Safety Discussion

Supervisor News – Managing Heat Stress

How your Body Reacts to Hot Conditions

Four environmental factors affect the amount of stress a worker faces in a hot work area: *temperature*, *humidity*, *radiant heat* (such as from the sun or a furnace) and *wind speed*. Individuals with high blood pressure or some heart conditions and people who take diuretics (water pills) may be more sensitive to heat exposure.

The body defends itself from heat through three mechanisms: breathing, sweating, and changing the blood flow. The first reaction is to circulate blood to the skin, which increases skin temperature and allows the body to give off some heat. During heavy work, muscles need more blood flow, which reduces the amount of blood available to flow to the skin and release the heat.

Sweating also helps the body to cool off, but only when the humidity levels are low enough to allow the sweat to evaporate and if water and salts lost through sweating is replaced.

Heat Stress Disorders

When the body becomes overheated, a condition of heat stress exists. Heat stress can lead to a number of problems, including heat exhaustion, heat stroke, heat cramps, fainting, or heat rash. Many people confuse these disorders, but it is important to be able to recognize each one and know what to do when it happens. Each of these heat stress disorders is described below.

Heat exhaustion

Although not the most serious health problem, heat exhaustion is the most common heat-related ailment. Heat exhaustion happens when a worker sweats a lot and does not drink enough fluids or take in enough salt or both. The simple way to describe the worker is wet, white and weak.

Signs and symptoms

Sweaty
Weak or tired, possibly giddy
Nausea
Normal or slightly higher body temperature
Pale, clammy skin (sometimes flushed)

What to do

Rest in a cool place
Drink an electrolyte solution, such as Gatorade or another sports drink. Avoid caffeinated beverages such as colas, iced tea or coffee.
In severe cases involving vomiting or fainting, seek medical assistance - **contact 911**

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Heat stroke

Heat stroke is the ***most serious health problem*** for people working in the heat, but is not very common. It is caused by the failure of the body to regulate its core temperature. Sweating stops and the body cannot get rid of excess heat. Victims will die unless they receive proper treatment promptly.

Signs and symptoms

Mental confusion, delirium, fainting, or seizures
Body temperature of 106ºF or higher
Hot, dry skin, usually red or bluish color

What to do:

Call 9-1-1 immediately and request an ambulance
Move victim to a cool area
Soak the victim with cool water
Fan the victim vigorously to increase cooling

Heat cramps

Heat cramps are painful muscle spasms. They occur when a worker drinks a lot of water, but does not replace salts lost from sweating. Tired muscles – those used for performing the work – are usually the most likely to have the cramps.

Signs and symptoms:

Cramping or spasms of muscles
May occur during or after the work

What to do

Drink an electrolyte solution (sports drink) such as Gatorade
If the cramps are severe or not relieved by drinking a sports drink, seek medical attention from your local hospital as appropriate.

Fainting (Heat Syncope)

Fainting usually happens to someone who is not used to working in the hot environment and simply stands around. Moving around, rather than standing still, will usually reduce the likelihood of fainting.

Signs and symptoms

Brief loss of consciousness
Sweaty skin, normal body temperature
No signs of heat stroke or heat exhaustion

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What to do:

Lie down in a cool place
Seek medical attention if not recovered after brief period of lying down

Heat rash

Heat rash, also called prickly heat, may occur in hot and humid environments where sweat cannot evaporate easily. When the rash covers a large area or if it becomes infected, it may become very uncomfortable. Heat rash may be prevented by resting in a cool place and allowing the skin to dry.

Signs and symptoms

rash characterized by small pink or red bumps
irritation or *prickly* sensation
itching

What to do

keep skin clean and dry to prevent infection
wear loose cotton clothing
cool baths and air conditioning are very helpful
some over-the counter lotions may help ease pain and itching

Preventing Heat Stress

In most cases, heat stress can be prevented or, at least, the risk of developing heat stress can be reduced.

Engineering Controls

A number of engineering controls can help reduce heat exposure. These include:

general and local exhaust ventilation in areas of high heat
shielding of radiant heat sources, such as furnaces or hot machinery
elimination of steam leaks
use of cooling fans or personal cooling devices, such as cooling vests
use of power tools to reduce manual labor

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Work Practices

Clothing: Wear loose-fitting, lightweight clothing, such as cotton, to allow sweat to evaporate. Light colors absorb less heat than dark colors. When working outside, wear a lightweight hat with a good brim to keep the sun off your head and face.
Drinking: Drink plenty of liquids, especially if your urine is dark yellow, to replace the fluids you lose from sweating – as much as one quart per hour may be necessary. Water and/or sports drinks are recommended. Since caffeine is a diuretic (makes you urinate more), beverage such as cola, iced tea and coffee should be avoided. Thirst is not a reliable sign that your body needs fluids. When doing heavy work, it is better to sip rather than gulp the liquids.
Work Schedule: If possible, heavy work should be scheduled during the cooler parts of the day. Otherwise, alternate heavy work in the heat with lighter work or work in cooler areas. When the temperature humidity index is between 84 and 93 (Warning Zone), try to minimize the amount of time working in the heat such that approximately half of each hour is spent doing heavy work in the heat. When the temperature humidity index is 94 or higher (Danger Zone), this should be further minimized to approximately one quarter of each hour spent doing heavy work in the extreme heat.
Acclimatization: New employees and workers returning from an absence of two weeks or more should have 5 days to get used to the heat. Begin with 50 percent of the normal workload and time exposure the first day and gradually build up to 100 percent on the fifth day.
Body Weighing: Workers may be at greater risk of heat stress if they lose more than 1.5% of their body weight in a single day from sweating.

Personal Protective Equipment

When work must proceed in hot conditions at Princeton, personal cooling systems may help reduce the risk of heat stress. There are several systems available through health and safety catalogs, including the following:

Heat reflective clothing may alleviate the problem of radiant heat sources, such as furnaces. However, if the worker is fully covered, he or she will have trouble evaporating sweat.
Ice vests or cooling vests remove heat from the skin. They are relatively inexpensive and allow freedom of movement.
Liquid cooling systems also remove heat from the skin. Cool liquid flows in the suit around the body and carries the heat away.

Training

Employees and supervisors need to be trained to be able to detect early signs of heat stress. Employees must understand the need to replace fluids and salt from sweat and recognize the signs of dehydration, fainting, heat cramps, heat exhaustion, and heat stroke.

Supervisors should watch for signs of heat stress and allow workers to interrupt their work if they are extremely uncomfortable. Supervisors should also ensure that work schedules allow appropriate rest periods and ensure liquids are available. They should use appropriate engineering controls, personal protective equipment and work practices to reduce the risk of heat stress.

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