

UNDERSTANDING HEAT INJURIES (continued)

(5) The intensity of exercise should be gradually increased each day, working up to an appropriate PT schedule adapted for the environment.

(6) PT should be conducted in the morning or evening, during cooler hours. Commands should modify this guide to reflect specifics of climatic conditions in their geographic locations.

(7) Newly enlisted, reservists, and transferred military personnel are generally not acclimatized adequately to hot environments and strenuous workloads, which make them have a higher risk for heat injuries. As a part of their check-in, they should be medically screened for susceptibility to heat injury and degree of acclimatization prior to being assigned to perform their duties in a hot and humid environment.

(8) Physically fit personnel can adapt more rapidly than the less fit.

7. Avoiding a Heat Injury.

a. Drink fluids frequently in accordance with enclosure (4).

b. Avoid salt tablets unless prescribed by, and under the supervision of, a licensed physician. NAVMED P-5010 provides guidance on the proper use of salt tablets. Use of alcohol, lack of sleep, poor physical condition, lack of muscle tone, and obesity can increase an individual's susceptibility to heat. Individuals who use certain over-the-counter drugs, prescription medications, and dietary supplements, are more susceptible to heat-related injuries. Consult with command medical personnel before taking a dietary supplement, to include products containing creatine, ephedra (ma huang), performance enhancing drugs, or energy boosters. Many supplements do not have Food and Drug Administration approval and can affect rates of fluid intake available to the tissues for rehydration. Also, inform medical personnel of any known family history of heart disease, high blood pressure, diabetes, asthma, or prior history of heat related fainting or illness.

c. If individuals stop sweating, they must get immediate medical attention.

UNDERSTANDING HEAT INJURIES (continued)

d. Some foods and prescription drugs may alter the color of urine. Consult with medical personnel on these issues.

8. Training and Education.

a. Newly enlisted or transferred military personnel shall receive heat stress and awareness training prior to deployment into hot, dry, and humid environments. They shall receive the training locally from medical personnel serving their command. The training shall include the types, causes, symptoms, treatment, and prevention of heat injuries, per Common Skills Handbook.

b. PT programs for individuals who are not acclimatized should be limited in intensity and time. Enclosure (4) provides a guideline for maximum work times and work/rest periods. During the breaking-in period of 2 to 3 weeks, the workload should be increased gradually but not to the point of exhaustion. Until acclimatized, personnel will lose greater than normal quantities of water and salt. These losses must be replaced. Although acclimatization increases tolerance for heat, it does not make an individual immune from suffering a heat injury.

c. Individuals who are overweight or have problems with sweating and/or blood circulation and individuals who have suffered prior heat-related injuries are more susceptible to another, usually more serious, heat injury. Refer individuals for medical attention: (1) who have experienced previous illness; (2) who currently are ill or recovering from an acute or chronic disease; (3) who are using health or muscle building supplements; and (4) who take over-the-counter drugs or prescription medications.

9. Effects of Clothing on Military Operations. Military personnel who wear MOPP gear should be aware that the addition of MOPP gear and other equipment can substantially increase the risk of heat injury even in physically fit, acclimatized, and well hydrated individuals. Enclosure (4) contains fluid replacement guidelines for warm weather training. Local commanders and unit leaders will use these guidelines when they plan training that involves heightened physical activity and the wearing of additional layers of uniform.

UNDERSTANDING HEAT INJURIES (continued)

10. Prior to a hot weather exercise/operation, individuals who are overweight, dieting, have suffered prior heat injuries, have returned to duty shortly after giving birth, are recovering from an illness, have history of heart disease, or who are taking medications should be medically evaluated for fitness to participate in PT or any hot weather operation or activity. These individuals should be identified and continually monitored by their supervisors and medical department personnel.

SIGNS/SYMPTOMS	FIRST AID
Heat Cramps: Muscle cramps of the arms, legs, and/or stomach and excessive sweating.	<ol style="list-style-type: none"> 1. Move individual to a cool shady area or improvise shade; loosen clothing. 2. Monitor the individual and give water as tolerated; should slowly drink at least one full canteen.
Heat exhaustion: Heavy sweating with pale, moist, cool skin; headache, weakness, dizziness, and/or loss of appetite, heat cramps, nausea (with or without vomiting); chills (gooseflesh), rapid breathing, change in mental status, confusion, and tingling of the arms and/or feet. Core temperature is 104°F or less.	<ol style="list-style-type: none"> 1. Move individual to a cool shady area or improvise shade; loosen or remove clothing. 2. Monitor the individual and give water as tolerated; should slowly drink at least one full canteen. 3. Spray or pour water on individual and fan to cause a cooling effect. 4. Urgent medical evaluation is indicated, especially if there are mental status changes. 5. If you have ice packs, use them. Put them in arms, armpits, and neck.
Heat Stroke: The individual stops sweating (hot, dry skin). They first may experience headache, dizziness, nausea, fast pulse and respiration, seizures and mental confusion. They may collapse and suddenly become unconscious. Core temperature is greater than 104°F, typically around 108°F(although it may be as low as 102°F). THIS IS A MEDICAL EMERGENCY.	<ol style="list-style-type: none"> 1. Heat stroke is a life-threatening medical emergency. Move the individual to a cool shady area or improvise shade; loosen or remove clothing. 2. Start cooling the individual immediately. Spray or pour water on individual and fan. 3. Elevate legs. If you have ice packs, use them. Put them in arms, armpits, and neck. 4. If conscious, individual should slowly drink at least 1 cup (8 oz.) of cool water every 20 minutes. Do not force water if abdominal discomfort occurs. 5. Seek medical aid immediately. <p>Continue cooling while awaiting transport, and continue first aid while en route.</p>

TABLE 1-1.--Heat Injury, Signs/Symptoms, and First Aid.

THE WET-BULB GLOBE TEMPERATURE (WBGT) INDEX SYSTEM

1. Installation. Use a standard WBGT equipment station as described in paragraph 3. Commands will use instruments that are calibrated and traceable to the National Institute of Standards and Technology or International Standards Organization. Commands may also use direct reading and portable heat stress monitors. The monitors are reliable and avoid the use of alcohol or mercury thermometers. For those units without access to a WBGT equipment station, the WBGT Index shall be obtained from the local weather station and communicated to all units affected.

2. Frequency of Readings. WBGT readings shall be taken before commencement of planned PT and whenever surrounding temperatures are expected to exceed 80 degrees Fahrenheit. Compute the WBGT every hour on the hour from the time normal work commences until training is completed.

a. Take WBGT readings at the local site; Medical Department personnel will train those taking readings. Record the readings in a log maintained at the site and display the appropriate warning flag.

b. Note that some military and civilian weather stations may not routinely report WBGT readings, providing a heat index instead. The heat index is an attempt to quantify the effect, which high levels of heat and humidity have on the human body. Heat index is calculated differently from the WBGT and should not be used for determining heat stress.

3. Equipment. A WBGT equipment station will be used. In addition to the actual equipment used, a thermo-screen shelter should be used to house the dry-bulb thermometer and spare instruments. The WBGT equipment station consists of the following:

a. Dry-Bulb (DB) Thermometer. Standard alcohol in glass thermometer that measures ambient air temperature and is the only instrument kept inside the thermo-screen instrument shelter.

b. Wet-Bulb (WB) Thermometer. This is a standard alcohol in glass thermometer with a moist wick surrounding the bulb. The remainder of the wick is placed in a 125ml flask of distilled water. This temperature measurement takes into account the moisture content of the air.

THE WET-BULB GLOBE TEMPERATURE (WBGT) INDEX SYSTEM (Continued)

c. Globe Thermometer (GT). A copper sphere about 6 inches in diameter, the exterior of which is painted matte black. A 1/4-inch hole in the sphere allows the insertion of an alcohol in glass thermometer. The alcohol in glass thermometer must be 12 inches long and graduated from 30 degrees Fahrenheit (°F) to 150°F.

d. Shelter, Instrument Thermo Screen. This item is listed in section L of the Naval Aviation Supply Table 00-34-QL-22 under Meteorological Equipment for Aerological Units. The stock number is 5410-00-267-8898, ML-41.

4. Setup of the WBGT Equipment Station

a. The GT must be suspended from a 6-foot vertical support with a horizontal arm about 36 inches long. A sturdy-braided flexible wire from the outboard end of the horizontal arm should suspend the globe. The center of the globe should be 48 inches from the ground. The arm must point south to avoid a shadow of the upright from falling on the globe.

(1) To perform reliably, the globe must be situated in an open area unshielded in any way from the sun and wind. The ground below should be either grass or gravel. Asphalt surfaces are not desirable.

(2) The globe requires no attention except that the surface should be kept free of dust and streaks and must be repainted each year. After rain, the thermometer should be removed and the globe turned upside down to remove accumulated moisture.

b. The WB thermometer is an ordinary alcohol thermometer (30°F to 150°F) with a wet wick around the bulb and exposed in an un-shaded position to natural air movement and to solar radiation.

(1) The wick consists of a white cotton shoelace with the tips cut off. The shoelace must be cotton, as other fabrics will give false readings. One end surrounds the bulb of the alcohol; the other end is immersed in distilled water contained in a 50ml Erlenmeyer flask.

THE WET-BULB GLOBE TEMPERATURE (WBGT) INDEX SYSTEM (Continued)

(2) The wick must be rinsed with fresh water every 2 days, and the water in the flask replaced with fresh distilled water every 2 days. Every week the wick must be washed with soap and water, and then rinsed thoroughly.

(3) The wick surrounding the bulb must be thoroughly wet, but the bulb must be 1 inch above the mouth of the flask and freely exposed to the air.

5. WBGT Logs

a. WBGT readings shall be maintained in a bound log that contains the following minimum information:

(1) Location of WBGT Station.

(2) Subordinate commands affected by WBGT readings at that station and their phone numbers.

(3) Instructions for flag warning system.

(4) WBGT computation formula.

b. Logs shall contain the following information:

DATE	TIME	DB	GT	WB	WBGT	FLAG	SIGNATURE
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c. Heat Stress Logs will be inspected during regularly scheduled site visits, command inspections, and during Inspector General inspections.

6. Computing the WBGT

The WBGT is computed as follows:

$$(DB \times 0.1) + (GT \times 0.2) + (WB \times 0.7) = (WBGT)$$

(DB=Dry Bulb; WB=Wet Bulb; GT=Globe Thermometer)

HEAT CONDITION FLAG WARNING SYSTEM

1. When the WBGTI reaches the temperatures indicated in the parenthesis below, the corresponding color of flag closest to the specific site of the hot weather operation shall dictate level of the operation.

a. Green Flag (WBGTI of 80°F to 84.9°F). Heavy exercises, for un-acclimatized personnel, will be conducted with caution and under constant supervision.

b. Yellow Flag (WBGTI of 85°F to 87.9°F). Strenuous exercises, such as marching at standard cadence, will be curtailed for un-acclimatized troops in their first 3 weeks per NAVMED P-5010. Avoid outdoor classes in the sun.

c. Red Flag (WBGTI of 88°F to 89.9°F). All PT will be curtailed for those troops who have not become thoroughly acclimatized by at least 12 weeks per NAVMED P-5010. Those troops who are thoroughly acclimatized may carry on limited activity not to exceed 6 hours per day.

d. Black Flag (WBGTI of 90°F and above). All nonessential physical activity will be halted for all units.

2. Essential Activities. Essential activities are activities associated with scheduled exercises or other major training evolutions where the disruption would cause undue burden on personnel or resources, be excessively expensive, or significantly reduce a unit's combat readiness. Essential outdoor physical activity will be conducted at a level that is commensurate with personnel acclimatization as determined by the unit's commanding officer in coordination with the unit's medical officer or medical personnel. All efforts should be made to schedule major hot weather training activities to occur during cooler periods of the day, such as very early hours in the morning, or later in the evening.

3. Controls. The following controls will be used to reduce heat stress:

a. Conduct heat injury prevention awareness training prior to the operation.

b. Ensure all individuals are acclimatized to the environment prior to the operation.

HEAT CONDITION FLAG WARNING SYSTEM (continued)

c. Ensure water consumption is a continuous process (prior to, during, and after the operation).

d. Do not allow an individual to continue working or performing hot weather operations when they stop sweating. Call medical personnel immediately. They will obtain the individual's core body temperature with a rectal thermometer.

e. Reduce physical demands such as excessive lifting or digging with heavy objects.

f. In heat stress conditions, schedule intermittent rest periods with water breaks. Newly enlisted or transferred military personnel shall receive annual heat stress and awareness training prior to deployment into hot, dry, and humid environments. They shall receive the training locally from medical personnel serving their command. Encourage individuals to drink cold water. Do not rely on electrolyte-replenishment fluids such as sports drinks as a sole source of hydration. If the units provide them, drink them diluted with plentiful cold water. Pre-hydrate by drinking 8 to 16 ounces of water before PT. Avoid drinks containing caffeine due to their diuretic effect.

g. Large volumes of relatively clear urine indicate proper hydration. Small volumes and/or dark urine indicate dehydration and the need to drink more fluids. The aim is to produce relatively clear to light yellow urine. If the individual urinates once daily and/or produces darker urine, they may be severely dehydrated, and may need to start drinking water immediately. Be aware that some foods, vitamins, prescriptions, and over-the-counter drugs may alter urine color or have a diuretic effect.

h. Whenever feasible, wear loose clothing. Loose clothing allows free air circulation to promote cooling effect on the body. Avoid wearing tight fitted clothing. Use sun-blocking lotions with appropriate sun protection factor of 30 or more.

i. Provide protective shelters and recovery areas that reduce solar exposure such as shades, air-conditioned enclosures and rooms, where feasible.

j. Caution. Do not over-hydrate. Drinking too much water (over-hydrating) may be dangerous. Since the stomach can empty

HEAT CONDITION FLAG WARNING SYSTEM (continued)

water to the intestines (the site of its absorption) at a maximum rate of approximately 1.2 liters per hour it is of no value to drink more than this amount per hour. Again, use the guideline in enclosure (4).

FLUID REPLACEMENT GUIDELINES FOR WARM WEATHER TRAINING

Flag Condition	WBGTI °F	Easy Work		Moderate Work		Strenuous Work	
		Work/ *Rest	Water per Hr.	Work/ *Rest	Water per Hr.	Work/ *Rest	Water per Hr.
Green	80 - 84.9	No Limit	¼ Qt.	50/10	¼ Qt.	40/20	1 Qt.
Yellow	85 - 87.9	No Limit	¼ Qt.	40/20	¼ Qt.	30/30	1 Qt.
Red	88 - 89.9	No Limit	¼ Qt.	30/30	¼ Qt.	20/40	1 Qt.
Black	90 & >	50/10	1 Qt.	20/40	1 Qt.	10/50	1 Qt.

* Rest means minimal physical activity (sitting or standing) and should be accomplished in the shade if possible.

Note 1: For MOPP gear, PPE, or body armor, ADD 10°F to the WBGT Index.

Note 2: Work/rest times and fluid replacement volumes will sustain performance and hydration for at least 4 hours of work in the specified heat category. Individual water needs will vary ±¼ quart per hour.

TABLE 5-1. Fluid Replacement Guidelines For Warm Weather Training.

Easy Work	Moderate Work	Strenuous Work
-Weapon maintenance -Walking hard surface at 2.5 mph, < 30 lb. load -Manual of Arms -Marksmanship training -Drill and ceremony	-Walking loose sand at 2.5 mph, no load -Walking hard surface at 3.5 mph, < 40 pound load -Calisthenics -Patrolling -Individual movement technique; e.g., low crawl, high crawl -Defensive position construction -Field assaults	-Walking hard surface at 3.5 mph, ≥ 40 lb. load -Walking loose sand at 2.5 mph with load -Running and participating in physical conditioning training

TABLE 5-2.--Examples of Work.