



UNC CHARLOTTE

Environmental Health and Safety Office

HEAT STRESS PROGRAM

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HEAT STRESS PROGRAM

The University of North Carolina at Charlotte is committed to the health and safety of our students, faculty, staff and visitors. The goal of this Program is to minimize the detrimental effects of excessive heat on UNC Charlotte employees who are required to work outdoors or within indoor environments with elevated temperatures. Effective measures to prevent heat stress vary by department, job duties and the work environment. Please contact the Environmental Health and Safety (EH&S) Office for assistance in implementation the most effective preventative heat stress measures.

BACKGROUND

Heat Stress is influenced by several risk factors: climatic conditions, the work environment, demands of the work, clothing and personal characteristics.

Climatic and environmental conditions that affect the risk of heat-related disorders are air temperature and humidity, air movement, and the temperature of surrounding surfaces which affects radiant heat exchange.

Demands of the work influence the stress on the temperature regulation system. Individual responses to a given work load vary but, as an employee expends more energy, the body's internal metabolic heat production rises. This increases stress on the cardiovascular system to regulate body temperature (i.e., by increasing blood flow to skin). Work-related factors that influence heat stress include work rate, level of physical effort, and duration of activity.

Clothing characteristics such as insulation, permeability, weight, fit and ventilation affect the body's ability to regulate internal temperatures. Other factors that may increase the risk of heat-related disorders include additional equipment, the use of a respirator, or other personal protective equipment (PPE).

Personal characteristics such as age, weight, previous heat stress injury, underlying medical conditions (e.g., diabetes, cardiovascular disorders, chronic pulmonary disease, and thyroid disorders), medication use and overall health and physical fitness contribute to an employee's susceptibility of contracting a heat-related illness.

Working in an environment with heat stress not only increases the risk for specific heat related conditions such as heat exhaustion and heat stroke, but also increases the risk for other adverse events. A study conducted by NIOSH (National Institute for Occupational Safety and Health) links the signs of heat stress (e.g., lower mental alertness and physical performance) to an increase in workplace accidents.

SIGNS AND SYMPTOMS OF HEAT-RELATED DISORDERS

Heat related disorders may occur when there is an exposure to heat risk factors. Table 1 below illustrates some of the signs, symptoms, preventative measures and responses associated with heat stress. It is important to remember that heat related illnesses can rapidly develop into life-threatening situations. If an employee develops heat exhaustion, heat stroke and/or heat collapse, the employee should receive immediate medical attention.

TABLE 1 (SIGNS & SYMPTOMS OF HEAT-RELATED DISORDERS)

| Disorder | Signs | Symptoms | Prevention | Response |
|-----------------|---|---|--|---|
| Dehydration | Loss of work capacity Delayed response to stimuli | Fatigue Weakness Dry mouth | Fluid replacement | Cool environment. Drink water or carbohydrate-electrolyte replacement liquid. |
| Heat Exhaustion | High pulse rate, confusion, anxiety Profuse sweating Low blood pressure Pale face, or flushing Body temperature increased but below 104 degrees F. Excessive thirst, decrease urine output | Fatigue, malaise Weakness Blurred vision Dizziness Headache Nausea Loss of appetite | Fluid Replacement Acclimatization Exercise | Contact medical responders immediately. If applicable, worker should be removed from hot environment and given fluid replacement. |
| Heat rash | Skin eruptions | Itching skin, prickly sensation | Keep skin clean and periodically let skin dry. | Remove from hot environment. Keep skin clean and dry. |

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| Disorder | Signs | Symptoms | Prevention | Response |
|--------------|---|---|---|---|
| Heat Stroke | Red face Mental status changes such as Disorientation, Confusion or Irritability Hot, dry skin Erratic behavior Collapse Shivering Body temperature >104 F | May be same as those for heat exhaustion (see above) | Self-determination of heat stress exposure. Maintain a healthy life-style. Acclimation. | Contact medical responders immediately. If applicable, worker should be removed from hot environment and given fluid replacement. |
| Heat Cramps | Incapacitating pain in muscle | Muscle cramps (abdominal and lower extremities) Fatigued muscles | Fluid Replacement | Massage muscle. Rest in cool area. Drink small amounts of water or carbohydrate-electrolyte replacement liquid. |
| Heat Syncope | Brief fainting or near fainting behavior | Blurred vision | Flex muscles several times before moving. | Lie on back in cool environment. Drink water. |

Any questions regarding heat-related health disorders (signs, symptoms, prevention, or treatment) should be directed to the Student Health Center at 704-687-7400. Any questions regarding your physical abilities and heat-related health disorders should be referred to your personal physician.

PREVENTIVE CONTROLS

A control is a mechanism used to minimize or eliminate an exposure to a hazard, such as heat. There several controls (Acclimatization, Administrative, Engineering, PPE, Monitoring) that can be implemented to reduce exposure to excessive heat. Each person and situation is unique, so controls and their application will vary. Contact EH&S for help in selecting the most appropriate preventive measures for your work.

ACCLIMATIZATION

The human body can adapt to heat exposure to some extent. This physiological adaptation is called acclimatization. After a period of acclimatization, the same activity will produce fewer cardiovascular demands. The worker will sweat more efficiently (causing better evaporative cooling), and thus will more easily be able to maintain normal body temperatures.

A properly designed and applied acclimatization program decreases the risk of heat-related illnesses. Such a program basically involves exposing employees to work in a hot environment for progressively longer periods. NIOSH (1986) says that, for workers who have had previous experience in jobs where heat levels are high enough to produce heat stress, the regimen should be 50% exposure on day one, 60% on day two, 80% on day three, and 100% on day four. For new workers who will be similarly exposed, the regimen should be 20% on day one, with a 20% increase in exposure each additional day.

ADMINISTRATIVE CONTROLS

Administrative controls, also known as work strategy controls, are strategies used by supervisors to limit exposure to a hazard. For example, changes to the work schedule (i.e., when and how the job is performed) can limit the amount of time an employee is exposed to elevated temperatures. Developing and training employee on heat stress and good work practices.

ENGINEERING CONTROLS

Engineering controls are physical changes made to the work environment, such as adding fans, opening windows, installing shades, equipment canopies or air conditioning to an indoor environment.

WORK PRACTICES AND PERSONAL PROTECTIVE EQUIPMENT

Other than hats and loose-fitting clothing, there is a limited selection of personal protective equipment to reduce the risk of heat stress. Contact EH&S for help in evaluating the effectiveness of available personal protective equipment.

In some cases, personal protective equipment—such as impermeable protective clothing and respirators—may increase the risk of developing a heat-related disorder. If such PPE is truly necessary, administrative and engineering controls may be necessary to allow work in heat risk environments. Contact EH&S for help with these decisions.

MONITORING FOR SIGNS AND SYMPTOMS OF HEAT STRESS

Supervisors, coworkers and employees themselves are responsible for monitoring for the signs and symptoms of heat-related disorders. See the above table for information on recognizing the signs and symptoms of impending heat stress. A supervisor or coworker is often in the best position to observe the onset of a heat-related disorder.

- When heat stress risks are present, supervisors should regularly check workers (by observation and questions) for signs and symptoms of heat stress.
- Take extra care to monitor those at high risk, such as employees who are older or overweight, employees who overexert themselves, and employees with chronic medical conditions including diabetes, heart or lung disease, thyroid disease or high blood pressure. Employees who take certain medications may also be at increased risk and need to check with their physician.
- If you need to work outdoors or within indoor environments with elevated temperatures, monitor yourself for the signs and symptoms of heat-related illness, such as taking your own pulse.
- Use a buddy system. When working in the heat, monitor the condition of your coworkers and have someone do the same for you.
- Supervisors should check to ensure that employees are self-monitoring, and ask for their determinations.

DEPARTMENT AND SUPERVISOR RESPONSIBILITIES

Every UNC Charlotte department with employees who must work outdoors or in environments with extreme heat are required to address heat stress by providing training, administrative controls and/or engineering controls.

Supervisors are required to provide initial heat stress training for each employee who must work outdoors or in environments with extreme heat. Documentation of this initial training shall be submitted to EH&S. Supervisors are required to review heat stress training with their staff at the beginning of the hot weather season, the beginning of any new job with the potential for heat stress or whenever relevant work procedures change. During the warm season, supervisors should closely monitor their staff to ensure that the work units' heat stress Job Safety Analysis is being followed, and evaluate if any additional measures are needed. Contact the EH&S office to complete your job safety analysis.

Cool water should be immediately available to any employee who is required to work outdoors or within indoor environments with excessively hot temperatures.

TRAIN EMPLOYEES WHO ARE AT RISK OF HEAT STRESS

Heat stress training should include:

- A review of heat-related disorders and their risk factors.
- Recognition of the signs and symptoms of heat-related disorders, and the importance of monitoring for them.
- Preventive measures that will be used.
- Fluid replacement options and expectations.

ISSUE HEAT ALERTS

When conditions are present that contribute to heat stress, departments and work units are to alert at risk employees and implement their preventive measures for working in heat. The alert should include a reminder of signs and symptoms, how to control exposure, and a re-emphasis of the preventive work strategies to be followed.

EMPLOYEE'S RESPONSIBILITY

Employees who work outdoors or within indoor environments with elevated temperatures have the following responsibilities:

- Participate in your work unit's heat stress training. Learn the signs and symptoms of heat stress, as well as risk factors.
- Take extra care if you are at high risk. You may be at increased risk if you are older or overweight, you overexert, you have a chronic medical condition including diabetes, heart or lung disease, thyroid disease or high blood pressure. If you take medications, you should check with your doctor to see if you are at increased risk because of the effects of these medications.
- Follow the preventive measures listed in your department Job Safety Analysis.
- Take time to acclimate to heat and humidity. A heat wave is stressful to your body. You will have a greater tolerance for heat if you limit physical activity until you become accustomed to it.
- Stay hydrated by drinking small amounts of cool water frequently, to relieve thirst and maintain adequate urine output.
- Wear appropriate clothing. Choose lightweight, light-colored, loose-fitting clothing.
- Pace yourself. Start slowly and pick up the pace gradually.
- Monitor yourself for the signs and symptoms of heat-related illness, described above.
- When working in the heat, monitor the condition of your co-workers. Ask your coworker to do the same for you.

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- Protect yourself from the sun by wearing a wide-brimmed hat. (Sunglasses and sunscreen—SPF 15 or higher—are also recommended.)
- Promptly report to your supervisor any known or suspected unsafe conditions, or unsafe procedures.

EXPOSURE MONITORING

Upon request, EH&S will evaluate the workplace for heat stress risk and recommend ways to manage exposure to heat. Temperature exposure, the demands of the work, and protective equipment will be evaluated. Recommendations will address controls and safe exposure times and for a given level of heat stress.