



RISK AHEAD

Risk Control Alert

May 2018

HEAT-RELATED ILLNESSES

The first day of summer returns in the middle of June each year, but depending on your location, the first reported cases for heat-related illnesses have probably already occurred. Indoor or outdoor activities, in locations that are inherently hot, expose workers to environmental heat stress that may lead to severe illness or death.

Normally, the main source of heat is generated internally by your body. Metabolic heat is generated within the body by the biochemical processes that keep us alive, and by the energy used during physical activity. The body exchanges heat with its surroundings mainly through radiation, convection, and evaporation of sweat.

Radiation is the process by which the body gains heat from surrounding hot objects, such as hot metal, furnaces, or steam pipes, and loses heat to cold objects, such as chilled metallic surfaces, **without contact** with them. No radiant heat gain or loss occurs when the temperature of surrounding objects is the same as the skin temperature (about 35°C or 95°F).

Convection is the process by which the body exchanges heat with the surrounding air. The body gains heat from hot air and loses heat to cold air which comes **in contact** with the skin. Convective heat exchange increases with increasing air speed and increased differences between air and skin temperature.

Evaporation of sweat from the skin cools the body. Evaporation occurs more quickly, and the cooling effect is more noticeable with high wind speeds and low relative humidity. In hot and humid workplaces, the cooling of the body, due to sweat evaporation, is limited because the air cannot accept more moisture. In hot and dry workplaces, the cooling, due to sweat evaporation, is limited by the amount of sweat produced by the body.



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The body also exchanges small amounts of heat by **conduction** and breathing. However, the amount of heat exchanged through conduction and breathing is normally small enough to be ignored in assessing the heat load on the body.

Heat-related illnesses occur when at-risk workers build up metabolic heat faster than their bodies can release it and cool down. In a limited study of 20 cases investigated by OSHA, in which 13 deaths occurred, it was found that four of the deaths occurred on the first day of work in a new job, or after returning from time away from the job. Three deaths occurred on the second day, and two on the third day (9 deaths within the 1st three days). Long-term workers made up the other 4 deaths. In cases that involved heat illness but not death, the number of days on the job did not appear to have an effect.

This is similar to other studies that found that the failure to support acclimatization appears to be the most common deficiency for employers that have employees at-risk, and the factor most clearly associated with death. Acclimatization to hot environments, by gradually increasing duration of work in the hot environment is an important preventative measure. Employers need to provide time for workers to acclimatize when they have been absent from work more than a few days (for new workers or workers returning to a job, where exposure to heat-related illness may occur). New workers, and all workers returning from an absence of more than a week, should begin with 20% of the usual duration of work in the hot environment on the first day, increasing incrementally by no more than 20% each subsequent day¹. During a rapid increase in excessively hot weather, like a heat wave, even experienced workers should begin on the first day of work (in excessive heat) with 50% of the usual duration of work, 60% on the second day, 80% on the third day, and 100% on the fourth day¹. Full acclimatization might take up to 14 days or longer to attain, depending on individual or environmental factors.

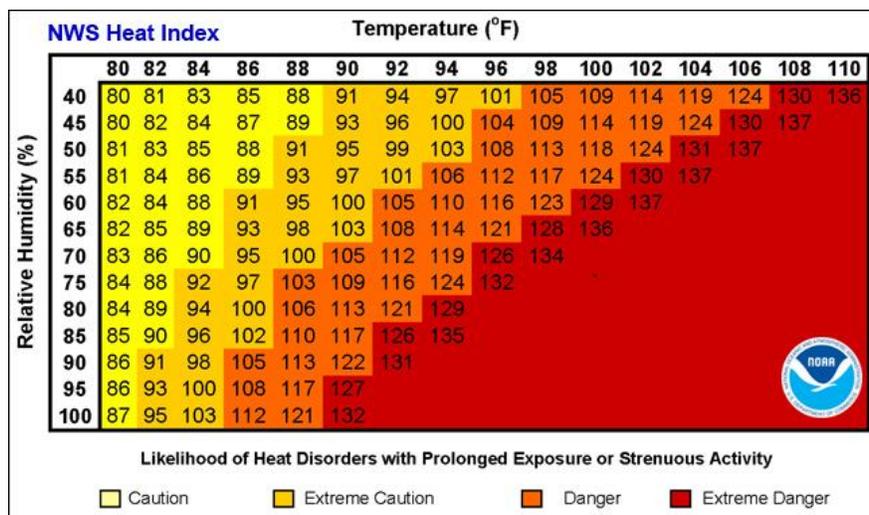


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Important elements for employers to consider when addressing heat-related illness include assigning a responsible person for developing and executing a heat-related illness prevention program within the company. Goals for the program should include plans for:

1. Gradual acclimatizing of workers;
2. Monitoring the temperature (e.g., heat index and wet bulb globe temperature) of their worksite;
3. Worker hydration (water) before, during, and after work;
4. Providing shaded and cool areas for rest breaks;
5. Modifying work schedules to reduce workers' exposure to heat;
6. Training workers on the signs and symptoms of heat illness;
7. Monitoring workers for signs of heat stress; and
8. Planning for emergencies and response.

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1. Heat Illness and Death Among Workers — United States, 2012–2013
<http://www.cdc.gov/mmwr/preview/mmwrhtml/mm6331a1.htm>
2. National Oceanic and Atmospheric Administration, National Weather Service Heat Index
<https://www.weather.gov/safety/heat-index>