



U.S. Geological Survey Manual

*Appendix 45-1
Part 445-2-H Chapter 45*

Heat-Related Illnesses

There are a number of illnesses that can be attributed to excessive heat exposure. There may be no observable progression from one to another. The following is a list of heat-related illnesses and recommended first aid:

Miliaria is a medical term used to define several forms of heat rash. Outbreaks of miliaria generally occur on areas of the skin that are both covered by clothing that rubs on the area and is continually wetted by sweat. If untreated it can worsen and lead to a serious infection. Miliaria can be prevented and treated by good hygiene and by keeping the area as clean and dry as possible. Allowing the skin to dry completely between heat exposures is important.

Heat edema is caused by swelling of the hands and feet upon initial exposure to heat. It is a mild heat illness that normally goes away once you become accustomed to the heat.

Heat syncope occurs when an individual faints from the heat. This usually happens when an individual is standing or sitting in one position for extended periods of time without moving. The blood tends to pool in the dilated blood vessels in the lower body and skin causing the person to temporarily lose consciousness (sometimes when rising from a seated position). This generally happens to individuals that are not acclimated to the heat. First-aid treatment requires moving the individual to a cooler area to rest lying down. Cool water can be given if the individual is conscious. Recovery is usually swift and complete.

Heat exhaustion can occur with greater frequency and severity in individuals that overexert themselves in hot environments without adequate fluid replacement and rest breaks. Symptoms of heat exhaustion may include pale, clammy skin, nausea, fatigue, headache, and irrational behavior. The symptoms are normally attributed to dehydration, strain on the circulatory system, and diminished oxygen flow to the brain. Assist individuals suffering from heat exhaustion by bringing them to a cooler environment. Have them rest lying down and give small amounts of fluids by mouth until recovered. A good way to determine if an individual is becoming dehydrated is by the volume and color of their urine. Low urine volume that is dark in color can signal dehydration. Sometimes a worker experiencing heat exhaustion will exhibit irrational behavior or exercise poor judgment leading to errors which they would not make under normal circumstances. This can lead to workplace accidents.

Heat cramps are painful muscle spasms of the arms, legs, or abdominal muscles during or after work in the extreme heat. Heat cramps can be caused by heavy sweating during hot work plus the drinking of large volumes of water. Though water is being replaced, electrolytes are not which causes water to enter muscles which in the absence of adequate electrolytes causes

cramping. Heat cramps can be relieved by drinking liquids along with salt or electrolytes. Quicker relief can be gained at a medical facility by administering IV fluids.

Heat stroke is the most dangerous of heat injuries. **HEAT STROKE IS A MEDICAL EMERGENCY!!!** Medical care must be provided quickly in order for the victim to survive. Heat stroke symptoms may include hot, dry skin, elevated heart rate and blood pressure, seizure, involuntary tremor, loss of consciousness, and irrational behavior. After summoning medical help or during transport to a medical facility, use whatever means is available to lower the body temperature as rapidly as possible. Normally, treatment consists of rapid cooling of the body in chilled water or ice. Do not attempt to give fluids by mouth to someone that is unconscious or delirious.

Hyponatremia is a condition sometimes referred to as “water intoxication.” It is the opposite of dehydration and is often associated with long-distance events like running and cycling. Normally, this occurs when individuals consume large volumes of water over a greater than 4-hour period. As an individual consumes large amounts of water, blood plasma increases which dilutes the salt content of the blood. At the same time, the body is also losing salt by sweating. Consequently, the amount of electrolytes available in body tissues decreases over time to a point where that loss interferes with the brain, heart, and muscle function. Electrolytes must be replaced if heat-related illnesses such as heat cramps and heat exhaustion are to be avoided.