of lightly salted liquids. This treatment will resolve most cases of heat exhaustion, though severe cases may require care for several days. There are no known permanent effects. Caution: people with heart problems or low-sodium diets should consult a physician in these cases.

Heat cramps are painful muscle spasms caused by losing salt in perspiration. Workers who drink much water but do not replace salt are prone to heat cramps because drinking water dilutes the body's fluids, without replacing salt. Soon, the low salt in the muscles will cause painful cramps in the arms, legs or abdomen. Cramps can occur during or after work hours and may be relieved by drinking one glass of water containing 1/2 teaspoon of salt. Caution: people with heart problems or on low-sodium diets should consult a physician about this condition.

Fainting. A worker who stands still in the heat may simply black out. Under these conditions, blood pools in the enlarged blood vessels near the skin and in the lower part of the body rather than returning to the heart to be pumped to the brain. Once lying down, the worker should soon recover as circulation to the brain improves. To avoid further fainting, have the worker move around to maintain good circulation.

Heat rash, or prickly heat, occurs in humid environments where sweat does not evaporate easily. Perspiration may plug sweat ducts and cause inflammation that becomes a rash. Discomfort from severe or infected prickly heat can reduce a worker's performance. Resting in a cool place at regular intervals and taking periodic showers will help workers avoid this condition.

Momentary or transient heat fatigue is marked by discomfort and mental strain because of prolonged exposure to heat. Workers can lose coordination and

alertness and/or become irritable and depressed. Unacclimated workers are particularly susceptible; gradual adjustment to the hot environment will help such workers cope with heat fatigue.

Becoming Accustomed to Heat

Under normal circumstances, workers can adjust to hot working conditions in about a week. On the first day of work in a hot environment, the body temperature, pulse rate and general discomfort will increase, then gradually decrease each day. Once the body adjusts, the worker should be able to work with less strain and distress.

Heat disorders are more likely among workers who have not been given time to adjust to working in the heat or those who have been away from hot conditions. Do not ignore conditions that produce heat stress or try to tolerate its symptoms.

Preventing Heat Stress

Heat stress depends, in part, on the amount of heat a person's body produces. Hard, steady work produces more heat than does light work. To reduce heat stress on the job:

- Temporarily make the work easier
- Decrease the speed at which the work is performed
- Increase the number or duration of rest periods

Reduce exposure to heat. Distribute the workload evenly by breaking long work periods into shorter work rest cycles. Short rest periods throughout the day allow the body to get rid of excess heat and slow the production of internal body heat.

When heat and humidity are high:

- Postpone nonessential work
- Hire extra workers to spread the workload, but allow them time to acclimate
- Use younger or more physically fit workers where needed

Provide a rest area. Because periodic rest in a cool place reduces heat stress, the rest area should be close enough to the workplace to allow for effective breaks. Short, frequent breaks are the most beneficial and should be increased as temperature rises. Provide plenty of drinking water. During a day's work an employee may sweat away as much as 3 gallons of fluid and the salt it contains. To avoid common heat disorders, workers must replace the water and salt they lose during the day. A worker should not depend on thirst to signal when and how much to drink because thirst is satisfied before the body's water requirements are met. Instead, he or she should drink more than enough fluids to satisfy thirst every 15 to 20 minutes. The water should be 50 to 60 degrees F, palatable and convenient to the work area.

The best way to replace salt is to have a 0.1 percent salt solution available for drinking. A tablespoon of table salt per 15 quarts of water or $\frac{1}{4}$ tablespoon per gallon will make this solution. Workers who use salt tablets must drink enough water to prevent gastric irritation.

The first days of exposure to heat require the most care. Caution: People with heart disease or low-sodium diets must not be given salt. Consult a physician on care for people with these conditions.

Make sure workers wear protective clothing. When the ambient temperature is lower than skin temperature, clothing holds the body's heat in. When the air temperature is higher than skin temperature, just the opposite is true. On the hottest summer day, it may be better for a worker to wear a shirt and trousers than to wear only shorts.

Clothing should not interfere with evaporation of sweat. Workers should wear loose garments made of thin cotton fabric because they don't interfere with evaporation of sweat. In dry climates, inadequate evaporation is seldom a problem.

Change workplace conditions. Changing the workplace can keep workers cooler and increase comfort and efficiency by decreasing fatigue and the time need for rest.

Reduce heat and humidity by:

- Shielding or insulating equipment heat sources from people
- Placing exhaust fans near heat-producing equipment to blow hot or humid air away from workers

- Opening windows and using fans or air blowers to provide maximum air flow around people
- Providing opportunities, when outdoors, for people to work in well-ventilated, shaded areas
- Providing air-conditioned rooms, enclosures or vehicles as work areas

Special Considerations During Prolonged Heat

Heat illnesses usually increase when hot weather lasts more than 3 days. Workers are placed at higher risk after progressive loss of body fluid and salt, loss of appetite and build-up of heat in work and living areas. Protect yourself and your workers by avoiding highly stressful activities during extended hot spells or performing them during the early morning or at night. During peak seasons, hire additional temporary help rather than scheduling lengthy work periods or overtime shifts.

Finally, remember the basics:

- Get enough sleep and good nutrition to maintain heat tolerance.
- Avoid alcoholic beverages, as they cause additional dehydration.
- Consult your physician if you take special medication.
- Avoid significant weight loss from fluid loss.

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