Workers who are exposed to extreme heat or work in hot environments, or even those engaged in strenuous physical activities may be at risk for heat stress. Exposure to extreme heat can result in occupational illnesses, including heat stroke, heat exhaustion, heat cramps, or heat rash. Heat can also increase workers’ risk of injuries, as it may result in sweaty palms, fogged-up safety glasses, burns, dizziness, and may reduce brain function responsible for reasoning ability, creating additional hazards. The NIOSH Education and Information Division (EID) develops heat-related guidance and educational materials in collaboration with scientists internal and external to NIOSH.

In 2016, NIOSH published an updated Criteria for a Recommended Standard: Occupational Exposure to Heat and Hot Environments.1 This document provides technical guidance for managing heat stress in workplaces, and targets safety and health professionals. In addition, NIOSH has created products in many different formats for varying occupational safety and health (OS&H) audiences (e.g., workers, employers, safety and health professionals) to ensure the information is translated and disseminated as widely as possible. Future efforts include the development of heat stress training for outdoor workers.

According to data from the U.S. Bureau of Labor Statistics, there were 220 fatal occupational injuries due to exposure to environmental heat from 2011 to 2016. Heat-related illnesses (HRIs) can vary in severity, with heat stroke often leading to death.

Who works in hot environments?

In 2011, the Bureau of Labor stated that 2 out of every 1000 workers are at risk for heat stress, with some occupations at greater risk.

Outdoor Workers
- Construction
- Roofers
- Farmers/Agricultural
- Laser cutters/lasercutters
- Foresters
- Police

Indoor Workers
- Firefighters
- Factory/Foundry
- Bakery
- Anyone in hot, confined spaces

Not Enough Fluids
- Sweat production rates of about 1 L/hr are common in industrial work.
- Heavy sweating could result in a 2-3% deficit in body weight at end of shift.

PPE and Clothing
- Alters the rate and amount of heat exchange between skin and air.
- The thinner and greater the air and vapor impermeability, the greater its resistance with heat exchange.
- High humidity environments created from increased metabolic heat production during exertion and trapped inside clothing or PPE.

Physical Condition (e.g. obesity)
- Predisposes individuals to heat disorders.
- Extra weight calls for a greater expenditure of energy.
- Fat provides additional insulation.
- Lower physical fitness, decreased maximum work capacity and cardiovascular capacity.

Lack of Recent Exposure (i.e., unacclimated)
- Readily show signs of heat stress.
- Difficulty replacing water lost in sweat.
- Failure to replace the water lost will slow or prevent acclimatization.

Heat-related Illness
- Headache
- Fatigue
- Dizziness
- Malaise
- Muscle cramps
- Weakness
- Nausea
- Vomiting
- Heat rash

Employers should provide appropriate hydration
- Water should be cool and near the work area
- Provide individual drinking bottles
- Encourage workers to hydrate

Training
Workers and Supervisors:
- Recognize symptoms of HRI
- First aid
- HRI risk factors
- Importance of acclimatization
- Importance of reporting HRI symptoms

Additional Training for Supervisors:
- Implementation of an acclimatization plan
- Procedures for when HRI symptoms are present
- Monitoring weather reports and responding to advisories
- Monitoring and encouraging adequate hydration and rest breaks

Heatstroke
- Core body temperature > 105°F
- Generalized, often severe symptoms
- Loss of consciousness

Heat exhaustion
- Core body temperature < 105°F
- More common than heat stroke
- Fatigue, weakness, light-headedness, nausea, vomiting

Heat cramps
- Muscle spasms
- Fatigue
- Cramping

Heat rash
- Small red or brown skin bumps
- Itching

Rest Breaks
- Avoid exercise for an hour after a hot spell
- Drink cool fluids
- Cool down gradually
- Stay hydrated

References

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Document provides technical guidance for managing heat stress in workplaces, and targets safety and health professionals. In

Future Projects
Stakeholders have shown ongoing interest in having training modules made available based on the information found in the NIOSH Criteria Document. In the near future, there are plans to develop online heat stress training for outdoor workers and evaluating the training among different sectors.

Along with developing online heat stress training, the NIOSH Small Business Assistance Program is interested in developing tools that could be of use to small businesses. Small businesses are often found in occupational sectors (e.g., construction, agriculture, services) that experience a high heat burden, in addition to having OSH-related challenges specific to their small size and lack of resources.

Hypothermia
- Core body temperature < 90°F
- Common in cold and wet environments
- Shivering, slurred speech

Sweaty palms, fogged-up glasses

Fainting, confusion

If you are:

Drink:

Sports drinks containing balanced electrolytes

1 cup (8 oz) of water every 15-20 minutes

Experiencing prolonged sweating lasting several hours

References