

FM 21-10
MCRP 4-11.1D

FIELD HYGIENE AND SANITATION

**HEADQUARTERS, DEPARTMENT OF THE ARMY
AND COMMANDANT, MARINE CORPS**

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PREFACE

The purpose of this publication is to assist individual service members, unit commanders, unit leaders, and field sanitation teams (FSTs) in preventing disease and nonbattle injury (DNBI). The publication provides information on preventive medicine measures (PMM)

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for the individual service member as well as essential information for the unit commander, unit leaders, and the FST on applying unit-level PMM.

When a problem exists beyond unit capabilities, the brigade or division preventive medicine (PVNTMED) section or corps PVNTMED detachments should be called upon to assist in countering the threat.

The use of trade names or trademarks does not constitute endorsement by the Department of Defense (DOD).

Unless this publication states otherwise, masculine nouns and pronouns do not refer exclusively to men.

The proponent of this publication is the United States (US) Army Medical Department Center and School. Submit changes for improving this publication on Department of the Army (DA) Form 2028 and forward it directly to **Commander, US Army Medical Department Center and School, ATTN: MCCS-FCD-L, 1400 East Grayson Street, Fort Sam Houston, Texas 78234-6175.**

CHAPTER 1

INTRODUCTION TO THE MEDICAL THREAT**Section I. MESSAGE TO THE UNIT COMMANDER****DISEASE AND NONBATTLE INJURY**

A DNBI casualty can be defined as a military person who is lost to an organization by reason of disease or injury, and who is not a battle casualty. This definition includes persons who are dying of disease or injury due to accidents directly related to the operation or mission to which they were deployed. The acronym, DNBI, does not include service members missing involuntarily because of enemy action or being interned by the enemy (as a prisoner of war). The total number of DNBI casualties is evaluated to identify DNBI rates per number of service members in an operation. The DNBI rates are critical in evaluating the effectiveness of PVNTMED missions within the area of operations (AO) and in determining the health of a force within an operation.

Historically, in every conflict the US has been involved in, only 20 percent of all hospital admissions have been from combat injuries. The other 80 percent have been from DNBI. Excluded from these figures are vast numbers of service members with decreased combat effectiveness due to DNBI not serious enough for hospital admission.

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Preventive medicine measures are simple, common sense actions that any service member can perform and every leader must know. The application of PMM can significantly reduce time loss due to DNBI.

*How Much Time Does Your Unit Spend Training Service Members on—
Disease and Nonbattle Injury Prevention?
Combat Injury Prevention?*

YOUR RESPONSIBILITY

You are responsible for all aspects of health and sanitation of your command. Only you can make command decisions concerning the health of your unit in consideration of the—

- Mission.
- Medical threat.
- Condition of troops.

DO NOT LET THIS HAPPEN TO YOU

Togatabu Island, 1942: The 134th Artillery and the 404th Engineer Battalions were part of a task force preparing to attack Guadalcanal. Fifty-five percent of the engineers and sixty-five

percent of the artillerymen contracted a disease called *filariasis* transmitted by mosquitoes. Both units had to be replaced (medically evacuated) without seeing any enemy action because they were not combat ready. The use of insect repellents and insecticides and the elimination of standing water would have prevented this.

Merrill's Marauders: Disease was an important detractor to this famous unit. The medical threat faced by the Marauders in the jungles of Burma was great. Everyone was sick, but some had to stay and fight. Evacuation was limited to those with high fever and severe illness. One entire platoon cut the seats from their pants because severe diarrhea had to be relieved during gunfights. After a bold and successful attack on a major airfield, Merrill's Marauders were so decimated by disease that they were disbanded.

Section II. THE MEDICAL THREAT AND PRINCIPLES OF PREVENTIVE MEDICINE MEASURES

The medical threat is—

- Heat.
- Cold.
- Arthropods and other animals.

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- Food- and waterborne diseases.
- Toxic industrial chemicals/materials.
- Noise.
- Nonbattle injury.
- The unfit service member.

PRINCIPLES OF PREVENTIVE MEDICINE MEASURES

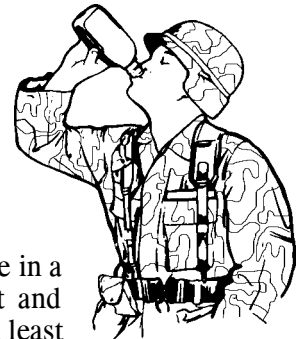
- Service members perform individual techniques of PMM.
- Chain of command plans for and enforces PMM.
- Field sanitation teams train service members in PMM and advise the commander and unit leaders on implementation of unit-level PMM.

Failure to Apply the Principles of PMM Can Result in Mission Failure.

CHAPTER 2

INDIVIDUAL PREVENTIVE MEDICINE MEASURES**Section I. HEAT INJURIES****OVERVIEW**

Heat injuries can occur anywhere, depending on physical activity (work rate) and clothing worn. However, they occur most frequently during warm-weather training, exposure to high climatic temperatures, high humidity, and bright sunlight. These conditions make it difficult for the body to regulate its temperature. Hot weather also increases daily water requirements, because body water is lost as sweat. Dehydration leads to added heat stress, increased susceptibility to heat injury, reduced work performance, and degraded mission capability.

**ACCLIMATIZATION**

When the mission permits, all personnel should work and exercise in a manner so that they gradually become acclimatized to the heat and humidity in the AO. Significant heat acclimatization requires at least

3 to 5 days and full acclimatization can take up to 2 weeks. Exercising in the heat and humidity for 1 to 2 hours daily, gradually increasing the workload each day, can produce acclimatization. (Refer to Table 3-1 in Chapter 3.) When the mission does not permit time for gradual increases in workload, then leaders and buddies must observe each other and ensure that everyone drinks plenty of water during each work period. Individuals leaving a cold or cool climate will require additional time to become acclimatized to a hot climate.

DRINK PLENTY OF WATER

Depending on the heat and activity level, you may need to drink from $\frac{1}{2}$ to $1\frac{1}{4}$ quarts of water per hour—*3 gallons/12 liters per day in hot, dry climates*. **Drinking water is a must in order to prevent heat injury.** If desired, individuals may add flavoring to the water to enhance consumption. Field rations/meal(s), ready to eat (MRE) have flavoring for water in each meal. If the flavoring is used, add it to water in your canteen cup. **Do not** add flavoring to the water in your canteen; it increases the risk of contamination and illness. Never flavor the bulk source water supply. (Flavoring the bulk source water supply will reduce the action of water disinfectants.) See Table 3-1 for water intake requirements.

- Drink extra water **before** starting any mission or hard work. Cool water (60° to 70° Fahrenheit [F]) is absorbed faster than cold water.
- Drink small quantities of cool fluids frequently. Carbohydrate/electrolyte beverages (sport drinks) may provide supplemental nutrients under conditions of extreme calorie and water requirements; such as extremely vigorous activity. However, they cannot replace and must not be used to meet all water requirements.

- Drink “non-caffeinated” fluids even if you are not thirsty. (Caffeine increases water requirements in all environments.)
- Refill your canteens at every opportunity, using only treated water, if possible.

NOTE

The color and volume of the urine stream are good indicators of a service member’s hydration status. If your urine stream is **dark yellow** and the volume is small, or if you are constipated and experience hard stools, you may not be drinking enough water. Maintain a urine stream that is **clear or light yellow**. Thirst is not a good indicator of dehydration during physical activity.

USE WORK/REST CYCLES

- Work and rest as your leader directs. (See Table 3-1.) A rest period helps prevent dangerous increases in body temperatures by minimizing heat production.
- Work and rest in the shade, if possible.

EAT ALL MEALS TO REPLACE SALTS

Eating all meals in the field will usually provide the body's requirements for salts. Field rations/MRE meet the daily requirements for minerals and electrolytes (sodium). **DO NOT take extra salt in meals** unless medically indicated.



NOTE

DO NOT TAKE SALT TABLETS. One salt tablet increases your water requirement by at least a pint. Salt draws water from muscles to dilute your blood. Salt tablets can cause vomiting.

RECOGNIZE THE RISK OF MISSION-ORIENTED PROTECTIVE POSTURE/BODY ARMOR/ARMORED VEHICLES

- Mission-oriented protective posture (MOPP)/body armor increases your heat stress. (See Table 3-1.) You must—
 - Drink more water. **DO NOT EXCEED 1¹/₄ QUARTS PER HOUR.**
 - Work and rest as your leader directs.

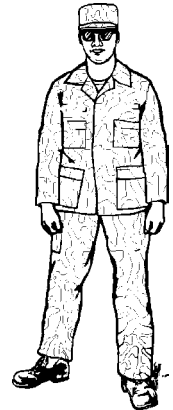


- You may be at a greater risk of heat injuries when in armored vehicles—you may need to drink more water.

MODIFY YOUR UNIFORM

When directed/authorized by your commander to reduce heat stress and to protect against ultraviolet (UV) radiation, you should—

- Unblouse pants from boots.
- Cover all skin exposed to sun; wear sunscreen and lip balm with a sun protection factor of 15 or higher.
- Protect the eyes from UV with UV-protective sunglasses, especially wraparound sunglasses.
- Seek shade when resting outdoors.
- Keep clothing loose at the neck, wrists, and lower legs.



NOTE

When the threat from biting arthropods is high, keep your shirtsleeves rolled down and pants bloused in boots.

NOTE

See Graphic Training Aid (GTA) 8-5-50 and FM 21-11, for information on heat injury prevention and first aid.

Section II. COLD INJURIES

OVERVIEW

Cold injuries are most likely to occur when an unprepared individual is exposed to winter temperatures. They can even occur with the proper planning and equipment. The cold weather and the type of operation in which the individual is involved impact on whether a service member is likely to be injured and to what extent. The service member's clothing, physical condition, and mental makeup are also determining factors. Well-disciplined and well-trained service members can be protected, even in the most adverse conditions. Service members and their leaders must know the hazards of exposure to the cold. They must know the importance of personal hygiene, exercise, care of the feet and hands, and the use of protective clothing. Cold injuries may be divided into "freezing and nonfreezing" types. A freezing type is frostbite. The nonfreezing types are chilblains, trench foot, and immersion foot. (See FM 21-11.)

- Frostbite can occur when the temperature is at or near freezing or colder. Frostbite can also occur when the skin is exposed to winds of less than five miles per hour and actual temperature readings of 30° F.

- Trench foot (and immersion foot) results from prolonged exposure to a wet, cold condition, or the outright immersion of the feet in water with a temperature usually below 50° F.
- At the upper range of temperatures, exposure of 12 hours or more will cause injury. Shorter duration at or near 32° F will cause the same injury.
- A trench foot injury is usually associated with immobilization of the feet.

WEAR UNIFORM PROPERLY

- Wear the clothing your commander and leaders direct.
- Wear clothing in loose layers (top and bottom). Avoid tight clothing, including tight underwear.
- Keep clothing clean and dry. Remove or loosen excess clothing when working or in heated areas to prevent sweating.
- Wear headgear to prevent body heat loss. The body loses large amounts of heat through the head.
- Avoid spilling fuel or other liquids on clothing or skin. Evaporating liquids increase heat loss and cool the skin. Also, liquid stains on clothing will reduce the clothing's protective effects.



- Change wet/damp clothes as soon as possible. Wet/damp clothing pulls heat from body.

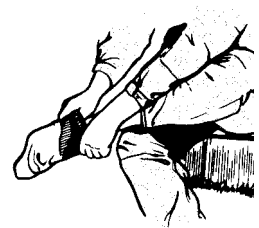
KEEP YOUR BODY WARM

- Keep moving, if possible.
- Exercise your big muscles (arms, shoulders, trunk, and legs) frequently to keep warm.
- If you must remain in a small area, exercise your toes, feet, fingers, and hands.
- Avoid the use of alcohol as it makes your body lose heat faster.
- Avoid standing directly on cold, wet ground, when possible.
- Avoid tobacco products. The use of tobacco products decreases blood flow to your skin.
- Eat all meals to maintain energy.
- Drink plenty of water and/or warm nonalcoholic fluids. Dark yellow urine means you are not drinking enough fluids! You can dehydrate in cold climates too!
- Buddies should monitor each other for cold weather injury.



PROTECT YOUR FEET

- Bring several pairs of issue boot socks with you.
- Keep socks clean and dry. Change wet or damp socks as soon as possible. Socks can become wet from sweating. Apply foot powder on feet and in boots when changing socks.
- Wash your feet daily, if possible.
- Avoid tight socks and boots (completely lace boots up as loosely as possible).
- Wear overshoes to keep boots dry.



NOTE

A decrease in physical activity reduces the exposure **time necessary to produce injury**. In all types of footgear, feet perspire more and are generally less well ventilated than other parts of the body. Moisture accumulates in socks, decreasing their insulating quality. The feet are susceptible to cold injury and are less frequently observed than the remainder of the body.

PROTECT YOUR HANDS

- Wear gloves with inserts, or mittens with inserts.

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- Warm hands under clothing if they become numb.
- Avoid skin contact with snow, fuel, or bare metal.
- Waterproof gloves by treating with waterproofing compounds, such as snow seal.



PROTECT YOUR FACE AND EARS

- Cover your face and ears with a scarf or other material, if available.
- Wear your insulated cap with flaps down or wear a balaclava and secure under your chin.
- Warm your face and ears by covering them with your hands. **Do not rub face** and ears.
- Do not use face camouflage when windchill is -10° F or below; prevents detection of cold weather injury (frostbite).

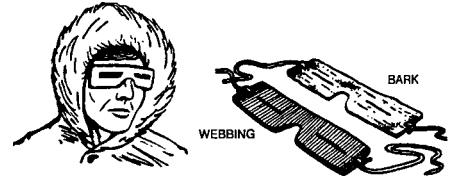
NOTE

Rubbing cold extremities can be potentially harmful. Frostbitten areas that are rubbed can cause additional injury to the affected areas.

- Wear sunscreen. Solar UV exposure is doubled when you are surrounded by snow.
- Exercise facial muscles.

PROTECT YOUR EYES

- Wear sunglasses (or goggles) (Sun, Wind, and Dust, National Stock Number [NSN] 8465-01-004-2893) to prevent snow blindness (gray lens insert for above system is NSN 8465-01-004-2891).
- Wear Spectacles, Protective, Laser-Ballistic, NSN 8465-01-416-4626, or Special Protective Eyewear, Cylindrical System, NSN 8465-01-416-4626.
- Improvised sunglasses (slit goggles), if actual sunglasses are not available, can be made from the field rations/MRE cardboard box or other opaque material.



PROTECT YOUR BUDDY

- Watch for signs of frostbite on the service member's exposed skin. The affected skin will appear as pale/gray/waxy areas (it may be hard to see these changes in poor lighting or on service members with dark skin).
- Ask the service member if his feet, hands, ears, or face are numb and need rewarming.

