



JEROME E. SPEAR

# THE SERIOUSNESS OF HEAT ILLNESS

Make sure you know the risks.

**T**he National Weather Service cites excessive heat is the number one weather-related killer—causing more fatalities each year than floods, lightning, tornadoes, hurricanes, winter storms, and extreme cold.

Evidence from the Centers for Disease Control, the American Red Cross, and the National Institute of Occupational Safety and Health show hot temperatures cause hundreds of employees working outdoors (and in hot work environments) to experience heat-related illnesses and deaths.

Heat illness can be prevented by recognizing and controlling the risks.

## What Is Heat Illness?

Heat illness results when the body is out of heat balance—the heat the body produces equals the heat it loses. When the body is out of heat balance, it produces and retains more heat than it loses, causing heat illnesses ranging from heat rash and heat cramps to heat exhaustion and heat stroke. Heat stroke requires immediate medical attention—as it can result in death.

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The activity of moving muscles doing physical work is the major source of heat buildup in the body. About 75% of the stored energy the body uses to do physical work is converted into heat. About 25% of the energy is converted into the movements required to perform work. The more strenuous the physical activity, the more internal heat the body produces. Doing physical work when the risks for heat illness are present increases the internal heat the body produces.

Added to this internal heat is the outside, external heat load on the body that comes from working where environmental risks like hot air, direct sunlight, or lack of shading are present. A major danger that hot weather, high relative humidity, and lack of air movement poses is these conditions greatly slow the body's natural processes of releasing heat to the surrounding environment. All of these increase the risk of heat illness.

## Environmental Risks for Heat Illness

Risks posed by the environment can increase the external heat load on the body. Outdoor working conditions create the possibility heat illness could occur.

- ▲ **Air temperature:** During high heat, the air temperature greatly increases the risk of heat-related illness. Cal/OSHA defines high heat when the air temperature is equal to or exceeds 95°F. High heat can be worse in low-lying regions like valleys and depressions where stagnant atmospheric conditions trap the lower layer of hot air and prevent air circulation.
- ▲ **Relative humidity:** When there is high humidity, sweat doesn't readily evaporate off the skin. This greatly slows the body's natural processes of releasing heat to the surrounding environment, causing the body to quickly overheat.
- ▲ **Radiant heat from the sun and other sources:** The body may gain heat from radiant heat sources if the body is cooler than the radiant heat source and may lose heat if the body is hotter than the radiant heat source. Providing shade helps the body to cool from radiant heat sources like the sun.
- ▲ **Conductive heat sources:** Since conduction is another way heat may be transferred to and from the body, being in contact with a hot surface like sitting on the hot ground or in a chair that has been sitting in the sun may limit the body's ability to cool itself.
- ▲ **Air movement:** Air flowing past the body can cool the body only if the air temperature is cooler than about 95°F. If the temperature is hotter than 95°, the body can gain heat by the hot air flowing past the body. This is why fans don't provide effective cooling when the air temperature is hotter than 95°.
- ▲ **Workload severity and duration:** Strenuous work causes the body to heat up and is a major source of heat gain for the body. Employees performing strenuous work out in the heat need more frequent breaks than others performing less strenuous work in the heat.
- ▲ **Protective clothing and personal protective equipment:** The type and level of PPE worn are major factors that determine an employee's added risk of heat illness. Wearing PPE that covers the body or face limits air movement and the cooling effects of sweating. It greatly reduces the release of heat from the body to the

surrounding environment and increases the heat load on the body. Also, wearing dark colored or tight fitting work clothes can increase the risk of heat illness.

## Personal Risks for Heat Illness

Besides outside environmental risks are internal, personal conditions that present risks for heat illness.

- ▲ **Water consumption:** In hot conditions, drinking enough water to stay hydrated is vital for maintaining a normal body temperature. When working in the heat, the body loses a lot of water through sweating. Sweating helps lower the internal body heat, but as the body continues to lose water, it needs replaced to prevent dehydration and heat illness. Dehydration results in less perspiration, so the body can't get rid of heat fast enough and increases the heat load. Without drinking enough water, the body overheats.
- ▲ **Alcohol consumption:** Drinking alcohol increases dehydration and the body's requirements for water. Sweating can cause the body to lose large amounts of water. As the body becomes dehydrated, more water is needed to replace bodily fluids. Dehydration increases a person's susceptibility to heat illness. So it is important for employees working in hot environments to drink adequate amounts of water—and avoid drinking any alcoholic beverages!
- ▲ **Adapting to the heat:** Workers new to outdoor jobs are most at risk for heat-related illnesses. Some years ago, OSHA investigated 25 incidents of heat-related illness. In almost half the cases, a worker was on their first day on the job and in 80% of the cases, a worker had only been on the job for four days or fewer. That's why it is important to gradually increase the workload or allow more frequent breaks to help new workers, and those returning to a job after time away, to build up a tolerance for hot conditions.
- ▲ **Caffeine consumption:** If employees choose caffeinated drinks, they may drink less water. Coffee, sodas, and drinks containing caffeine and sugar may increase dehydration and its effects on the body. It is important to encourage employees to choose water over these types of drinks.
- ▲ **Medications:** Over-the-counter medicines, prescription medicines, and other drugs may increase the risk for heat illness. These substances may affect the body's ability to retain water and alter its ability to deal with heat—and may even reduce a person's being aware they are experiencing symptoms of heat illness.
- ▲ **Physical condition:** Physical fitness greatly influences a person's ability to perform work under heat stress. The more fit someone is, the more work they can safely perform. A worker who is physically fit, compared to someone unfit, will have:
  - Less strain on their heart, lungs, and muscles
  - A lower body temperature, which indicates less body heat retained
  - A more efficient sweating mechanism

## DACUM Codes

To help meet your professional needs, this column covers skills and competencies found in DACUM charts for drillers and pump installers. DO refers to the drilling chart and PI represents the pumps chart. The letter and number immediately following is the skill on the chart covered by the column. This column covers:

### DOD-4, DOD-8, DOK-9, DOL-2, PIB-2, PIG-3

More information on DACUM and the charts are available at [www.NGWA.org/Certification](http://www.NGWA.org/Certification) and click on "Exam Information."

- Slightly lower oxygen consumption
- Slightly lower carbon dioxide production.
- ▲ **Age:** Working at full capacity declines with increasing age—but is not always the case. Active, well-conditioned seniors often have performance capabilities equal to or greater than younger, less active workers. But don't ignore there is some evidence that older individuals are less effective when it comes to working in a given level of environmental heat and workloads.
- ▲ **Weight:** Overweight individuals produce more heat than thin individuals. Thus, overweight individuals should be given special consideration in situations involving heat stress. However, when wearing the right kind of protective clothing and equipment, the weight of an individual is not a critical factor in determining the ability to dissipate excess heat.

## Risk Assessment and Planning

Once more, heat illness results when the body is out of heat balance. Heat balance means the heat the body produces equals the heat it loses. When the body is out of heat balance, it produces and retains more heat than it loses, causing heat illness. Heat illnesses range from heat rash and heat cramps to heat exhaustion and heat stroke. Heat stroke requires immediate medical attention, and can result in death.

The steps to protect employees from heat illness are the same type of steps to follow when addressing other hazards in the workplace.

1. Develop a plan to prevent heat illness for outdoor work based on both the environmental and personal risks.
2. Train your workers how to recognize and prevent heat-related illness.
3. Track and monitor the environmental risks (such as the heat index) and communicate the required precautions to workers.
4. Activate your plan and revise the plan as needed throughout the long, hot summer. **WWJ**

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