

Heat Stress: Prevention and Response

Exposure to Heat:

Any process or job site that is likely to raise the workers' core temperature (often listed as higher than 100.4 degrees F (38°C)) raises the risk of heat stress. Operations involving high air temperatures, radiant heat sources, high humidity, direct physical contact with hot objects, or strenuous physical activities have a high potential for inducing heat stress in employees.

Heat Stress:

Heat stress is the buildup in the body of heat generated by the muscles during work, plus heat coming from warm and hot environments. When the body becomes overheated, less blood goes to the active muscles, the brain and other internal organs. Workers get weaker, become tired sooner, may be less alert, and less able to use good judgement. Heat stress can be the underlying cause of other injuries, such as heart attacks, falls and equipment-related accidents resulting from poor judgement.

Additional Causal Factors for Heat Stress:

Age, weight, degree of physical fitness, degree of acclimatization, metabolism, dehydration, diet, use of alcohol, tobacco or drugs (Rx and/or illegal), and a variety of medical conditions such as hypertension all affect a person's sensitivity to heat; even the type of clothing worn must be considered. Prior heat injury predisposes an individual to additional injury. Individual susceptibility varies. In addition, environmental factors include more than the ambient air temperature. Radiant heat, air movement, conduction, and relative humidity all affect an individual's response to heat.

Heat-Related Disorders:

Heat Cramps – are usually caused by performing hard physical labor in a hot environment. These cramps have been attributed to an electrolyte imbalance caused by sweating. Cramps appear to be caused by the lack of water replenishment. Thirst cannot be relied on as a guide to the need for water; instead, water must be taken every 15 to 20 minutes in hot environments.

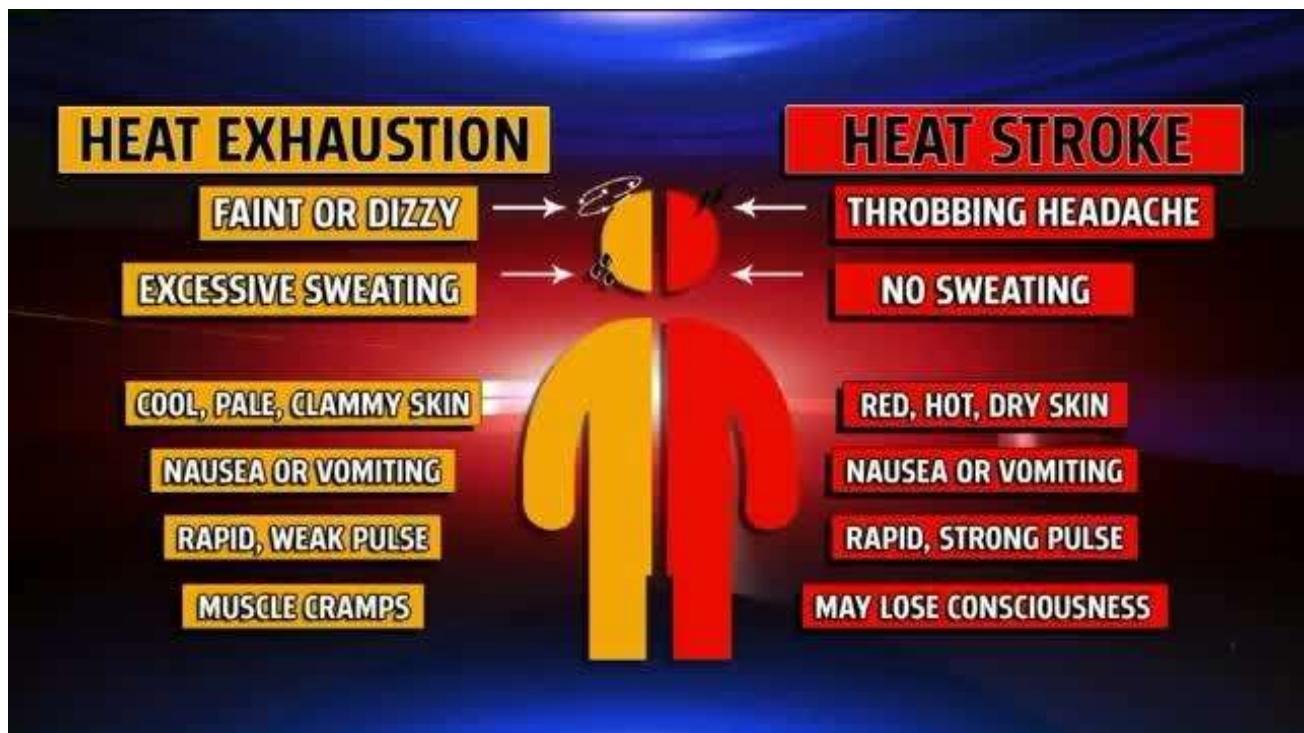
Heat Rash - are the most common problem in hot work environments where the skin is persistently wetted by unevaporated sweat. Prickly heat appears as red papules and usually in areas where the clothing is restrictive. As sweating increases, these papules give rise to a prickling sensation. Heat rash papules may become infected if they are not treated. In most cases, heat rashes will disappear when the affected individual returns to a cool environment.



Heat Fatigue - is often caused by a lack of acclimatization. A program of acclimatization and training for work in hot environments is advisable. The signs and symptoms of heat fatigue include impaired

performance of skilled manual, mental, or vigilance jobs. There is no treatment for heat fatigue except to remove the heat stress before a more serious heat-related condition develops.

Heat Exhaustion - signs and symptoms are headache, nausea, vertigo, weakness, thirst, and giddiness. Fortunately, this condition responds readily to prompt treatment. Heat exhaustion should not be dismissed lightly. Also, the signs and symptoms seen in heat exhaustion are similar to those of heat stroke, a medical emergency. Workers suffering from heat exhaustion should be removed from the hot environment and given fluid replacement. They should also be encouraged to get adequate rest and when possible ice packs should be applied.



Heat Stroke - is the most serious heat related disorder and occurs when the body's temperature regulation fails and body temperature rises to critical levels. The condition is caused by a combination of highly variable factors, and its occurrence is difficult to predict. Heat stroke is a medical emergency that may result in death. The primary signs and symptoms of heat stroke are confusion; irrational behavior; loss of consciousness; convulsions; a lack of sweating (usually); hot, dry skin; and an abnormally high body temperature, e.g., a rectal temperature of 41°C (105.8°F).

If a worker shows signs of possible heat stroke, professional medical treatment should be obtained immediately. The worker should be placed in a shady, cool area and the outer clothing should be removed. The worker's skin should be wetted and air movement around the worker should be increased to improve evaporative cooling until professional methods of cooling are initiated and the seriousness of the condition can be assessed. Fluids should be replaced as soon as possible.

Regardless of the worker's protests, no employee suspected of being ill from heat stroke should be sent home or left unattended unless a physician has specifically approved such an order.

Call Public Safety at x4444 or (971) 722-4444 for all suspected cases of heat stroke

Engineering Controls:

General ventilation - dilutes hot air with cooler air (ideally, bringing in cooler outside air) and is the most cost effective). Portable or local exhaust systems may be more effective or practical in smaller areas.



Air treatment/air cooling differs from ventilation because it reduces the temperature of the air by removing the heat (and sometimes humidity) from the air. **Air conditioning** is a method of air cooling which uses a compressed refrigerant under pressure to remove the heat from the air. **Local air cooling** can be effective in reducing air temperature in specific areas, e.g., cool rooms, can be used to enclose a specific workplace or to offer a recovery area near hot jobs. The second type is a portable blower with built-in air chiller. The main advantage of a blower, aside from portability, is minimal set-up time.

Administrative / Work Practice Controls:

Acclimatize workers by exposing them to work in a hot environment for progressively longer periods.

Replace Fluids by providing cool (50°-60°F) water or any cool liquid (except alcoholic beverages) to workers and encourage them to drink small amounts frequently, e.g., one cup every 20 minutes. Ample supplies of liquids should be placed close to the work area. Although some commercial replacement drinks contain salt, this is not necessary for acclimatized individuals because most people add enough salt to their summer diets. Reduce consumption of diuretics that cause fluid loss, such as coffee, tea or sodas containing caffeine.



Reduce the physical demands by reducing physical exertion.

Provide recovery areas such as air-conditioned enclosures and rooms and provide intermittent rest periods with water breaks.

Develop a heat stress training program, and incorporate into health and safety plans at least the following components:

- Knowledge of the hazards of heat stress;
- Recognition of predisposing factors, danger signs, and symptoms;
- Awareness of first-aid procedures for, and the potential health effects of, heat stroke;
- Employee responsibilities in avoiding heat stress;
- Dangers of using drugs, including therapeutic ones, and alcohol in hot work environments;
- Use of protective clothing and equipment; and
- Purpose and coverage of environmental and medical surveillance programs and the advantages of worker participation in such programs.

Questions or comments? Call Environmental Health & Safety at (971) 722-2875 or request safety services via the Service Request Center: (971) 722-4800 or src@pcc.edu