

Heat Stress and Heat Injury

Heat Stress - Environmental conditions that tend to increase body temperature; can cause heat strain and injury

Heat Injury - Environmental injuries that result when a Soldier is exposed to extreme heat for extended periods of time and the body is unable to cool itself normally and if the heat strain becomes more severe, a rapid rise in body temperature and heart rate can occur.

*If the heat stress continues to increase and is not checked, a rise of just 5°F can result in serious illness, injury, and death.

Risk Factors

High heat category

Physical exertion

Time/length of exposure and recovery time

Poor fitness

High BMI

Minor illness

Drugs and medications

Alcohol consumption

History of heat injury

Skin disorders

Age

Hot beverage consumption

Dehydration

Tight clothing

Warning signs, symptoms, and immediate actions for suspected heat casualties

Common Sign and Symptoms

Dizziness

Headache

Nausea

Unsteady walk

Weakness

Muscle cramps

Fatigue

Chills

Immediate Actions

Remove from training

Drink water

Loosen or remove unnecessary clothing

Rest casualty in shade, fan and spray

- **Medically evaluate casualty: monitor rectal temperature and mental status**
- **If no medic available, call for ambulance and medical evacuation**

Significant Signs and Symptoms

Persistent mental status changes

Delirium

Inappropriate behavior or aggressiveness

Convulsions and/or seizures

Coma

High rectal temperature (> 104°F)

Recurrent vomiting

Loss of bowel control/fecal incontinence

Flaccid muscles or persistent rigidity

Weak or rapid pulse

Immediately call medical evacuation or ambulance for emergency transport while doing the following:

Lay casualty down in shade, elevate feet until medical evacuation or ambulance arrives

Remove as much clothing as possible

Cool rapidly using best method possible:

- Pour water over body while fanning
- Repeatedly wrap in iced sheets
- Apply contour conforming ice bags/frozen gel packs covering torso, neck, and scalp
- Douse or immerse in iced/cold water

If conscious, provide sips of water

If persistent hyperthermia not improving, and emergency evacuation delayed, start IV hydration

Monitor airway and breathing

- Apply sunscreen on all exposed body parts
- Drink water
- Replace salts by eating all meals
- Follow work/rest cycles
- Find shade and rest if you become dizzy, confused, or develop a rash

Heat Injury Prevention

Acclimatize

Maintain good general health

Replace salts by eating all meals

Apply sunscreen on all exposed skin

Drink water

Work under shade

Follow work/rest schedules

Table 1. Work/Rest Times & Fluid Replacement Guide, Technical Bulletin 507

Heat Category	WBGT Index (°F)	Easy Work (250 W) Weapon maintenance, marksmanship training, drill and ceremony		Moderate Work (425 W) Patrolling with 30 lb load, low and high crawl, dig defensive position		Heavy Work (600 W) Patrolling with 45 lb load, four-person litter carry (180 lbs), jogging 4 mph		Very Heavy Work (800 W) Two-person litter carry (150 lbs), move under direct fire, obstacle course	
		Work/Rest (minutes)	Fluid Intake (quarts/hour)	Work/Rest (minutes)	Fluid Intake (quarts/hour)	Work/Rest (minutes)	Fluid Intake (quarts/hour)	Work/Rest (minutes)	Fluid Intake (quarts/hour)
1	78-81.9	NL	1/2	NL	3/4	40/20 (110)*	3/4	20/40 (45)*	1 (3/4)*
2 (GREEN)	82-84.9	NL	1/2	NL	3/4 (1)*	30/30 (70)*	1	15/45 (40)*	1
3 (YELLOW)	85-87.9	NL	3/4	NL	3/4 (1)*	30/30 (60)*	1	10/50 (25)*	1
4 (RED)	88-89.9	NL	3/4	50/10 (180)*	3/4 (1 1/4)*	20/40 (50)*	1 (1 1/4)*	10/50 (20)*	1 (1 1/4)*
5 (BLACK)	> 90	NL	1	20/40 (70)*	1 (1 1/2)*	15/45 (45)*	1 (1 1/2)*	10/50 (20)*	1 (1 1/2)*
NL = No limit to work time per hour		*Use the amounts in parentheses for continuous work when rest breaks are not possible. Leaders should ensure several hours of rest and rehydration time after continuous work				CAUTION: Hourly fluid intake should not exceed 1.25 quarts. Daily fluid intake should not exceed 12 quarts.			
¹ This guidance will sustain performance and hydration for at least 4 hours of work in the specified heat category. ² Fluid needs can vary based on individual differences (+/-0.25 qt/hr) and exposure to full sun or full shade (+/-0.25 qt/hr). ³ Rest means minimal physical activity (sitting or standing) in the shade if possible. ⁴ Body Armor - Add 5°F to WBGT index in humid climates. ⁵ NBC (MOOPP 4) - Add 10°F (Easy Work) or 20°F (Moderate or Hard Work) to WBGT index.									

Cold Injury

Cold Injury – Tissue injury produced by exposure to cold

Freezing Cold Injury – Associated with dry environments and cold temperatures

Nonfreezing Cold Injury – Associated with exposure to water and cold temperatures

Risk Factors

Age	Rank
Previous cold injury	Fatigue
Discipline, training, and experience	Psychosocial factors
Gender	Race
Geographic origin	Nutrition
Activity	Drugs and medications
Clothing not suited for the weather	History of cold injury

Warning signs, symptoms, and immediate actions for suspected cold injuries

Freezing Cold Injuries

Frostbite

Prickling	Red, white, gray or bluish skin
Numbness, waxy skin	Joint and muscle stiffness
Fluid-filled blister	Affected area turns black as tissue dies

*Hypothermia may occur simultaneously

Nonfreezing Cold Injuries

Chillblains

Results from prolonged exposure in cold-wet conditions below 50°F but above freezing temperatures.

Immersion Syndrome/Trench Foot

Can occur in tropical environments.

Likely to occur with prolonged wear of cold wet socks and boots.

Associated with immobilizations and with high dependence of lower extremities.

Results from exposure to were, cold conditions in temperature below 50°F for three days or more.

Get medical help immediately

Hypothermia

Occurs when a core body temperature falls below 95°F.

Confusion

Mood changes

Slurred speech

Slowed heart rate

Intense shivering

Sleepiness

Stiff Muscles

Snow Blindness

Occurs when UV rays from sun reflect from snow-covered surface into the eyes.

Severe Pain

Feeling of sand in eyes

Pink or red eyes

Extreme light sensitivity

Dehydration

Cold weather makes it difficult to detect.

Just as prevalent in cold regions as it is in hot regions.

Fainting

Very dry skin

Feeling dizzy

Lack of energy

Lack of urine

Dark yellow urine

Immediate Actions

For most cold injuries:

Do not pop blisters

Do not allow to refreeze

Gently dry and clean tissue

Do not massage, lotion, or rub affected area

Warm with direct body heat

Do not expose area to fire, stove, or intense heat

Do not wet area or apply snow/ice

Rest eyes if affected

Cold Injury Prevention

Wear clothing in loose layers

Avoid alcohol and tobacco products

Remove/change layers if wet or damp

Wear headgear to prevent body heat loss

Stay active and focus on exercising extremities (fingers, hands, toes, feet)

*Reinforce buddy system to encourage monitoring for heat/cold illness

*Do not attempt to rewarm frozen extremities without medical supervision

GLOSSARY OF REFERENCES AND SUPPORTING INFORMATION

References

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