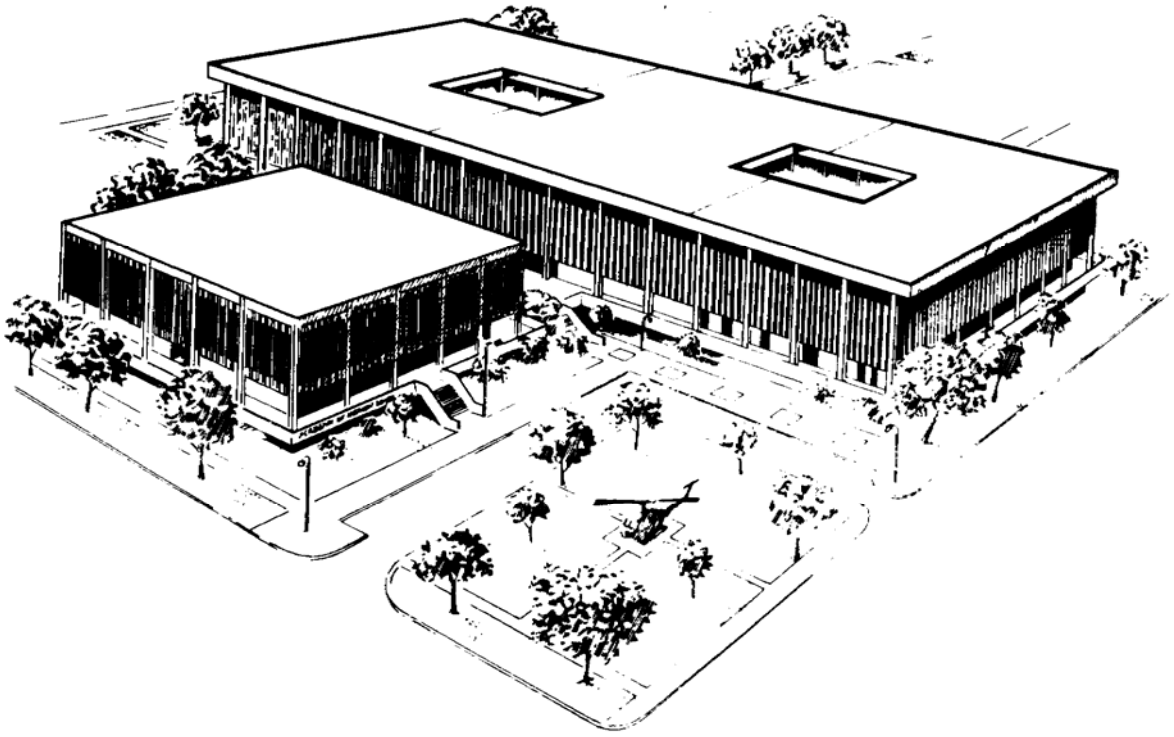
U.S. ARMY MEDICAL DEPARTMENT CENTER AND SCHOOL
FORT SAM HOUSTON, TEXAS 78234-6100



ENVIRONMENTAL INJURIES

SUBCOURSE MD0548 EDITION 200

DEVELOPMENT

This subcourse is approved for resident and correspondence course instruction. It reflects the current thought of the Academy of Health Sciences and conforms to printed Department of the Army doctrine as closely as currently possible. Development and progress render such doctrine continuously subject to change.

ADMINISTRATION

Students who desire credit hours for this correspondence subcourse must enroll in the subcourse. Application for enrollment should be made at the Internet website: http://www.atrrs.army.mil. You can access the course catalog in the upper right corner. Enter School Code 555 for medical correspondence courses. Copy down the course number and title. To apply for enrollment, return to the main ATRRS screen and scroll down the right side for ATRRS Channels. Click on SELF DEVELOPMENT to open the application; then follow the on-screen instructions.

For comments or questions regarding enrollment, student records, or examination shipments, contact the Nonresident Instruction Branch at DSN 471-5877, commercial (210) 221-5877, toll-free 1-800-344-2380; fax: 210-221-4012 or DSN 471-4012, e-mail accp@amedd.army.mil, or write to:

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CLARIFICATION OF TERMINOLOGY

When used in this publication, words such as "he," "him," "his," and "men" 'are intended to include both the masculine and feminine genders, unless specifically stated otherwise or when obvious in context.

USE OF PROPRIETARY NAMES

The initial letters of the names of some products may be capitalized in this subcourse. Such names are proprietary names, that is, brand names or trademarks. Proprietary names have been used in this subcourse only to make it a more effective learning aid. The use of any name, proprietary or otherwise, should not be interpreted as endorsement, deprecation, or criticism of a product; nor should such use be considered to interpret the validity of proprietary rights in a name, whether it is registered or not.

TABLE OF CONTENTS

CORRESPONDENCE COURSE OF
THE U.S. ARMY MEDICAL DEPARTMENT CENTER AND SCHOOL

SUBCOURSE MD0548

ENVIRONMENTAL INJURIES

INTRODUCTION

This subcourse deals with environmental and climatic injuries including snakebites, insect and spider bites, insect and scorpion stings, dermatitis caused by toxic plants, heat injuries, and cold injuries. Some of the injuries discussed in this subcourse can result in death if not treated promptly and properly. The medical specialist must recognize when the dangers discussed in this subcourse are present and take the appropriate preventive measures to protect himself and other soldiers.

Additional information is available in FM 8-230, Medical Specialist; FM 21-11, First Aid for Soldiers; and other sources. These references are not needed to successfully complete this subcourse.

Subcourse Components:

The subcourse instructional material consists of five lessons as follows:

Lesson 1, North American Snakebites.

Lesson 2, Arthropod Bites and Stings.

Lesson 3, Plant Contact Dermatitis.

Lesson 4, Heat Injuries.

Lesson 5, Cold Injuries.

Here are some suggestions that may be helpful to you in completing this subcourse:

--Read and study each lesson carefully.

--Complete the subcourse lesson by lesson. After completing each lesson, work the exercises at the end of the lesson, marking your answers in this booklet.

--After completing each set of lesson exercises, compare your answers with those on the solution sheet that follows the exercises. If you have answered an exercise incorrectly, check the reference cited after the answer on the solution sheet to determine why your response was not the correct one.

Credit Awarded:

Upon successful completion of the examination for this subcourse, you will be awarded 7 credit hours.

To receive credit hours, you must be officially enrolled and complete an examination furnished by the Nonresident Instruction Section at Fort Sam Houston, Texas.

You can enroll by going to the web site http://atrrs.army.mil and enrolling under "Self Development" (School Code 555).

A listing of correspondence courses and subcourses available through the Nonresident Instruction Section is found in Chapter 4 of DA Pamphlet 350-59, Army Correspondence Course Program Catalog. The DA PAM is available at the following website: http://www.usapa.army.mil/pdffiles/p350-59.pdf.

LESSON ASSIGNMENT

LESSON 1	North American Snakebites.
TEXT ASSIGNMENT	Paragraphs 1-1 through 1-5.
TASK TAUGHT	081-833-0073 Treat a casualty for a North American snakebite.
LESSON OBJECTIVES	After completing this lesson, you should be able to:

1-1. Identify the characteristics of poisonous North American snakes.

1-2. Distinguish between the characteristics of a nonpoisonous snakebite and a poisonous snakebite.

1-3. Identify the procedures for treating a casualty with a nonpoisonous snakebite.

1-4. Identify the procedures for treating a casualty with a poisonous snakebite.

SUGGESTION After completing the assignment, complete the exercises at the end of this lesson. These exercises will help you achieve the lesson objectives.

LESSON 1

NORTH AMERICAN SNAKEBITES

1-1. GENERAL

a. With the exception of a few species not found in North America, snakes tend to be shy or passive by nature. Usually, they will avoid contact with human beings unless they are injured, trapped, or disturbed. However, both poisonous and nonpoisonous snakes show some aggressiveness during breeding season.

b. All species of snakes can swim. Many snakes can even remain underwater for long periods without drowning. They can also bite while they are in the water. The bite of a poisonous snake sustained in water is just as dangerous as one sustained on dry land.

c. Many snakebites can be prevented by avoiding areas where snakes like to rest (next to logs, in heavy brush, on rocky ledges, and so forth). When practical, clear the area of dense undergrowth, trash, and piles of rocks or logs that may attract snakes.

d. Often, the thought of a snakebite creates fear and confusion because the individuals involved fear the worst. Reassuring the casualty and reducing his anxiety are important steps in rendering treatment. Even if a person is bitten by a poisonous snake, the snake may have injected little or no venom (poison) into the casualty if the snake has recently struck an animal and temporarily exhausted its supply of venom.

1-2. IDENTIFY POISONOUS NORTH AMERICAN SNAKES

There are four kinds of poisonous snakes native to North America. They are the rattlesnake, copperhead, water moccasin, and coral snake.

a. **Pit Vipers.** The rattlesnake, copperhead, and water moccasin are pit vipers. Pit vipers are poisonous snakes that have a deep pit between the eye and nostril on both sides of the head. The pit contains a sensory organ for detecting the body heat from the snake's prey. Pit vipers have thick bodies, thin necks, and flat, triangular heads that are very distinct from their bodies. Their eyes are elliptical and their pupils are vertical (like the pupils of a cat). A pit viper also has two large, hollow fangs that inject venom into its victim. The venom will kill small animals. The venom also contains strong enzymes that help the snake to digest its prey.

(1) Rattlesnakes. Rattlesnakes (figure 1-1) are found in every state of the continental United States (CONUS). They can be found in the desert, grassy plains, forests, and rocky Fully-grown rattlesnakes range from three to eight feet in length and can be identified by the rattles at the end of their tail. Often, a rattlesnake will shake his tail and make a rattling sound (caused by layers of incompletely shed skin at the end of his tail) before he strikes in an attempt to scare the intruder away.

Figure 1-1. Rattlesnake.

(2) Copperheads. Copperheads (figure 1-2) are generally found in the eastern half of the US. The head is usually a reddish-brown (like copper) and the body is usually brownish with dark bands. Copperheads usually prefer dry, stony terrain. Mature copperheads range from two to four feet in length.

Figure 1-2. Copperhead.

(3) Water moccasins. Water moccasins (figure 1-3) are usually found in the southern states (in Texas and eastward) in or near lakes or swampy areas. When excited, a water moccasin coils with its head back and its mouth open, exposing the white inside of its mouth. Because of the white interior of its mouth, the water moccasin is also called the cottonmouth. It is usually brownish with dark bands and measures four to five feet in length when mature.

Figure 1-3. Cottonmouth.

b. **Coral Snakes.** Coral snakes (figure 1-4) are not pit vipers and do not have the distinctive triangular head. The fangs of a coral snake are much smaller than those of a pit viper. Coral snakes have bright red, black, and yellow (or whitish) bands on its body. Some nonpoisonous snakes closely resemble coral snakes, but their bands differ in order. In poisonous coral snakes, the repeating sequence is: black, yellow (or white), red, yellow (or white). The red band of a coral snake is always touching a yellow (or whitish) band, never the black band; hence the saying, "Red on yellow, kill a fellow; red on black, venom lack." Coral snakes are normally found from Arizona to Florida and North Carolina. Mature coral snakes range from one to three feet in length and their bodies are about a half-inch in diameter. Because of its limited jaw expansion, the coral snake usually bites the casualty on a small part of the body such as a finger, hand, or foot. Also, the venom of a coral snake is released by a "chewing" action rather than being injected like the venom of a pit viper. Coral snakes are usually found under loosely packed materials, such as decaying logs. They tend to avoid humans if possible.

Figure 1-4. Coral snake.

1-3. IDENTIFY CHARACTERISTICS OF POISONOUS AND NONPOISONOUS SNAKEBITES

Poisonous snakes have two rows of teeth (one row on each side of its mouth) and two fangs that create puncture wounds. Nonpoisonous snakes have four to six rows of teeth (two or three rows on each side of its mouth) and do not have fangs. Figure 1-5 shows the bite pattern of poisonous and nonpoisonous snakes. Sometimes a poisonous snakebite will only show one fang puncture (the snake may have lost a fang or the other fang may not have struck flesh). Also, the fangs of a coral snake are smaller than those of a pit viper and the fang marks may be difficult to detect. Poisonous snakebites can also be recognized by the signs and symptoms caused by their venom. Some symptoms may not appear for 6 to 8 hours after the bite.

a. **Pit Viper.** Pit vipers have a hematotoxic (also called hematoxic) venom that attacks the casualty's blood system.

(1) There is immediate pain and swelling at the site of the bite.

(2) The skin may become discolored (bluish).

(3) The casualty may become weak and go into shock.

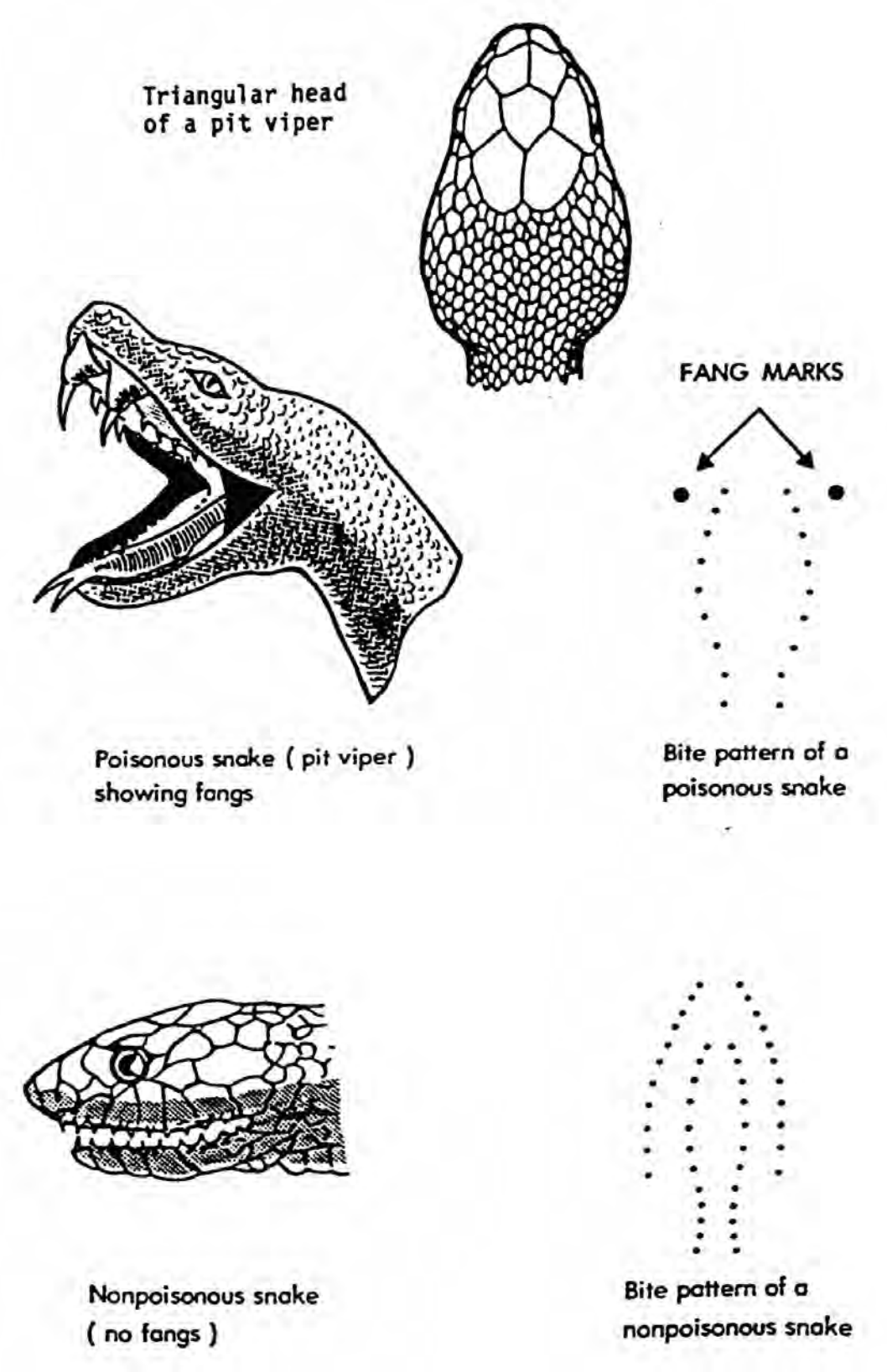

Figure 1-5. Characteristics of poisonous and nonpoisonous snakebites.

b. **Coral Snake.** Coral snakes have a neurotoxic venom which attacks the casualty's nervous system. The site of the bite is not swollen, but the casualty may experience the following.

(1) Severe headache.

(2) Dizziness.

(3) Blurred vision.

(4) Hearing difficulty.

(5) Fever and/or chills.

(6) Nausea or vomiting.

(7) Difficulty in breathing.

1-4. TREAT A POISONOUS SNAKEBITE

If you are not sure if the snakebite was made by a poisonous or nonpoisonous snake, assume the snake was poisonous. Emergency measures consist of slowing down the spread of the venom and evacuating the casualty to a medical treatment facility where antivenin (serum used to neutralize the venom) and other medical procedures can be administered.

a. **Immobilize the Casualty and Perform Other Procedures.**

(1) Have the casualty lie down.

(2) Keep the casualty as calm as possible. Do not administer any sedatives.

(3) Tell the casualty to keep as still as possible.

(4) Explain to the casualty what you are doing.

(5) If the patient has been bitten on an extremity, keep the bitten part at or below the heart level in order to slow down the spread of the poison to the heart. Immobilize (splint) the extremity.

(6) Prevent a second bite or a second victim. Snakes can continue to bite and inject venom with successive bites until they run out of venom.

(7) Identify or be able to describe the snake, but only if it can be done without significant risk for a second bite or a second victim.

(8) Safely and rapidly transport the victim to an emergency medical facility unless the snake has positively been identified as harmless (non-venomous). Remember, misidentification could be fatal. A bite without initial symptoms can still be dangerous or even fatal.

(9) Provide emergency medical care within the limits of your training.

(10) Remove constricting items on the victim, such as rings or other jewelry, which could cut off blood flow if the bite area swells.

(11) If you are in a remote area in which transport to an emergency medical facility will be prolonged, apply a splint to the affected limb. If you do apply a splint, remember to make sure the wound does not swell enough to make your splint a tourniquet, cutting off the blood flow. Check to make sure the casualty's toes and fingers are still pink and warm, that the limb is not going numb, and that pain is not getting worse.

(12) If the soldier has been bitten by a dangerous elapid (coral snakes, coberas, mambas, and so forth) and have no major local wound effects, you may apply a pressure immobilizer. This technique is mainly used for Australian elapids or sea snakes. Wrap a bandage at the bite site and up the extremity with a pressure at which you would wrap a sprained ankle. Then immobilize the extremity with a splint using the same precautions concerning limiting blood flow. This technique may help prevent life-threatening systemic effects of venom, but may also worsen local damage at the wound site if significant symptoms are present there.

(13) While applying mechanical suction (such as with a Sawyer Extractor) has been recommended by many authorities in the past, it is highly unlikely that it will remove any significant amount of venom and it is possible that suction could actually increase local tissue damage.

(14) The two guiding principles for care often conflict during evacuation from remote areas.

(a) First, the victim should get to an emergency care facility as quickly as possible because antivenin (medicine to counteract the poisonous effects of the snake’s venom) could be life-saving.

(b) Second, the affected limb should be used as little as possible to delay absorption of the venom.

b. **Avoid Performing Improper Procedures**. A number of old first aid techniques have fallen out of favor. Medical research supports the following warnings:

(1) Do NOT cut and suck. Cutting into the bite site can damage underlying organs, increase the risk of infection, and does not result in venom removal.

(2) Do NOT use ice. Ice does not deactivate the venom and can cause frostbite.

(3) Do NOT use electric shocks. The shocks are not effective and could cause burns or electrical problems to the heart.

(4) Do NOT use alcohol. Alcohol may deaden the pain, but it also makes the local blood vessels bigger, which can increase venom absorption.

(5) Do NOT use tourniquets or constriction bands. These have not been proven effective, may cause increased tissue damage, and could cost the victim a limb.

c. **Kill the Snake.** If a soldier can kill the snake that bit the casualty without endangering himself, have the snake killed. Transport the snake with the casualty so medical personnel can identify the snake and administer the appropriate antivenin quickly. If the snake has escaped, try to obtain a description of the snake.

d. **Have Casualty Evaluated by Specialized Medic, if Applicable.** Sometimes, a specially trained and specifically authorized medic will carry antivenin. Such a medic can administer antivenin if he can positively identify the snake, if the antivenin is appropriate for the type of snake identified, if the casualty is showing signs of envenomation (being poisoned by venom), and if a sensitivity test indicates the casualty is not allergic to the antivenin.

(1) Signs of envenomation are required because the snake may have exhausted its supply of venom before it struck the casualty.

(2) A sensitivity test is necessary because anaphylactic shock could result if the casualty has an allergic reaction to the antivenin.

e. **Record Treatment.** Record a description of the casualty's injury and the treatment given on a DD Form 1380, U.S. Field Medical Card, and attach the card to the casualty's clothing where it can be found quickly by other medical personnel.

f. **Perform Cardiopulmonary Resuscitation, If Needed.** A possible complication of a poisonous snakebite is respiratory failure. If the casualty stops breathing, perform mouth-to-mouth resuscitation. If the casualty's heart stops beating, perform cardiopulmonary resuscitation (CPR). These procedures are discussed in MD0532, Cardiopulmonary Resuscitation.

g. **Evacuate the Casualty.** Evacuate the casualty to a medical treatment facility. Keep the casualty as still as possible. Monitor the casualty's breathing and pulse during evacuation. Do not give the casualty any alcohol, drugs, tobacco, fluids, or food. If the snake was killed, transport the snake with the casualty. Proper identification of the snake will assist medical personnel in selecting the correct antivenin.

1-5. TREAT A NONPOISONOUS SNAKEBITE

If the snakebite can be positively identified as being caused by a nonpoisonous snake, treat the bite as a wound.

a. **Cleanse the Wound.** Cleanse the wounds (bite punctures) with soap and water or with an antiseptic solution. If the casualty is not allergic to iodine, apply iodine to the wound.

b. **Check Immunization.** One of the chief dangers of a bite from a nonpoisonous snake is tetanus. If the soldier's tetanus toxoid series is not current, he will need to be referred to a medical treatment facility (usually the battalion aid station) for immunization before returning to duty.

c. **Record Treatment.** Record the injury and the treatment given on a DD Form 1380, U.S. Field Medical Card. If the casualty is to return to duty, forward the card through appropriate channels.

d. **Return the Casualty to Duty/Evacuate the Casualty.** If the casualty needs an immunization, have him report to the nearest medical treatment facility. Otherwise, return the casualty to duty. If the casualty returns to duty, tell him to avoid alcohol, drugs, and tobacco products. Do not administer any sedatives to the casualty. Tell the casualty to seek medical help if signs of infection, such as redness and swelling, occur.

Continue with Exercises

EXERCISES, LESSON 1

INSTRUCTIONS: Mark the letter of the response that BEST completes the sentence or BEST answers the question. After you have completed all the exercises, turn to "Solutions to Exercises" at the end of the lesson and check your answers. For each exercise answered incorrectly, reread the material referenced after the solution.

1. A soldier has been bitten by a snake. The bite has six rows of puncture marks, but no fang marks. This bite was probably caused by a:

   a. Poisonous snake.

   b. Nonpoisonous snake.

2. A soldier has been bitten by a snake. The bite has two rows of puncture marks and a single fang mark. You should treat the bite as being from a:

   a. Poisonous snake.

   b. Nonpoisonous snake.

3. A soldier was bitten by a snake. The skin around the bite site was damaged when the soldier injured himself while running away from the snake and you cannot determine whether fang marks are present or not. You should treat the bite as being from a:

   a. Poisonous snake.

   b. Nonpoisonous snake.

4. You see a snake about two feet long with colored bands in the following order: black, red, black, yellow, black, red, black. This snake is:

   a. Poisonous.

   b. Nonpoisonous.

5. A soldier says that a person who is bitten by a snake in the water does not have to worry about venom. Is he correct?

   a. Yes.

   b. No.

6. Which of the following poisonous snakes does not have two deep depression between the eyes and nostrils?

   a. Rattlesnake.

   b. Copperhead.

   c. Water moccasin.

   d. Coral snake.

7. A soldier has been bitten by a snake. The bite area began to hurt and swell immediately after the bite. The soldier was probably bitten by a:

   a. Poisonous pit viper.

   b. Poisonous coral snake.

   c. Nonpoisonous snake.

8. You are treating a soldier with a poisonous snake bite on his forearm. Should you elevate the arm?

   a. Yes.

   b. No.

9. A casualty has been bitten by a poisonous snake. The casualty wishes to get up and walk around. You should:

   a. Allow him to walk around as long as he does not become dizzy.

   b. Have him lie down with the bite site elevated.

   c. Have him lie down with the bite site at or below the heart level.

10. A soldier was bitten by a nonpoisonous snake and you have treated the wound. Do you need to evacuate him to a medical treatment facility?

    a. No.

    b. Yes.

    c. Only if he needs an immunization for tetanus.

11. A soldier has been bitten on the hand by a poisonous snake. Which of the following is true?

    a. You should put a constricting band above the casualty's wrist.

    b. You should put a tourniquet above the casualty's wrist.

    c. You should not apply a constricting band or a tourniquet to the bitten limb.

12. Which of the following is a proper treatment for a snakebite?

    a. Apply ice to the wound.

    b. Cut the fang punctures and suck out the venom with a suctioning device.

    c. Elevate the limb above the level of the heart.

    d. Splint the extremity while having the casualty lie still.

13. A specialized medic can administer antivenin if:

    a. The snake has been positively identified.

    b. He has the correct antivenin available.

    c. The casualty has signs and symptoms of envenomation.

    d. The casualty is not sensitive (allergic) to the antivenin.

    e. All of the above conditions have been met.

14. Which of the following is correct concerning initiating a DD Form 1380 on a casualty treated for snakebite?

    a. You should prepare the form only if the casualty was bitten by a poisonous snake.

    b. You should prepare the form only if the casualty was bitten by a nonpoisonous snake.

    c. You should prepare the form regardless of whether the snake was poisonous or nonpoisonous.

    d. You should prepare the form only if the casualty is to be evacuated.

15. While on a field training exercise in the South, you come upon a snake lying on some rocks. The snake is about four feet in length, brownish with dark bands, and has a head shaped like a triangle or spearhead that is distinct from its body. This snake is probably a:

    a. Poisonous pit viper.

    b. Poisonous coral snake.

    c. Nonpoisonous snake.

Check Your Answers on Next Page

SOLUTIONS TO EXERCISES, LESSON 1

1. b (para 1-3)
2. a (para 1-3)
3. a (para 1-4)
4. b (para 1-2b)
5. b (para 1-1b)
6. d (para 1-2)
7. a (para 1-3a(1))
8. b (para 1-4a(5))
9. c (paras 1-4a(1), (5))
10. c (paras 1-5b, d)
11. c (paras 1-4a(1), (5); b(1), (3))
12. d (para 1-4b(3))
13. e (para 1-4d)
14. c (paras 1-4e, 1-5c)
15. a (paras 1-2a, a(2))

End of Lesson 1

LESSON ASSIGNMENT

LESSON 2	Arthropod Bites and Stings.
TEXT ASSIGNMENT	Paragraphs 2-1 through 2-22.
TASK TAUGHT	081-833-0072, Treat a casualty for insect bites or stings.
LESSON OBJECTIVES	When you have completed this lesson, you should be able to:

2-1. Identify and treat a black widow spider bite.

2-2. Identify and treat a brown recluse spider bite.

2-3. Identify and treat a deadly scorpion sting.

2-4. Identify and treat a non-deadly scorpion sting.

2-5. Identify and treat a sting from a bee, wasp, hornet, or yellow jacket.

2-6. Identify and treat a fire ant sting.

2-7. Identify and treat a tick bite.

2-8. Identify and treat a chigger bite.

2-9. Identify and treat an urticating caterpillar sting.

2-10. Treat a casualty for a bite or sting from an unidentified arthropod.

2-11. Identify and treat a casualty with anaphylactic shock.

SUGGESTION After completing the assignment, complete the exercises at the end of this lesson. These exercises will help you to achieve the lesson objectives.

LESSON 2

ARTHROPOD BITES AND STINGS

2-1. INTRODUCTION

Bites and stings from venomous arthropods (poisonous insects, spiders, and scorpions) can result in severe reactions and can even cause death. Even if the condition is not life threatening, a sting or bite can be severe enough to significantly reduce a soldier's effectiveness in the performance of his duties. The arthropods most frequently responsible for such bites and stings in the CONUS are wasps, bees, ants, caterpillars, spiders, and scorpions. You must be able to quickly identify the injury, properly treat the casualty, and either evacuate the casualty or return him to duty.

a. The term "arthropod" refers to animals having a hard, jointed exoskeleton, and paired, jointed legs. The term includes true insects (such as wasps, bees, ants, and moths), arachnids (such as spiders, scorpions, ticks, and mites), and certain other animals such as centipedes. Many times, all harmful arthropods are covered under the general term "biting insects."

b. In some geographical locations, certain arthropods have only seasonal importance while others are present all year round. Because of the danger of venomous arthropods to humans, their identification, behavior, and control are important factors in the prevention of bites and stings.

2-2. INITIATE TREATMENT TO A CASUALTY WITH AN ARTHROPOD BITE OR STING

The following are general procedures used to treat a casualty that has been stung or bitten by an arthropod.

a. **Survey the Casualty**. Check the casualty for life-threatening conditions, especially respiratory distress and anaphylactic shock. Perform mouth-to-mouth resuscitation or cardiopulmonary resuscitation, if needed.

b. **Expose Bite Area**. Loosen or remove the casualty's clothing, including shoes, to fully expose the site of the bite or sting.

c. **Remove Jewelry, If Applicable.** If the casualty is wearing any jewelry on the bitten limb, remove the jewelry and place it in the casualty's pocket or give it to the casualty. Jewelry is removed because the limb could swell and the jewelry could interfere with blood circulation.

d. **Calm the Casualty.** Calm the casualty with reassuring words.

e. **Identify Arthropod, If Possible.** Sometimes, a casualty will know what stung or bit him. At other times, you may be able to identify the arthropod responsible for the injury from the casualty's description of the arthropod, from an examination of the bite/sting site, or from the casualty's signs and symptoms resulting from the bite or sting.

f. **Question Casualty About Allergies.** Ask the casualty if he is allergic to any insects or arthropods. If he says he is, ask him which insects or arthropods he is allergic to and whether he has a kit for treating allergic reaction to bites or stings (anaphylactic shock).

g. **Treat the Casualty.**

(1) Treat the bite or sting based upon your identification (or lack of identification) of the arthropod. Specific procedures for treating arthropod bites and stings are given in paragraphs 2-6, 2-8, 2-10, 2-12, 2-14, 2-16, 2-18, 2-20, and 2-22. Do not apply a tourniquet or attempt the removal of venom by incision or suction.

(2) If signs and symptoms of anaphylactic shock are present (paragraph 2-3), treat the casualty for anaphylactic shock (paragraph 2-4) and evacuate the casualty as soon as possible.

h. **Record Treatment**. Record the casualty's signs and symptoms and the treatment given on a DD Form 1380, U.S. Field Medical Card. If the casualty is evacuated, attach the card to his clothing. If he is returned to duty, forward the card through proper channels.

i. **Evacuate the Casualty/Return Casualty to Duty.** Request evacuation if the casualty is showing signs and symptoms of respiratory distress and/or anaphylactic shock, is not responding to initial treatment, or has bite or sting from an arthropod requiring evacuation (such as the brown recluse spider). If a casualty is not showing any abnormal reaction to the bite or sting and evacuation is not a normal part of treatment, return the soldier to duty. Tell him to return to you or seek other medical help if he begins having difficulty breathing or if other signs or symptoms of allergic reaction occur.

2-3. IDENTIFY A CASUALTY WITH ANAPHYLACTIC SHOCK

When you examine (survey) a casualty who has been bitten or stung by an arthropod, watch for signs and symptoms of anaphylactic shock (anaphylaxis). Anaphylactic shock is an unusually severe allergic reaction to a foreign substance, such as the venom of an arthropod. Anaphylactic shock can occur within minutes or seconds after the sting or bite. It affects the respiratory and circulatory systems of the human body and can result in death if adequate measures are not taken. Signs and symptoms of anaphylactic shock include the following:

a. Red, itching, or burning sensation of the skin, especially of the face and upper chest.

b. Bluish coloration of the lips.

c. Hives (urticaria) [smooth, slightly elevated patches (wheals) which can also be distinguished by color (either redder or paler than surrounding skin) and often accompanied by severe itching]. Hives are an important sign that anaphylactic shock is developing.

d. Swelling (edema), especially of the face, lips, and/or tongue.

e. Tightness or pain in the chest.

f. Coughing and/or wheezing, usually with labored breathing.

g. Weak pulse.

h. Dizziness.

i. Pallor.

j. Unconsciousness.

2-4. TREAT A CASUALTY WITH ANAPHYLACTIC SHOCK

a. Monitor the casualty's respiration and heartbeat. Perform mouth-to-mouth resuscitation or cardiopulmonary resuscitation, if needed.

b. Have the casualty lie down and elevate his legs to promote blood circulation.

c. Prevent the loss of body heat by placing blankets or other covering beneath the casualty and over the casualty.

d. Ask the casualty if he is carrying medication for allergic reaction. If the casualty is carrying medication (usually an autoinjector containing 0.3 milliliter of 1:1000 epinephrine per injection), assist the casualty in administering the injection or administer the injection to him in accordance with the instructions in the kit.

e. Record the casualty's signs and symptoms and the treatment rendered on the casualty's DD Form 1380, U.S. Field Medical Card.

f. Evacuate the casualty to a medical treatment facility where he can be administered medication for the specific venom, if needed. Do not allow the casualty to have anything to eat or drink.

g. Administer oxygen during evacuation if it is available and is needed.

2-5. IDENTIFY BLACK WIDOW SPIDER BITES

Very few spiders are capable of inflicting bites that are fatal to humans. Two such spiders are the black widow and the brown recluse. The black widow spider is found throughout the US, particularly in warmer climates. The black widow spider prefers shady, cool places such as grass, shrubs, rock piles, woodpiles, and latrines. While the black widow spider prefers to remain hidden and is generally nonaggressive, it will readily bite when threatened. Black widow spider bites can be identified by seeing the spider or by the characteristic signs and symptoms of its bite.

a. **Physical Characteristics of Black Widow Spiders.**

(1) Female black widow spider. The body of a female black widow spider (figure 2-1) is about one-half inch in length. It is black and shiny with a reddish-orange spot shaped like an hourglass on the ventral side of the abdomen.

(2) Male black widow spider. The male, which is less often seen, has a body about one-fourth inch in length. It is marked like the female, but also has four pairs of reddish- orange stripes along the sides of the abdomen. The male spider does not cause a noticeable bite.

(3) Brown and gray widow spiders. There are two other species of widow spiders in the US, also known as false widow spiders. One species lives in southern Florida while another species lives primarily in southern Florida and southern California. These species are brown or gray in color and are also mildly poisonous.

Figure 2-1. Black widow spider.

b. **Signs and Symptoms of a Black Widow Spider Bite.**

(1) Immediate pinprick sensation. The pinprick sensation, caused by the spider's bite, may quickly disappear. The spider's venom attacks the nerves (neurotoxic) and causes the area to become numb. The numbness may cause the casualty to ignore the bite until it becomes more serious.

(2) Two red puncture marks at the bite site. There is usually only a slight local reaction.

(3) Severe muscular pain and spasms. The pain usually peaks in 1 to 3 hours (this is the worst stage) and persists for 12 to 48 hours.

(4) Abdominal pain, usually beginning about 10 to 40 minutes after the bite.

(5) Rigid, board-like abdomen, especially if the bite was in the lower half of the body. You will have to feel the casualty's abdomen to determine whether this sign is present.

(6) Nausea or vomiting.

(7) Profuse sweating.

(8) Tightness in the chest and/or pain during inspiration.

(9) Dizziness.

(10) Convulsions.

(11) Paralysis.

(12) Shock.

2-6. TREAT A BLACK WIDOW SPIDER BITE

a. **Keep Casualty Warm.** Keep the casualty quiet and warm.

b. **Cleanse Wound.** Cleanse the wound (bite punctures) with an antiseptic solution from your aid bag. If an antiseptic solution is not available, cleanse the area with soap and water. Do not cut the puncture wounds.

c. **Supportive Care.** Support the casualty with analgesic and respiratory support, if needed.

d. **Evacuate Casualty.** Evacuate the casualty to a medical treatment facility. Continue to monitor the casualty's vital signs. Be ready to treat the casualty for anaphylactic shock should it develop.

2-7. IDENTIFY BROWN RECLUSE SPIDER BITES

The brown recluse spider is primarily found in the southern and central parts of the US. It prefers to stay in grass, weeds, rocky bluffs, cellars, under rocks, and in woodpiles. It will also seek refuge in blankets, bedrolls, shoes, clothing, or loose materials. The brown recluse spider prefers to stay hidden and is generally nonaggressive. However, it will bite if disturbed.

a. **Physical Characteristics of Brown Recluse Spiders.** The brown recluse spider is dull brown in color with a distinctive dark brown area on its back that resembles a violin or fiddle (figure 2-2). This marking has given rise to another common name for the spider--the fiddle-back spider. The body of the brown recluse spider is about 3/8ths of an inch in length.

b. **Signs and Symptoms of a Brown Recluse Spider Bite.** The bite of a brown recluse spider may not result in immediate symptoms. Several hours may elapse between the bite and the onset of symptoms. Signs and symptoms of a brown recluse spider bite are given below.

(1) Mild to severe pain. (Pain usually begins 1 to 8 hours after the bite. There is very little, if any, immediate pain at the time of the bite.)

(2) Chills, nausea, and/or vomiting during first few hours following the bite.

(3) Bite site becomes red, swollen, and tender. The center becomes pale and a small blister may develop.

Figure 2-2. Brown recluse spider.

(4) Star-shaped firm area of deep purple color develops at the bite site three to four days after bite.

(5) Central area of depression and ulceration occurs 7 to 14 days following the bite.

(6) Scar formation occurs approximately 21 days following bite.

2-8. TREAT A BROWN RECLUSE SPIDER BITE

a. **Keep Casualty Calm.** Keep the casualty calm and quiet.

b. **Cleanse Wound.** Cleanse the wound (bite punctures) with an antiseptic solution from your aid bag. If an antiseptic solution is not available, cleanse the area with soap and water. Do not cut the puncture wounds.

c. **Evacuate Casualty.** Evacuate the casualty to a medical treatment facility. Continue to monitor the casualty's vital signs. Be ready to treat the casualty for anaphylactic shock should it develop. Administer oxygen, if needed.

NOTE: Constricting bands are not applied because the venom does not dilute. It goes deeper into the tissue and causes severe local tissue damage. If not properly treated, gangrene (the death of tissue caused by a lack of blood supply) can develop.

2-9. IDENTIFY SCORPION STINGS

Scorpions are usually found in warm climates, particularly the southwestern parts of the US and in deserts. They prefer to hide under rocks or undergrowth and are particularly active at night. If a soldier is in an area where scorpions are present, he should check his shoes or boots in the morning for scorpions before putting on the footwear. Although most scorpions found in the US only have stings that are painful, the Bark scorpion (found in Arizona and surrounding states) has a sting that can be fatal.

a. **Physical Characteristics of Scorpions.** Scorpions are easily recognized by their crab-like appearance and long, segmented tail that ends in a sharp spine or stinger (figure 2-3). A scorpion has two large, claw-like pincers. When it runs, the pincers are held forward and the tail is commonly curved upward, but can also be held straight behind the scorpion or curled to the side. Scorpions range from two to five inches in length. The female may carry its young on its back.

Figure 2-3. Bark scorpion.

b. **Signs and Symptoms of a Scorpion Sting.**

(1) Severe pain and burning sensation at sting site. The symptoms last for 24 to 78 hours.

(2) Local swelling and discoloration at the sting site.

(3) Sensitivity to touch and a tingling ("pins and needles") sensation or numbness at the sting site.

(4) Lack of swelling (usually) at the sting site.

(5) Impaired speech.

(6) Drowsiness.

(7) Itchy mouth, nose, and throat.

(8) Muscle spasms.

(9) Excessive salivation.

(10) Convulsions.

(11) Respiratory distress.

(12) Cardiac failure.

NOTE: A Bark scorpion is poisonous. The Bark scorpion sting may have additional symptoms such as numbness or tingling of extremities or face, blurry vision, or muscle twitching.

NOTE: When stung by a Bark scorpion, children may start to exhibit hyperactivity and have roving eye movements.

2-10. TREAT A SCORPION STING

a. **Position Casualty.** Have the casualty lie down on his back. Keep the casualty calm and quiet.

b. **Treat the Area.**

(1) Cleanse the sting area with soap and water.

(2) Apply a cool compress to the area of the scorpion sting.

c. **Monitor the Casualty.** Monitor the casualty's vital signs. Be ready to treat the casualty for anaphylactic shock should it develop.

d. **Evacuate the Casualty, If Applicable.** Evacuate the casualty to a medical treatment facility if:

(1) The signs and symptoms indicate that the patient may be having a severe reaction to the sting.

(2) The sting is on the face, neck, or genitals.

(3) Signs and symptoms of anaphylactic shock are present.

(4) The casualty develops signs/symptoms of a Bark scorpion sting. Bark scorpion sting requires immediate evacuation. Call the Poison Control Center at (800) 362-0101 or (602) 253-3334 for additional instructions, if needed.

NOTE: Soldiers should keep their tetanus shots and boosters current.

2-11. IDENTIFY BEE, HORNET, YELLOW JACKET, AND WASP STINGS

There are over 100,000 species of hymenopterans (bees, hornets, yellow jackets, wasps, ants, and similar insects). They are especially dangerous because a casualty may be stung by many insects at the same time. The bee has a barbed stinger that remains in the casualty. (The bee flies away and dies.) The wasp, hornet, and yellow jacket retain their stingers and can sting repeatedly. Stings from hymenopterans result in more deaths than do snakebites. Approximately five percent of the population is allergic to the venom of bees, hornets, yellow jackets, and/or wasps. These casualties may have allergic reactions that can develop into anaphylactic shock if preventive measures are not taken. The fire ant is discussed separately in paragraphs 2-13 and 2-14.

a. **Physical Characteristics of Bees, Hornets, Yellow Jackets, and Wasps.** Hymenopterans have four membranous wings. The hind wings are smaller than the front and have a row of tiny hooks on their anterior margin by which the hind wing attaches to the front wing. The bee has a rounded abdomen while the wasp, hornet, and yellow jacket have thinner bodies (figure 2-4).

b. **Signs and Symptoms of a Bee, Hornet, Yellow Jacket, or Wasp Sting.** Moderate reactions, if present, usually begin within 20 minutes of the sting.

(1) Pain at sting site.

(2) Stinger present in sting site (if bee sting).

(3) Wheal, redness, and swelling at the sting site.

(4) Itching at sting site.

(5) Anxiety (moderate reaction).

(6) Abdominal pain (moderate reaction) or cramps (severe reaction).

(7) Tightness in chest (moderate reaction).

A

B

C

D

Figure 2-4. Bee (a), wasp (B), hornet (C), and yellow jacket (D).

(8) Generalized discoloration (moderate reaction).

(9) Generalized itching and burning (severe reaction).

(10) Labored breathing, bronchospasms, wheezing, and coughing (severe reaction).

(11) Difficulty in swallowing (severe reaction).

(12) Hives (severe reaction).

(13) Mental confusion (severe reaction).

(14) Anaphylactic shock (severe reaction).

(15) Respiratory failure (severe reaction).

2-12. TREAT A BEE, HORNET, YELLOW JACKET, OR WASP STING

a. **Remove Stinger, If Present.** If a stinger is present at the sting site (bee sting only), gently scrape the skin with a knife blade, fingernail, or thin metal object to remove the stinger from the skin. Removing the stinger prevents additional venom from being injected into the casualty since the venom sac remains attached to the stinger.

b. **Cleanse Wound.** Cleanse the sting area with an antiseptic solution from your aid bag. If an antiseptic solution is not available, cleanse the area with soap and water.

c. **Apply Cold Treatment.** Apply ice, an ice bag, or chemical cold packs to the sting area, if available, to relieve pain, help control swelling, and reduce the spread of the venom. A 10 percent ammonia solution can be applied instead of ice or cold packs.

d. **Evacuate Casualty, If Needed.** Evacuate the casualty to a medical treatment facility if severe reactions are present. Monitor the casualty's vital signs and treat the casualty for anaphylactic shock if it develops.

2-13. IDENTIFY FIRE ANT STINGS

Fire ants are usually found in the Gulf Coast states, particularly in Louisiana and Texas. The fire ant was accidentally brought into the US by cargo ships from South America. The fire ant can sting repeatedly. A person may sustain several stings from a single fire ant within a short period of time.

a. **Physical Characteristics of Fire Ants.** Fire ants (figure 2-5) are small and usually brownish in color. They live in large mounds. The "fire" refers to the burning sensation their sting causes.

Figure 2-5. Fire ant.

b. **Signs and Symptoms of a Fire Ant Sting.**

(1) Burning sensation at the site of the sting.

(2) Wheal at site of the sting (forms within minutes after the sting).

(3) Clear fluid-filled bubble or blister at site of sting (forms within minutes after the sting). See figure 2-6.

(4) Cloudy fluid-filled bubble (2 to 4 hours after the sting).

(5) Bubble on a red base (appears 8 to 10 hours after the bite).

(6) Lesion (appears 3 to 8 days after the bite). The lesion often leaves a scar after healing.

(7) Anaphylactic shock.

Figure 2-6. Fire ant sting

2-14. TREAT A FIRE ANT STING

a. **Cleanse Wound.** Cleanse the sting area with an antiseptic solution from your aid bag. If an antiseptic solution is not available, cleanse the area with soap and water.

b. **Apply Cold Treatment.** Apply ice, an ice bag, or chemical cold packs to the sting area, if available, to relieve pain, help control swelling, and reduce the spread of the venom.

c. **Evacuate Casualty, If Needed.** Evacuate the casualty to a medical treatment facility if anaphylactic shock develops.

2-15. IDENTIFY TICK BITES

Ticks are common in woods and fields throughout the US. They attach themselves to an animal in order to obtain blood from the animal. Ticks are also carriers of diseases, such as Rocky Mountain spotted fever and Lyme disease.

a. **Physical Characteristics of Ticks.** Ticks are divided into two groups--hard ticks and soft ticks. The hard tick has a hard shield on its back and its mouthpart can be seen from above. The soft tick does not have a hard shield and its mouthparts cannot be seen from above. Ticks often have a leather-like appearance and embed themselves into the casualty's skin. Ticks are also further categorized by their region and the common animals that they affect as shown in figure 2-7.

b. **Common Tick Diseases.**

(1) Deer ticks transmit Lyme disease. Tick parasites also transmit a group of diseases generally called babesiosis.

(2) The Lone Star tick transmits ehrlichiosis (an immune disease) and a condition known as STARI, which mimics Lyme disease.

(3) The American dog tick transmits Rocky Mountain spotted fever and tularemia, but not Lyme disease.

c. **Signs and Symptoms of a Tick Bit**e.

(1) Itching at the bite site.

(2) Redness at the bite site.

(3) Pain in the legs.

(4) Breathing difficulty.

(5) Paralysis (may occur several days after the bite as a result of certain diseases which can be transmitted by ticks).

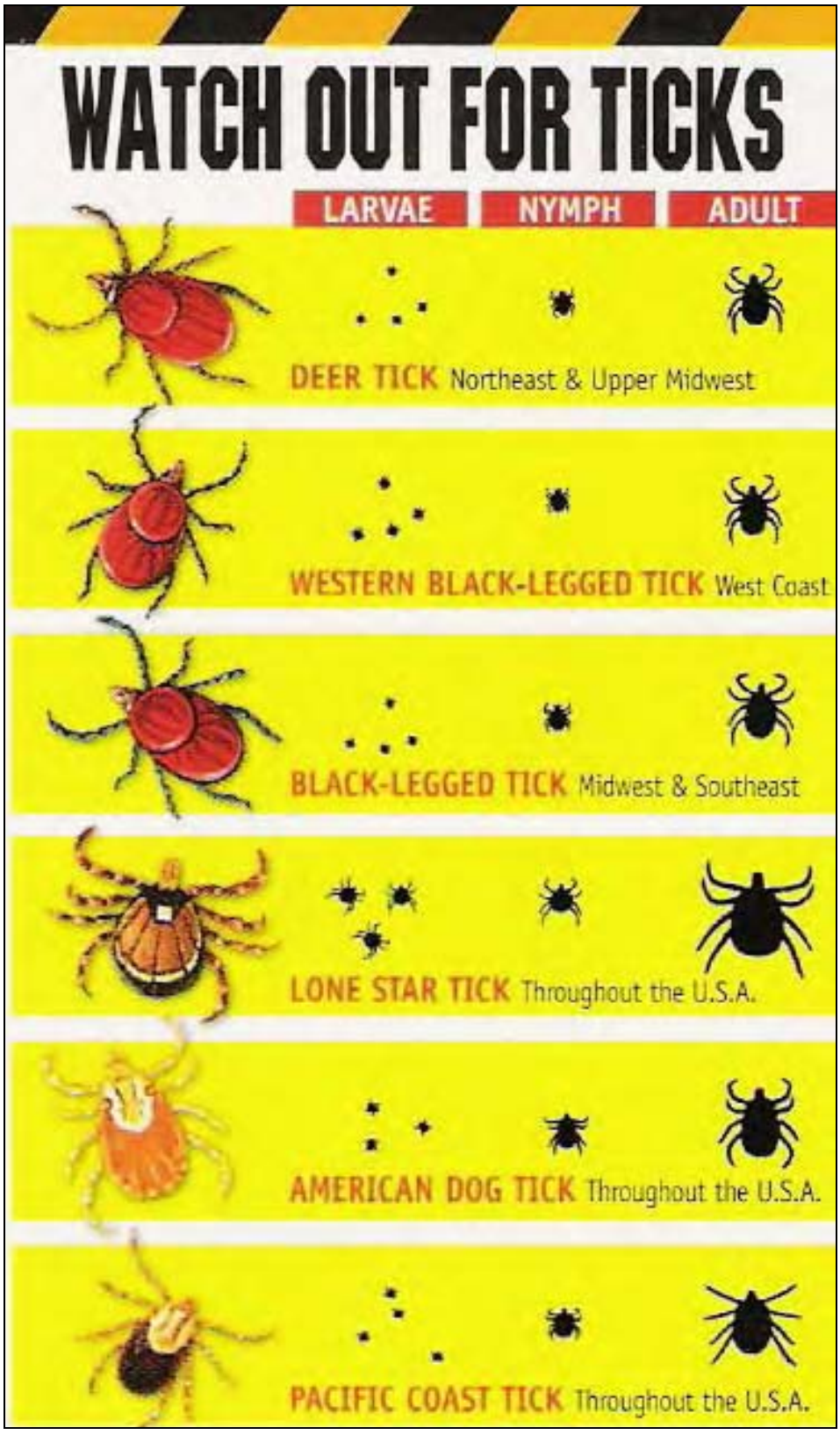

Figure 2-7. Ticks.

2-16. TREAT A TICK BITE

a. **Remove Tick**. Using tweezers, grasp the tick as close to the casualty's skin as possible and pull the tick straight out using steady pressure. Do not grasp the tick's abdomen. If you rupture the tick upon removal, cleanse the area with soapy water or alcohol.

(1) If tweezers are not available, use an absorbent material (gauze pads, paper towels, and so forth) to grasp the tick as close to the skin as possible. The absorbent material will help to protect you and the casualty from the contents of the tick's abdomen, which may contain disease-causing microorganisms.

(2) After removing the tick, inspect the tick and the bite site.

b. **Cleanse Wound**. Cleanse the wound (bite site) thoroughly using an antiseptic solution from your aid bag. If an antiseptic solution is not available, cleanse the area thoroughly with soap and water. If the tick broke apart, scrub the area aggressively with antiseptic.

c. **Cleanse Self**. If you touched the tick, if you used absorbent material to remove the tick, or if the tick broke apart (even if you used tweezers), aggressively clean your hands with antiseptic solution or with soap and water.

d. **Monitor Casualty**. Evacuate the casualty to a medical treatment facility if breathing difficulties develop. Continue to monitor the casualty for the next several days for signs and symptoms of tick-transmitted diseases, particularly breathing difficulties and paralysis. Watch the casualty for any rashes, fevers, malaise (tiredness), lethargy, or difficulty in thinking, all of which can indicate the onset of certain tick-borne diseases.

2-17. IDENTIFY MITE (CHIGGER) BITES

Mites are often found in tall grass and in scrub vegetation. The larva of the mite is commonly called a chigger. These small animals attach themselves to animals in order to obtain blood. Mites can transmit diseases such as scrub typhus (tsutsugamushi disease) and river fever. Soldiers should take protective measures against mites, including wearing shirts with the sleeves rolled down, tucking trouser legs in boots, and spraying socks, boot tops, boot tongues, trouser cuffs, waist bands, and clothing openings with insect repellent containing DEET (diethyltoluamide).

a. **Physical Characteristics of Mites.** Mites are very small, often requiring a microscope for identification. They usually have transparent or semitransparent bodies. Figure 2-8 shows a chigger, which is one stage in the life cycle of a mite.

b. **Signs and Symptoms of a Mite (Chigger) Bite.** The primary signs and symptoms of chigger bites are itching and redness at the site of the bite.

Figure 2-8. Chiggers.

2-18. TREAT A MITE (CHIGGER) BITE

a. **Cleanse Wound.** Cleanse the bite site thoroughly by aggressively scrubbing it with hot soapy water.

b. **Apply Topical Medication.**

(1) Apply an antipruritic to control itching.

(2) Apply an anti-inflammatory, such as one percent hydrocortisone cream, to control inflammation.

(3) Give diphenhydramine hydrochloride by mouth for the itching.

c. **Evacuate, If Needed.** Evacuate the casualty to a medical treatment facility, if severe itching (pruritus) is present.

2-19. IDENTIFY URTICATING CATERPILLAR STINGS

The caterpillar is the larva stage in the life cycle of moths and butterflies. Some caterpillars have venomous spines for protection. Although these caterpillars may appear to be soft and defenseless, they are to be respected and definitely not to be played with. These caterpillars are also referred to as "stinging moth larvae" and are primarily found in southern states.

a. **Physical Characteristics of Urticating Caterpillars.** Urticating caterpillars usually have stout, branched spines placed at various intervals along the body or a dense mat of extremely fine hair-like material covering both head and body (figure 2-9). One of the most common species in this group is the saddleback caterpillar, which is brownish with a green saddle-like mark on the back.

Figure 2-9. Urticating caterpillars.

b. **Signs and Symptoms of an Urticating Caterpillar Sting.**

(1) Burning, stinging sensation at the sting site.

(2) Redness at the sting site.

(3) Blisters, especially if the sting area is around the mouth.

(4) Internal bleeding if accidentally ingested.

2-20. TREAT AN URTICATING CATERPILLAR STING

a. **Remove Spines.** Remove any spines remaining in the wound site by pressing the sticky side of some adhesive tape on the wound and lifting the tape. The spines should adhere to the tape.

b. **Cleanse Wound.** Cleanse the sting area with an antiseptic solution from your aid bag. If an antiseptic solution is not available, cleanse the area with soap and water.

c. **Apply Cold Treatment.** Apply ice, an ice bag, or chemical cold packs to the sting area, if available.

d. **Evacuate Casualty, If Needed.** Evacuate the casualty to a medical treatment facility if anaphylactic shock develops, if the sting site is around the mouth or eyes, or if the caterpillar was ingested.

2-21. IDENTIFY BITES AND STINGS FROM UNIDENTIFIED ARTHROPODS

Many insects and other arthropods are medically important because their bite or sting can result in pain or irritation and be a source of concern to the casualty. Many times the casualty may not know what bit or stung him, but you must still treat the casualty and look for signs and symptoms that may indicate a life-threatening condition.

a. **Normal Signs and Symptoms.** Most arthropod bites and stings are characterized by swelling and pain at the site of the bite or sting.

b. **Severe Signs and Symptoms.** If the casualty has a severe reaction to the bite or sting, breathing difficulties and anaphylactic shock may develop.

2-22. TREAT A BITE OR STING FROM AN UNIDENTIFIED ARTHROPOD

a. **Cleanse Wound.** Cleanse the sting or bite area with an antiseptic solution from your aid bag. If an antiseptic solution is not available, cleanse the area with soap and water.

b. **Apply Cold Treatment.** Apply ice, an ice bag, or chemical cold packs to the sting or bite area to relieve pain, help control swelling, and reduce the spread of the venom.

c. **Monitor Casualty's Vital Signs.** Monitor the casualty's vital signs for indications of anaphylactic shock or other severe reaction to the bite or sting. Evacuate the casualty to a medical treatment facility if respiration problems or anaphylactic shock develop. Perform mouth-to-mouth resuscitation or cardiopulmonary resuscitation, if needed.

Continue with Exercises

EXERCISES, LESSON 2

INSTRUCTIONS: Mark the letter of the response that BEST completes the sentence or BEST answers the question. After you have completed all the exercises, turn to "Solutions to Exercises" at the end of the lesson and check your answers. For each exercise answered incorrectly, reread the material referenced after the solution.

1. A soldier reports being stung by "a wasp or bee or something like that." His face is swollen and itching and his lips have a bluish tint. He has hives and is complaining of chest pains. This casualty is probably suffering from:

   a. Anaphylactic shock.

   b. A bee sting.

   c. A wasp, hornet, or yellow jacket sting.

   d. A heart attack.

2. A soldier is showing signs of anaphylactic shock after being stung by "some insect" in a rock pile. When you ask if he is allergic to any insects or arthropods, he replies, "Don't know." You should:

   a. Tell the soldier to return to the rock pile and try to find the arthropod again.

   b. Monitor the soldier for 30 minutes to see if the signs of anaphylactic shock subside.

   c. Elevate the soldier's feet, keep him warm, and evacuate him to a medical treatment facility.

   d. Administer an injection of atropine from your aid bag and have the soldier return to duty.

3. Which of the following statements is true?

   a. All arthropods are insects, but not all insects are arthropods.

   b. All insects are arthropods, but not all arthropods are insects.

   c. Arthropods and insects are two terms for the same group of animals.

4. A soldier was bitten by a spider. He describes the spider as being shiny and black with a reddish figure on the underside of its abdomen. He was probably bitten by a(n):

   a. Black scorpion.

   b. Black widow.

   c. Brown recluse.

   d. Urticating caterpillar.

5. A soldier reports to you suffering from nausea and abdominal pain. When you check his abdomen, you find it to be very rigid. The casualty has been removing logs from a large wood pile. You should suspect that he was bitten by a(n):

   a. Black widow spider.

   b. Brown recluse spider.

   c. Fire ant.

   d. Scorpion (deadly).

6. A soldier has been bitten by a brown recluse. You should:

   a. Place a tourniquet above the site of the bite.

   b. Place a constricting band above and below the site of the bite.

   c. Cut the flesh over the fang marks in parallel lines about 1/4 inch deep and suck the venom out.

   d. Cleanse the bite site with an antiseptic solution.

7. A soldier says that he was stung by a "flying insect." You inspect the site and find the stinger sticking out of the sting site. The casualty was probably stung by a:

   a. Bee.

   b. Hornet.

   c. Wasp.

   d. Yellow jacket.

8. A soldier was stung by a scorpion. What treatments should be considered?

   a. Have the casualty return to duty.

   b. Monitor the casualty for signs of a severe envenomation.

   c. Transport the casualty immediately since all scorpion stings are deadly.

9. A soldier thinks he was stung on the leg by fire ants a few minutes ago. Which one of the following indicates a fire ant sting?

   a. Small, thin spines in the sting site.

   b. Numbness with swelling and discoloration at the sting site.

   c. A firm, star-shaped, deep purple area at the sting site.

   d. A bubble or blister filled with clear fluid at the sting site.

10. You are attempting to remove a tick from a casualty's leg when the tick breaks apart (abdomen separates from the head). You should:

    a. Cleanse the wound site.

    b. Cleanse your hands.

    c. Cleanse the wound site and your hands.

11. A soldier has been stung by an urticating caterpillar. Which of the following is usually the best method of removing the spines from the skin?

    a. Aggressively scrub the sting site with hot, soapy water.

    b. Use tweezers to grasp the spines as close to the casualty's skin as possible and pull straight out.

    c. Gently scrape the spines with a knife blade,

    d. Press some adhesive tape over the spines and lift.

12. Diphenhydramine hydrochloride can be administered for a chigger bite to control:

    a. Anaphylactic shock.

    b. Inflammation.

    c. Itching.

Check Your Answers on Next Page

SOLUTIONS TO EXERCISES, LESSON 2

1. a (para 2-3)
2. c (para 2-4)
3. b (para 2-1a)
4. b (para 2-5a(1))
5. a (paras 2-5, 2-5b(4), b(5), b(6))
6. d (para 2-8b)
7. a (para 2-11, 2-11b(2))
8. b (para 2-10b)
9. d (para 2-13b(3))
10. c (paras 2-16a, b, c)
11. d (para 2-20a)
12. c (para 2-18b(3))

End of Lesson 2

LESSON ASSIGNMENT

LESSON 3	Plant Contact Dermatitis.
TEXT ASSIGNMENT	Paragraphs 3-1 through 3-5.
TASK TAUGHT	081-833-0074, Treat a casualty suffering from contact poisoning.
LESSON OBJECTIVES	After completing this lesson, you should be able to:

3-1. Identify poison ivy.

3-2. Identify poison oak.

3-3. Identify poison sumac.

3-4. Identify the substance that causes plant contact dermatitis.

3-5. Identify measures for preventing plant contact dermatitis.

3-6. Identify the signs and symptoms of plant contact dermatitis.

3-7. Identify the treatment for plant contact dermatitis.

SUGGESTION After completing the assignment, complete the exercises at the end of this lesson. These exercises will help you to achieve the lesson objectives.

LESSON 3

PLANT CONTACT DERMATITIS

3-1. GENERAL

Contact dermatitis is an inflammation of the skin due to an allergic reaction to a substance with which it has come into contact. Plant contact dermatitis is a skin eruption caused by direct or indirect contact with a toxic plant or with direct or indirect contact with the sap (juice) of a toxic plant. In the United States (US), the most common plants that cause these skin eruptions are poison ivy (Rhus radicans), poison oak (Rhus diversiloba), and poison sumac (Rhus vernix). All three of these plants contain urushiol (pronounced u-roo'-she-ol), a toxic irritant. Urushiol is a clear, gummy, heavy oil contained inside all parts of the plant (leaves, stems, and roots). When the plant is damaged, the urushiol comes to the surface. If urushiol comes into contact with skin, it penetrates the outer layer of skin and binds itself to skin cells. The body then reacts to the toxic substance.

a. The urushiol does not have to pass directly from plant to skin. The urushiol can stick to boots, clothing, weapons, or animal fur with which it comes into contact. When a person touches the object (minutes, days, or months later), the urushiol attacks his skin. Even the smoke from burning plants containing urushiol carries droplets of urushiol which can get on a person's skin. If the smoke containing urushiol is inhaled, the urushiol can affect the person's respiratory system and create breathing problems. Urushiol can remain active even if the plant has died and dried.

b. In the US, about 25 percent of the people are immune to urushiol, about 25 percent are mildly sensitive, about 30 percent are moderately sensitive, and about 20 percent are extremely sensitive to urushiol.

3-2. IDENTIFY POISON IVY, POISON OAK, AND POISON SUMAC

a. **Poison Ivy.** Poison ivy (figure 3-1) is also known as three-leaf ivy, poison creeper, climbing sumac, oak leaf ivy, and mercury.

(1) Poison ivy grows as a small plant, either as a vine or shrub.

(2) Leaves of the poison ivy plant always consist of three glossy, pointed leaflets.

(3) Poison ivy has greenish-white flowers and berries that grow in clusters.

Figure 3-1. Poison ivy.

b. **Poison Oak.** Poison oak (figure 3-2) is often confused with poison ivy. It can be distinguished from poison ivy by the shape of its leaflets (poison oak has rounder leaflets with wavy edges).

Figure 3-2. Poison Oak.

(1) Poison oak grows as a small plant, either as a vine or shrub.

(2) Leaves of the poison oak plant always consist of three glossy leaflets with wavy edges.

(3) Poison oak has greenish-white flowers and berries that grow in clusters.

c. **Poison Sumac.** Poison sumac (figure 3-3) grows mostly in the eastern third of the US and is relatively rare. It is also called swamp sumac, poison dogwood, and thunderwood.

Figure 3-3. Poison sumac.

(1) Poison sumac grows as woody shrubs or small trees from 5 to 25 feet tall.

(2) Poison sumac has compound leaves and clusters of small greenish flowers, succeeded by red, hairy fruits. The leaves grow in pairs except at the tip where there is a single leaf.

3-3. INITIATE PREVENTIVE MEASURES

The following measures will help to keep soldiers from becoming casualties due to contact dermatitis.

a. Be able to identify the plants that cause contact dermatitis.

b. Avoid poison ivy, poison oak, and poison sumac whenever possible.

c. Avoid selecting bivouac areas that are infested with these plants.

d. Wear gloves and be fully clothed when working in an area likely to have poisonous plants. Shirt sleeves should be rolled down and buttoned. The shirt or jacket front, including collar, should be closed and buttoned.

e. Wash all exposed skin areas with a strong soap solution or with alcohol if you suspect that you may have been exposed to poison ivy, poison oak, or poison sumac.

f. Wash clothing or equipment with hot water and soap if you think the clothing or equipment may have been contaminated with urushiol.

g. When the tactical situation dictates, burn the poisonous plants.

(1) When burning, make sure the fire is on the downwind side of the bivouac or troop area in order to avoid contaminating the area with droplets of urushiol carried by the smoke.

(2) Ensure that troops are upwind from the burning. Inhaling smoke from burning poison ivy, poison oak, and/or poison sumac can cause several adverse reactions such as head-to-toe contact dermatitis, fever, irritation of the nose and throat, internal swelling in the lungs, difficulty in breathing, pneumonia, malaise, and even death.

3-4. IDENTIFY SIGNS AND SYMPTOMS OF PLANT CONTACT DERMATITIS

Since poison ivy, poison oak, and poison sumac all contain urushiol, contact with any of these plants produces the following signs and symptoms:

a. Red, swollen skin.

b. Headache.

c. Fever.

d. Burning sensation and itching on contaminated skin.

e. Skin eruptions (rash) that occur from within a few hours to 48 hours after contact.

f. Blisters. (This stage follows the rash.)

g. Sores. (When the blisters break 2 to 4 days after they form, a raw surface is left. These sores soon become encrusted and usually heal within 2 weeks.)

h. Secondary infection. (Secondary infection may occur when the blisters break. It may appear to be a skin disease or eczema.)

3-5. TREAT PLANT CONTACT DERMATITIS

Plant contact dermatitis from poison ivy, poison oak, or poison sumac is treated the following manner.

a. **Expose Areas.** Expose the affected areas by loosening or removing clothing. Also remove any jewelry on the affected limb(s) since the jewelry could interfere with blood circulation if the limb swells.

b. **Cleanse Areas.** Thoroughly wash the exposed areas of the casualty's skin with soap and water or with alcohol to remove or reduce the amount of urushiol on the skin.

(1) Wash the affected areas several times in succession, using a fresh soap and water solution for each wash.

(2) Confine the washing to the affected areas in order to avoid spreading urushiol to other parts of the body.

(3) Avoid contact with the contaminated wash water.

c. **Remove Contamination From Self.** After washing the affected areas on the casualty, wash your hands and any other part of your body that may have come into contact with the urushiol. Also remove any clothing that may have come into contact with urushiol. This protects you from reaction to the urushiol and also keeps the casualty from becoming contaminated again from contact with your hands and clothing.

d. **Apply Alcohol.** Apply alcohol to the affected areas on the casualty's skin to further cleanse it and to aid in preventing secondary infection.

e. **Apply Calamine Lotion.** Apply calamine lotion to soothe the contaminated area, reduce itching, and aid in healing. Do not apply calamine lotion to raw areas. Applying calamine lotion to an open sore could result in infection.

f. **Administer Benadryl.** Administer diphenhydramine hydrochloride (trade name Benadryl) capsules to the casualty if he is showing signs and symptoms of allergic reaction to the urushiol. The medication will help to decrease allergic reaction.

g. **Let Affected Areas Dry.** Do not dress the affected areas. Applying a dressing would cause retention of moisture and not allow the contaminated areas to dry.

h. **Record Treatment**. Record the casualty's signs and symptoms and the treatment given on a DD Form 1380, U.S. Field Medical Card. Include the area the casualty was working, when the itching and rash appeared, and whether or not the skin was exposed. If the casualty is evacuated, attach the card to his clothing. If he is returned to duty, forward the card through proper channels.

i. **Evacuate the Casualty/Return Casualty to Duty.** Evacuate casualties showing signs of respiratory distress and/or anaphylactic shock. Casualties with severe rash on the face or genitals may require evacuation. Other casualties can be returned to duty.

(1) Casualties can be returned either to full duty or to limited duty depending upon their reaction to the urushiol.

(2) Monitor casualties returned to duty. If secondary infection occurs, evacuate the casualty to a medical treatment facility for examination and treatment.

Continue with Exercises

EXERCISES, LESSON 3

INSTRUCTIONS: Circle the letter of the response that BEST completes the sentence or BEST answers the question. After you have completed all the exercises, turn to "Solutions to Exercises" at the end of the lesson and check your answers. For each exercise answered incorrectly, reread the material referenced after the solution.

1. Urushiol is a toxic chemical that is found in:

   a. Poison ivy.

   b. Poison oak.

   c. Poison sumac.

   d. All of the above.

2. In an average group of soldiers, about _____ of the soldiers will not be affected by exposure to poison ivy.

   a. One-fourth.

   b. One-third.

   c. One-half.

   d. Two-thirds.

3. A soldier says that he does not need to use gloves to clear away poison ivy vines because the vines are dead and dry. Is he correct?

   a. Yes.

   b. No.

4. Which of the following is a method of distinguishing poison ivy from poison oak?

    a. Poison ivy has greenish-white flowers; poison oak has red flowers.

    b. Poison ivy has red flowers; poison oak has greenish-white flowers.

    c. Poison ivy has rounder leaflets with wavy edges; poison oak has pointed leaflets.

    d. Poison ivy has pointed leaflets; poison oak has rounder leaflets with wavy edges.

5. A casualty has brushed against some poison sumac with his exposed forearm. Which of the following should you do?

    a. Scrub the forearm with a salt and sterile water solution and apply a dry bandage to the affected area.

    b. Wash the forearm several times with soap and water; do not apply a bandage to the affected area.

    c. Wipe the forearm with alcohol and apply a wet dressing to the area.

    d. Wash the entire arm several times with soap and water and apply a dry dressing to the area.

6. After cleansing the rash area on the casualty caused by plant contact dermatitis, do you need to cleanse your own hands?

    a. Yes.

    b. No.

7. When a person is exposed to contact dermatitis, he will usually have:

    a. Blisters, followed by a skin rash.

    b. A raw sore, followed by a skin rash.

    c. A skin rash, followed by blisters.

    d. A raw sore, followed by blisters.

8. When burning poison oak, you should be:

   a. Upwind from the fire.

   b. Downwind from the fire.

   c. Either upwind or downwind; does not make any difference.

9. Poison ivy and poison oak have small leaflets. These leaflets are grouped together with _____ leaflets to a cluster.

   a. Two.

   b. Three.

   c. Four.

   d. Five.

Check Your Answers on Next Page

SOLUTIONS TO EXERCISES, LESSON 3

1. d (para 3-1)
2. a (para 3-1b)
3. b (para 3-1a)
4. d (para 3-2b; figs. 3-1, 3-2)
5. b (paras 3-5b, g)
6. a (para 3-5c)
7. c (paras 3-4e, f, g)
8. a (para 3-3g(2))
9. b (paras 3-2a(2), b(2))

End of Lesson 3

LESSON ASSIGNMENT

LESSON 4	Heat Injuries.
TEXT ASSIGNMENT	Paragraphs 4-1 through 4-9.
TASKS TAUGHT	081-831-0038, Treat a casualty for a heat injury.
LESSON OBJECTIVES	When you have completed this lesson, you should be able to:

4-1. Identify the causes of heat cramps, heat exhaustion, and heat stroke.

4-2. Identify the signs and symptoms of heat cramps, heat exhaustion, and heat stroke.

4-3. Identify proper treatment procedures for heat cramps, heat exhaustion, and heat stroke.

4-4. Identify the heat injury that is a medical emergency.

4-5. Identify methods of preventing heat injuries.

4-6. Identify factors that make a person more likely to become a heat injury casualty.

SUGGESTION Complete the exercises at the end of this lesson before beginning the next lesson. The lesson exercises will help you to accomplish the lesson objectives.

LESSON 4

HEAT INJURIES

4-1. INTRODUCTION

A soldier who is in good physical condition and is not injured or sick may think he has nothing to worry about when working or marching in a hot climate. This is not so. Even a healthy person can suffer heat injury.

a. Heat injuries usually occur during hot weather or when a person is working near equipment that produces heat. When a person becomes hot, his body perspires. When the water in perspiration evaporates, it absorbs some of the body's heat and thus cools the body. Perspiration also contains salt. Salt in the body helps to regulate nerve impulses and muscle reactions. If the water and salt lost through perspiration and other body functions are not replaced, heat injury can result.

b. The three principal types of heat injury are heat cramps, heat exhaustion, and heat stroke. Heat stroke is also called sunstroke, heat pyrexia, and hyperthermia. Heat cramps and heat exhaustion will prevent a person from performing his mission effectively and can develop into heat stroke. Heat stroke is a medical emergency that can be fatal if effective measures are not taken immediately.

c. Another important consideration is the accumulative effect of heat injuries. If a mild heat injury has occurred, the next day the soldier is more likely to sustain a more significant heat injury. Soldiers that are operating in a high heat environment must have adequate rest and recovery after having a heat related injury. All heat exhaustion cases should be evaluated when the mission permits. Heat stroke is a medical emergency and should be treated accordingly.

4-2. IDENTIFY RISK FACTORS ASSOCIATED WITH HEAT INJURY

There are several factors that make a person more likely to suffer a heat injury. Some of these factors are discussed below.

a. **Dehydration.** A soldier who is not adequately replacing the water lost through perspiration, urination, and respiration is in danger of suffering heat injury.

b. **Lack of Acclimation.** A newly-arrived person who has not had a sufficient opportunity to adjust to the hot weather is more likely to suffer a heat injury than a person who has worked in the area for several weeks.

c. **Obesity.** A person is more likely to have a heat injury if he is overweight.

d. **Excessive Use of Alcohol.** Excessive use (abuse) of alcohol or other drugs can contribute to heat injuries.

e. **Medications.** Certain medications make a person more likely to suffer a heat injury.

f. **Age.** Older adults are more likely to have heat injuries than younger adults.

g. **Poor Health.** A person is more likely to have a heat injury if he is suffering from cardiovascular problems, lack of sleep, poor nutrition, or poor general health.

h. **Previous Occurrence.** A person who has had a previous episode of heat injury is more likely to have another heat injury than a person who has not had a previous heat injury.

4-3. INITIATE PREVENTIVE MEASURES

Heat injuries are caused by a lack of water in the body or by a lack of salt and water in the body. Heat injuries can be prevented by consuming adequate amounts of water and salt and by taking other preventive measures.

a. **Drink Sufficient Water.** The amount of water a person needs to drink depends upon the temperature and upon the work being done. A person working in a hot environment should drink at least one full canteen (one quart) every hour. A person who is performing strenuous physical labor or who is working in a very hot environment should drink one quart of water every half hour. The water should be consumed in small amounts throughout the work period rather than drinking a large amount of water at one time.

(1) A person cannot rely on thirst to remind him to drink water. People in a hot climate seldom feel thirsty enough to replace all of the water lost through perspiration, urination, and respiration. Leaders may need to order their troops to drink.

(2) It is important to drink water in adequate amounts, but it is also important to not “over-hydrate." This happens when a soldier dilutes the electrolytes in his body. This can cause mental confusion and muscle cramps due to the lack of electrolytes.

(3) A soldier should drink extra water before an attack or mission. The extra water in his system will help to keep him physically strong and mentally alert until the tactical situation allows him time to drink again.

b. **Consume Salt in Meals.** A soldier who eats three regular meals each day should get enough salt to replace the salt lost through perspiration. A soldier should not supplement his regular diet by taking salt tablets. Sports drinks are a good method of replacing electrolytes and water. They should be taken according to the label directions indicating serving size and amount. In hot environments, many soldiers do not have much of an urge to eat. It may be beneficial to eat several times a day. Eating smaller meals or snacks more often can maintain the body's electrolyte balance much better than eating three large meals each day.

c. **Wear Clothing Properly.** Clothing protects the body from solar radiation (sunlight). Unprotected skin may develop serious sunburn. When possible, clothing should be light and loose fitting, especially at the neck, wrists, and lower legs. This allows for better air circulation, which helps to cool off the body. Soldiers wearing full individual protective equipment (IPE) to protect themselves from chemical and biological agents are especially prone to heat injury because the protective clothing traps much of the heat energy produced by the body. Soldiers who must wear IPE gear in hot climates may be ordered to not wear their shirts and trousers under the protective overgarments. Body armor and other equipment also greatly reduce the body's ability to expel heat, increasing the risk of heat injury.

d. **Take Rest Breaks.** Rest breaks help a person's body to cool off. A person working in a moderately hot environment may need to take a 5-minute rest break in a shaded area after each 25-minute work period. A person performing heavy work in a hot environment may need to rest about as much as he works. Rest breaks should be taken only if the tactical situation allows.

e. **Modify Work Schedules as Needed.**

(1) Work schedules must be tailored to fit the climate, the physical condition of the personnel, and the military situation. The heavier work should be scheduled to be performed during the cooler hours of the day.

(2) Work should be performed in a shaded area, if possible.

(3) Personnel who are new to the climate should have their outside work scheduled to promote acclimation to the area. Acclimation (also called acclimatization) is the process that the body goes through while it adjusts to a new environment. Full acclimation (the ability to perform a maximum amount of work in the new environment) can best be achieved by scheduling outside work to be performed during the coolest hours of the morning and afternoon at first (usually an hour in the morning and an hour in the afternoon), then gradually expanding the working periods during the next couple of weeks until the soldiers are working a regular schedule.

4-4. IDENTIFY HEAT CRAMPS

Heat cramps are painful cramps of the voluntary muscles, usually of the abdomen, legs, or arms. The muscle cramps are caused by the inability of the muscles to relax once they have contracted. This condition results from an electrolyte imbalance in the body caused by excessive loss of salt and water from the body. Most of the salt and water are usually lost through perspiration when the person works in hot weather for a long period of time.

a. **Muscle Spasm.** The most obvious indication of a heat cramp is the soldier's reaction to the muscle cramp or spasm. The casualty will usually grasp or massage the muscle that is having the spasm if the spasm is in an arm or leg. If the spasm is in his abdominal region, he may hold his abdomen and bend over at the waist.

b. **Moist Skin.** The casualty will normally be sweating profusely. In some individuals, the skin will be pale or gray also.

c. **Thirst.** The casualty will probably be very thirsty.

d. **Dizziness.** The casualty may feel dizzy.

e. **Normal Vital Signs.** The casualty's body temperature will be either normal or only slightly elevated and his blood pressure will be within his normal range.

4-5. TREAT HEAT CRAMPS

A person with heat cramps will recover if the lost salt and water is replaced and steps are taken to prevent the heat cramps from developing into more serious heat injury. Steps for treating a casualty with heat cramps are given below.

a. **Protect Casualty From Sun.** Move the casualty to a cool, shaded area to rest. If shade is not available, improvise a shade using ponchos, blankets, or other available materials to protect the casualty from direct sunlight. Have the casualty sit or lie in a comfortable position.

b. **Loosen Clothing.** Loosen any tight-fitting clothing.

NOTE: If you are in a chemical environment (chemical agents present in the air and/or on the ground), do not loosen or remove the casualty's protective mask, protective clothing, or boots.

c. **Give Water.** If the casualty is not nauseous (feels as though he is going to vomit), give the casualty cool water and salt solution to drink. The solution will help to restore the body's natural fluid and electrolyte balance. To create the solution, dissolve 1/4 teaspoon of loose salt (same as one packet of salt from rations) in a canteen filled with one quart of cool water. Have the casualty slowly drink the entire canteen within a one hour period. After the casualty has consumed the quart of salt and water solution, have him drink cool, unsalted water.

(1) If the casualty feels nauseous, encourage him to drink a quart of cool water with no salt added. (Vomiting caused by drinking salty water will result in the loss of more water and salt from his body.) When the nausea has passed, give him salty water to drink or salty food to eat.

(2) If no salt is available, have the casualty drink cool, unsalted water.

d. **Observe Casualty.** Allow the casualty to rest. Observe the casualty to see if the cramps go away and to ensure that the casualty continues to consume water. If the casualty recovers and resumes his activities, continue to observe the casualty for reoccurrence of heat injury.

e. **Record Treatment.** Record the casualty's signs and symptoms and the treatment administered on a DD Form 1380, U.S. Field Medical Card (FMC).

f. **Evacuate, If Needed.** If the casualty continues to have severe cramps or cannot drink cool water, evacuate him to a medical treatment facility. Attach the Field Medical Card to the casualty's clothing.

4-6. IDENTIFY HEAT EXHAUSTION

Heat exhaustion is a condition caused by an excessive loss of water and electrolytes from the body (usually from heavy perspiration) resulting in hypovolemia (a decrease in the fluid in the casualty's blood circulatory system). It usually occurs in otherwise fit individuals who are performing tasks requiring heavy physical work in a hot environment. The casualty's body temperature will usually be normal.

a. **Most Common Signs and Symptoms of Heat Exhaustion.** A casualty with heat exhaustion will usually:

(1) Perspire heavily.

(2) Have skin that is pale (gray in a dark-skinned individual) and cool to the touch.

(3) Have a headache.

(4) Feel weak and/or dizzy.

(5) Have a loss of appetite.

b. **Other Signs and Symptoms.** Other signs and symptoms that may accompany heat exhaustion include:

(1) Heat cramps.

(2) Nausea (urge to vomit) with or without actual vomiting.

(3) Urge to defecate.

(4) Chills ("gooseflesh").

(5) Rapid breathing (short of breath).

(6) Tingling in the hands or feet.

4-7. TREAT HEAT EXHAUSTION

Heat exhaustion is treated by having the casualty drink water and by taking precautions to keep his condition from becoming worse.

a. **Protect Casualty From Sun.** Move the casualty to a cool, shaded area to rest. If shade is not available, improvise a shade using ponchos, blankets, or other available materials to protect the casualty from direct sunlight. Have the casualty lie down in a comfortable position.

b. **Loosen Clothing.** Loosen or remove any tight-fitting clothing or boots, unless you are in a chemical environment. If you are in a chemical environment, do not loosen or remove the casualty's protective mask, protective clothing, or boots.

c. **Cool Casualty.** If it is a very hot day, pour water over the casualty and fan him to promote the loss of body heat.

NOTE: If you are in a chemical environment, do not pour water over the casualty.

d. **Elevate Legs.** Elevate the casualty's legs so his feet are above the level of his heart and place a pack, small log, rolled-up field jacket, or other stable prop under his feet. If a litter is available, have the casualty lie on the litter and elevate the foot of the litter. Elevating his legs will help blood to return from his legs to his heart and will help to prevent shock.

e. **Give Water.** If the casualty is not nauseous, add 1/4 teaspoon (one ration packet) of salt to a one-quart canteen of cool water and have the casualty slowly drink the solution within a one-hour period. After the casualty has consumed the salty water solution, have him drink cool, unsalted water.

(1) If the casualty feels nauseous, have him drink a quart of cool water with no salt added. When the nausea has passed, give him salty water to drink or salty food to eat.

(2) If salt is not readily available, have the casualty drink cool, unsalted water.

f. **Observe Casualty.** Observe the casualty as he is resting to see if his condition improves and to ensure that he continues to consume water. If the casualty recovers and resumes his activities, continue to observe the casualty for reoccurrence of heat injury. Have the casualty evaluated as the tactical situation permits due to the accumulative effect of heat injuries.

g. **Record Treatment.** Record the casualty's signs and symptoms and the treatment administered on a DD Form 1380, U.S. Field Medical Card.

h. **Evacuate, if Needed.** If the casualty is nauseated and cannot drink the unsalted water or if his signs and symptoms do not improve in about 20 minutes:

(1) Initiate an intravenous infusion using Ringer's lactate or normal saline.

(2) Attach the Field Medical Card to the casualty's clothing.

(3) Evacuate the casualty to a medical treatment facility.

4-8. IDENTIFY HEAT STROKE

Heat stroke is caused by a failure of the body's temperature regulating system. Heat stroke comes on suddenly. The core (rectal) body temperature can rise from normal to 106 degrees Fahrenheit (ºF) or more in 10 to 15 minutes. If the situation is not controlled quickly, the vulnerable cells of the brain may be destroyed and irreversible central nervous system (CNS) damage may occur. Heat stroke is a medical emergency that can result in death if it is not corrected quickly. Signs and symptoms of heat stroke include:

a. Lack of normal perspiration.

NOTE: If a soldier is not perspiring or perspiring only slightly while others who are performing similar work in the same environment are perspiring heavily, the soldier's natural cooling system (perspiration) has stopped working and his body can no longer cool itself. Lack of perspiration is not the definitive diagnosis for heat stroke. If the patient is hot, has an elevated core temperature, and has any altered mental status, treat it as heat stroke.

b. Skin that is hot to the touch.

c. Elevated temperature.

d. Headache.

e. Dizziness.

f. Mental confusion.

g. Stomach pain, nausea, or cramps.

h. Weakness.

i. Rapid, shallow breathing.

j. Rapid and weak pulse.

k. Sudden loss of consciousness.

4-9. TREAT HEAT STROKE

Heat stroke is treated by quickly cooling the casualty's body and evacuating him to a medical treatment facility where additional measures can be taken. If the casualty is unconscious, open his airway and administer mouth-to-mouth resuscitation or cardiopulmonary resuscitation (CPR) if needed. (These procedures are covered in Subcourse MD0532, Cardiopulmonary Resuscitation.)

a. **Perform Immediate Cooling.** Immerse the casualty's trunk in cool water or pour cool water onto the casualty and fan him. This will help to control his temperature. Remove the casualties clothing to help cool the casualty.

b. **Evacuate.** Evacuate the casualty to the nearest medical treatment facility at once. Continue to perform cooling measures during evacuation.

c. **Perform Other Cooling Procedures.** Additional procedures for cooling the casualty are given below. Do not delay evacuation in order to begin these procedures. Continue to perform cooling measures while evacuating the casualty. Iced sheets or water can be carried when on patrol to enhance your ability to treat this condition in a tactical environment. It is good to have cooled IV's at this time; administering a warm IV to a heat stroke casualty would be detrimental to his outcome.

(1) Move the casualty to a shady area or improvise a shade.

(2) Have the casualty lie down and elevate his legs.

(3) Remove the casualty's outer garments, protective clothing (leave mask on if in a chemical environment), and boots.

(4) Pour water onto the casualty and fan him to promote evaporation.

(5) Place ice bags on the sides of the casualty's neck and under his armpits.

(6) If the casualty is unconscious, vomiting, or unable to retain fluids given by mouth, start an intravenous infusion of Ringer's lactate or normal saline. Maintain a systolic pressure of at least 90 mm Hg (millimeters of mercury).

d. **Record Treatment.** Record the casualty's signs and symptoms and the treatment administered on a DD Form 1380, U.S. Field Medical Card. If you have taken the casualty's temperature, record it on the Field Medical Card. Attach the completed Field Medical Card to the casualty's clothing.

Continue with Exercises

EXERCISES, LESSON 4

INSTRUCTIONS: Circle the letter of the response that BEST completes the statement or BEST answers the question. After you have completed all of the exercises, turn to "Solutions to Exercises" at the end of the lesson and check your answers. For each exercise answered incorrectly, reread the material referenced after the solution.

1. You are working in a hot climate. A fellow worker is perspiring only slightly even though you and others are perspiring heavily. He is behaving in a confused manner. When you take his pulse, you notice that his pulse rate is high and his skin is hot to the touch. He is probably suffering from:

   a. Heat cramps.

   b. Heat exhaustion.

   c. Heat stroke.

2. You are working in a hot climate. A fellow worker suddenly doubles-up and grabs his abdomen. He is sweating a great deal. This person is probably suffering from:

   a. Heat cramps.

   b. Heat exhaustion.

   c. Heat stroke.

3. You are working in a hot climate. A fellow worker is perspiring heavily. He complains of dizziness and nausea and is breathing rapidly. He is probably suffering from:

   a. Heat cramps.

   b. Heat exhaustion.

   c. Heat stroke.

4. How does alcoholic beverages affect a person's resistance to heat injuries?

    a. Alcohol abuse makes a person more likely to suffer heat injury.

    b. Alcohol abuse makes a person less likely to suffer heat injury.

    c. Alcohol abuse has no effect on a person's resistance to heat injury.

5. Which of the following is/are considered a life-threatening medical emergency?

    a. Heat cramps.

    b. Heat exhaustion.

    c. Heat stroke.

    d. All of the above.

6. You are preparing a salt and water solution for a heat injury casualty. How much salt should you add to a one-quart canteen full of cool water?

    a. 1 tablespoon of salt.

    b. 1 teaspoon of salt.

    c. 1/2 teaspoon of salt.

    d. 1/4 teaspoon of salt.

7. You are giving a salt and water solution to a casualty with heat cramps. Which of the following statements is correct?

    a. The casualty should drink one quart of salt and water solution as quickly as possible, then continue to drink additional salt and water solution until he is no longer thirsty.

    b. The casualty should drink one quart of salt and water solution as quickly as possible, then continue to drink additional water until he is no longer thirsty.

    c. The casualty should drink one quart of salt and water slowly, but should drink it within one hour. After he finishes the salt and water solution, he should drink cool, unsalted water.

8. Which of the following statements is/are true?

    a. If you drink enough water to keep from being thirsty, you are drinking all the water your body needs.

    b. When in a hot climate, you should take one or two salt tablets with each meal.

    c. A military leader should never order his troops to drink water.

    d. Soldiers should drink water in small amounts throughout the work period rather than drinking a large amount of water one time.

    e. All of the above are true.

9. Which of the following is more likely to suffer a heat injury in a country that has very hot weather?

    a. A soldier who has been in the country for several weeks.

    b. A soldier who has just arrived in the country.

10. Two soldiers have been in a country with a hot climate for the same amount of time. One has suffered heat injuries; the other has not. Which is more likely to suffer a heat injury?

    a. The soldier who has suffered previous heat injuries.

    b. The soldier who has not suffered previous heat injuries.

11. Which of the following is more likely to suffer heat injury?

    a. A soldier in full protective (IPE) gear.

    b. A soldier in normal combat clothing.

12. A heat stroke casualty is unconscious. What measure, if any, should you take to replace the casualty's body fluids?

    a. Pour cool water into the casualty's mouth until he swallows.

    b. Initiate a cooled intravenous infusion.

    c. Pour cool water into the casualty's nose until he swallows.

    d. Make no effort to administer fluids until the casualty regains consciousness.

13. A heat injury casualty is conscious. When he takes a swallow of the salt and water solution, he says that he cannot drink any more because he feels as though he is going to throw up. Should you force him to continue drinking the solution?

    a. Yes.

    b. No.

14. A casualty in a chemical environment has heat exhaustion. How will being in a chemical environment affect the treatment of the heat injury?

    a. You will not have the casualty to drink fluids.

    b. You will not add salt to the water before he drinks the water.

    c. You will not elevate his legs.

    d. You will not loosen or remove his clothing.

Check Your Answers on Next Page

SOLUTIONS TO EXERCISES, LESSON 4

1. c (para 4-8)
2. a (para 4-4)
3. b (para 4-6)
4. a (para 4-2d)
5. c (paras 4-1b, 4-8)
6. d (paras 4-5c, 4-7e)
7. c (para 4-5c)
8. d (paras 4-3a, b)
9. b (para 4-2b)
10. a (para 4-2h)
11. a (para 4-3c)
12. b (para 4-9c(8))
13. b (paras 4-5c(1), 4-7e(1), 4-9c(6))
14. d (para 4-7b)

End of Lesson 4

LESSON ASSIGNMENT

LESSON 5	Cold Injuries.
TEXT ASSIGNMENT	Paragraphs 5-1 through 5-12.
TASKS TAUGHT	081-831-0039, Treat a casualty for a cold injury.
LESSON OBJECTIVES	When you have completed this lesson, you should be able to:

5-1. Identify the signs and symptoms of chilblain, immersion syndrome, snow blindness, frostbite, and generalized hypothermia.

5-2. Identify the proper treatment procedures for chilblain, immersion syndrome, snow blindness, frostbite, and generalized hypothermia casualties.

5-3. Identify the cold injury that is a medical emergency.

5-4. Identify methods of preventing cold injuries.

5-5. Identify factors that make a person more likely to become a cold injury casualty.

5-6. Determine the wind chill factor from a wind chill chart.

SUGGESTION	Complete the exercises at the end of this lesson before beginning the next lesson. The lesson exercises will help you to accomplish the lesson objectives.

LESSON 5

COLD INJURIES

5-1. INTRODUCTION

Cold injuries have long been of medical importance. Baron Larrey's description of the role played by cold injuries in the defeat of Napoleon's army is a classic work in this area. During World War II, over 90,000 US soldiers were admitted to medical treatment facilities for cold injuries. Although cold injuries usually occur in very cold weather, certain cold injuries can occur when the temperature is as high as 50ºF. Special care must be taken to prevent cold injuries when training in cold weather or during combat in a cold environment. If cold injuries do occur, quick action is needed to keep them from becoming worse. Five general types of cold injuries covered in this lesson are chilblain, immersion syndrome, snow blindness, frostbite, and generalized hypothermia.

5-2. INITIATE PREVENTIVE MEASURES

The following measures will help to prevent cold injuries.

a. **Use a Buddy System.** It is often easier for a soldier to detect frostbite and other cold injuries on another person than on himself. Soldiers should be paired and instructed to look for signs of cold injuries on their partner periodically. This early detection of cold injuries will help to prevent more serious cold injuries from developing.

b. **Wear Adequate Clothing.** Soldiers should wear an adequate amount of clothing and the clothing should fit properly. Improper fit can impair blood circulation. Avoid lacing your boots overly tight. Boots that are laced tightly will impair blood circulation in the feet.

c. **Layer Clothing.** Soldiers should wear their clothing in loose layers since layering traps air and body heat. Bottom layers of clothing should be free of cotton since cotton does not retain heat when it is wet. Synthetic fabrics, wool, and silk are very good at retaining heat even when wet.

d. **Drink Water.** Many soldiers do not drink enough fluids during cold weather operations. Dehydration (loss of body fluids without adequate replacement) can be as serious a problem in cold weather as in hot weather. Dark-yellow urine is an indication that the soldier is not drinking enough fluids. During marches, soldiers may need to be ordered to drink water periodically in order to prevent dehydration.

e. **Eat Meals.** Eating nutritious meals (hot meals, if possible) helps soldiers to maintain proper body (core) temperature and good general health. Eating more, smaller meals is beneficial in maintaining proper body temperature.

f. **Exercise.** Exercising causes the muscles of the body to produce body heat and also increases blood circulation. Exercising the large muscle groups, such as the legs, produces the most body heat. When the military situation prevents excessive movement, a soldier should change his position, wiggle his toes, exercise his fingers, massage his face, and perform other actions to stimulate blood circulation.

g. **Change Wet Clothing.** Clothing that becomes wet from perspiration or another source will lose much of its insulating quality. Body heat can be lost rapidly when clothing is wet. Soldiers should change wet clothing, especially wet socks, when the opportunity arises.

h. **Avoid Excess Sweating.** When a soldier is going to perform strenuous physical activity in cold weather, he should remove some of his outer clothing before beginning the task. This will keep the removed clothing from becoming wet due to perspiration. Also, removing the outer layers will help the perspiration that is produced to evaporate, thus decreasing the amount of perspiration absorbed by the layers of clothing not removed. After the soldier completes his work, he can put on the dry clothing again.

i. **Avoid Excessive Fatigue.** Soldiers should take rest breaks when performing strenuous physical activities. Rest breaks help to avoid excessive physical and mental fatigue. When a soldier is physically tired and/or not mentally alert, he is in more danger of cold injury due to carelessness.

j. **Clean and Repair Clothing.** Clothing that is soiled with grease or similar substances lose some of their insulating quality. Rips and holes in clothing result in direct loss of body heat to the cold air. Soldiers should keep their clothing as clean as possible and repair rips and holes as soon as possible.

k. **Protect Feet.** The feet probably perspire more and are less ventilated than most other parts of the body. Moisture from perspiration or the environment accumulates in the socks and decreases their ability to protect the feet from cold. Soldiers should carry dry socks with them and change wet or damp socks whenever practical. Damp socks can be dried using body heat by placing them under the uniform and next to the body. Soldiers should avoid conditions that require their feet to stay wet in cold weather for long periods of time. Soldiers should wash and thoroughly dry their feet after they have been exposed to wet, cold conditions.

l. **Protect Hands.** Soldiers should wear windproof leather gloves or mittens to protect their hands. Hands should be kept dry. Soldiers should avoid conditions that require their hands to stay wet for long periods of time. Soldiers should wash and thoroughly dry their hands after they have been exposed to wet, cold conditions.

(1) Soldiers should prevent metal from coming into contact with bare skin in cold weather. The skin could freeze and stick to the metal. The skin may tear when attempting to remove the hand from the metal.

(2) Soldiers should prevent gasoline, kerosene, and alcohol from splashing on their skin and avoid using these substances to clean their hands. These substances evaporate rapidly and promote the loss of body heat.

m. **Protect Face.** Soldiers should wear masks and headgear to protect their faces. Sunglasses should be worn if the ground is covered with snow or ice in order to protect against snow blindness even if the weather is cloudy, foggy, or hazy.

n. **Avoid Alcohol and Tobacco.** Consumption of alcoholic beverages and use of tobacco products promote heat loss and should be avoided. Alcohol also depresses body systems and can reduce the soldier's ability to recognize danger and make appropriate judgments.

o. **Identify Soldiers Who Are at Higher-Than-Normal Risk.** Soldiers who have had previous episodes of cold injury are prone to repeat cold injuries. Also, soldiers with vascular impairment are prone to cold injury. Soldier at higher-than-normal risk need to pay special attention to preventive measures and may require additional observation.

p. **Consult Wind Chill Chart.** The wind chill chart (figure 5-1) allows the temperature and the wind velocity to be combined into a single index called the "wind chill factor." The chart shows the cooling power of the wind on exposed (unprotected) flesh by showing the temperature it would take to produce the same cooling effect on exposed flesh if no wind were present. This information can also be used to determine the danger that protected soldiers face when outdoors. (Remember, wet clothing looses much of its protective power.)

(1) To use the chart, find the column with the approximate air temperature column and the row with the approximate wind speed. The wind chill factor is located where the temperature column and wind speed row intersect. For example, an actual temperature of 23ºF with a wind of 20 miles per hour produces the same cooling effect of a temperature of -6ºF (six degrees below zero) with no wind.

(2) Wind is any air circulation. If you are in an open vehicle driving 40 miles per hour on a calm day and the air temperature is 14ºF, the wind chill factor will be -31ºF (14ºF at 40 mph).

(3) Once you have determined the wind chill, determine whether it falls into the little danger zone, considerable danger zone, or very great danger zone for personnel that are properly clothed.

WIND CHILL CHART

Wind Speed (MPH)	LOCAL TEMPERATURE (°F) EQUIVALENT TEMPERATURE (°F)										
	32	23	14	5	-4	-13	-22	-31	-40	-49	-58
CALM	32	23	14	5	-4	-13	-22	-31	-40	-49	-58
5	29	20	10	1	-9	-18	-28	-37	-47	-56	-65
10	18	7	-4	-15	-26	-37	-48	-59	-70	-81	-91
15	13	-1	-13	-25	-7	-49	-61	-73	-85	-97	-109
20	7	-6	-19	-32	-44	-57	-70	-83	-96	-109	-121
25	3	-10	-24	-37	-50	-64	-77	-90	-104	-117	-117
30	1	-13	-27	-41	-54	-68	-82	-97	-109	-123	-137
35	-1	-15	-29	-43	-57	-71	-85	-99	-113	-127	-142
40	-3	-17	-31	-45	-59	-74	-87	-102	-116	-131	-145
45	-3	-18	-32	-46	-61	-75	-89	-104	-118	-132	-147
50	-4	-18	-33	-47	-62	-76	-91	-105	-120	-134	-148
	LITTLE DANGER FOR PROPERLY CLOTHED PERSONS*		CONSIDERABLE DANGER*			VERY GREAT DANGER*					

*DANGER FROM FREEZING OF EXPOSED FLESH

Figure 5-1. Wind chill chart.

q. **Have Soldiers Memorize "COLD."** Soldiers should memorize the meaning of the acronym COLD (keep clothing Clean, avoid Overheating your body, wear clothing in Layers, and keep clothing Dry). Memorizing this acronym will help soldiers to remember to take preventive measures against cold injuries.

5-3. IDENTIFY CHILBLAIN

Chilblain usually results from prolonged exposure of skin to cool or cold air temperatures (50ºF to 32ºF) or from exposure to freezing temperatures (32ºF and below) for a shorter time.

a. Chilblain is characterized by skin (usually the hands, feet, or ears) that is very red, swollen, itching, tender, and hot to the touch.

b. Continued exposure results in sores (lesions) on the surface of the skin. These sores may bleed and become inflamed, open sores.

5-4. TREAT CHILBLAIN

Treatment for chilblain consists mainly of rewarming the affected body part and preventing infection if open sores are present. Do not rub snow or ice on the affected area.

a. **Rewarm Affected Body Part.**

(1) A soldier with chilblain on his ears, nose, or face should rewarm the affected area by covering the area with his bare hand until the area is warm again. Usually, the casualty can perform this rewarming without assistance.

(2) A soldier with chilblain affecting his hands (usually his fingertips) can rewarm the affected body parts by opening his outer garments, putting his bare hands under his armpits (right hand under left armpit, and so forth), and closing his clothing to prevent additional loss of body heat.

(3) A soldier with chilblain affecting his feet (usually the toes) can rewarm the affected body parts by having a fellow soldier open his outer garments, putting his bare feet against the other soldier's body (usually the abdomen), and having the other soldier close his clothing to prevent additional loss of body heat. The person warming the casualty's feet must take measures to ensure that he does not become a cold injury casualty himself.

b. **Dress Lesions.** If skin lesions have developed, cover the lesions with a dry, sterile dressing. Do not apply any ointment or grease to the lesions. The moisture in the ointment or grease can cause additional injury to the casualty's skin as long as the casualty is exposed to cool or cold temperatures.

c. **Protect Affected Body Part.** Protect the affected body part once it has been rewarmed by taking appropriate protective measures (change wet socks, put on mittens or face mask, and so forth).

d. **Record Treatment.** Record the casualty's signs and symptoms and the treatment administered on a DD Form 1380, U.S. Field Medical Card. Attach the form to the casualty's uniform if he is to be evacuated. If the casualty is not evacuated, forward the Field Medical Card through the appropriate channels.

e. **Refer to Medical Officer.** Chilblain which is properly treated will usually not require evacuation since there will be little or no loss of skin tissue. The casualty should be seen by a medical officer, though, when the opportunity presents itself. The medical officer will be able to determine if any tissue damage occurred which was not observable at the time of the cold injury and will provide any additional treatment that is needed.

5-5. IDENTIFY IMMERSION SYNDROME

Immersion syndrome is a term that covers several very similar cold injuries. These injuries include trench foot, immersion foot, and immersion hand. Trench foot is caused by exposing the foot to wet conditions in cool or cold weather (50ºF to 32ºF) for an extended period of time (usually over 12 hours, depending upon other conditions). Immersion foot is usually caused by the foot being kept in cool or cold water (usually below 50ºF) for an extended period of time (usually over 12 hours). Immersion hand is caused by the hand being exposed to the same conditions that create immersion foot. Immersion syndrome cold injuries usually occur in three phases--the anesthetic phase, the reactive hyperemic phase, and the vasospastic phase.

a. **Anesthetic Phase.** In the anesthetic phase, there is a loss of feeling including the loss of pain in the affected part. This loss of feeling can be tested by gently pinching or pricking the affected part and surrounding parts. The casualty will feel the pinching or pricking in the unaffected areas, but not in the affected area. The area may feel numb to the casualty without testing and will be cold to the touch. The casualty will usually have a weak pulse, also. In immersion foot, the bottom of the foot may be wrinkled and white.

b. **Reactive Hyperemic Phase.** In the reactive hyperemic phase, the blood flow that was restricted in the anesthetic phase increases until the affected part is engorged with blood (hyperemic). The affected area will be red and the limb will probably feel very hot. The flow of blood may cause the casualty to experience "shooting" pains in the limb.

c. **Vasospastic Phase.** In the vasospastic phase, the blood vessels contract. Initially, this contraction will cause the skin to look pale. This paleness is then replaced by a bluish discoloration (cyanosis) caused by a lack of oxygen in the affected tissue. The casualty's pulse rate will also decrease during this phase. Blisters, redness, and hemorrhages may also develop. Gangrene (tissue death) may also occur.

5-6. TREAT IMMERSION SYNDROME

The treatment outlined below should be begun as soon as possible after noticing the signs of immersion syndrome.

a. **Dry Affected Area.** Dry the affected area immediately.

b. **Rewarm Affected Area.** Rewarm the affected part gradually. If possible, rewarm the part by exposing it to warm air. If warm air from a heated source is not available, the affected area is normally rewarmed using the same procedures given for chilblain (paragraph 5-4a). Covering the affected part of the limb with dry, loose clothing or with several layers of warm coverings is also an acceptable method of rewarming.

(1) Do not massage the skin of the affected area.

(2) Do not apply extreme heat to the affected area.

(3) Do not apply cold (ice or snow) to the area.

c. **Elevate Affected Area.** Elevate the affected part using a stable prop (log, pack, and so forth). Elevating the part will help reduce swelling and fluid buildup (edema) in the affected part.

d. **Protect Affected Area.** Protect the affected area from injury (trauma) and from infection. Being accidentally hit, falling from its elevated support, or being massaged can cause additional tissue injury. Open wounds should be covered with a dry, sterile dressing.

e. **Record Treatment.** Record the casualty's signs and symptoms and the treatment administered on a DD Form 1380, U.S. Field Medical Card. Attach the Field Medical Card to the casualty's clothing if he is evacuated.

f. **Evacuate.** The casualty should be evacuated to a medical treatment facility for additional medical treatment as soon as possible. If possible, transport the casualty by vehicle, litter, or manual carry. Do not let the casualty walk on affected feet if walking can be prevented.

5-7. IDENTIFY SNOW BLINDNESS

Snow blindness is the temporary loss of sight due to the eyes being exposed to too much ultraviolet solar radiation. This occurs when the normal ultraviolet rays in sunlight are reinforced by ultraviolet rays being reflected off ice or snow. Since clouds do not stop ultraviolet rays, snow blindness can occur even during cloudy or hazy weather. In fact, snow blindness is more likely to occur during cloudy or hazy weather because individuals may not take the same precautions they would normally take if visible sunlight were reflecting brightly off the ice and snow.

a. **Initial Signs and Symptoms.** Snow blindness begins with a scratchy feeling in the eyes when the eyelids are closed. It may feel as though sand or dirt particles were present in the eye. Tears, redness of the eyes, and headache are usually present also.

b. **Severe Signs and Symptoms.** If the problem is allowed to continue without treatment for several hours, pain (sometimes extreme) will be experienced along with inability to visually distinguish objects.

5-8. TREAT SNOW BLINDNESS

a. **Wear Sunglasses.** Snow blindness should be treated as soon as the signs or symptoms are noted. If the casualty has not developed a severe case of snow blindness, have him put on sunglasses. If sunglasses are not available, make an improvised pair of sunglasses from a thin piece of wood or cardboard (figure 5-2). The piece of wood or cardboard should be as long as the person's face is wide. Cut narrow slits for the eyes and attach strings to the ends so that the improvised sunglasses can be tied on. The casualty should then be able to perform his assigned duties.

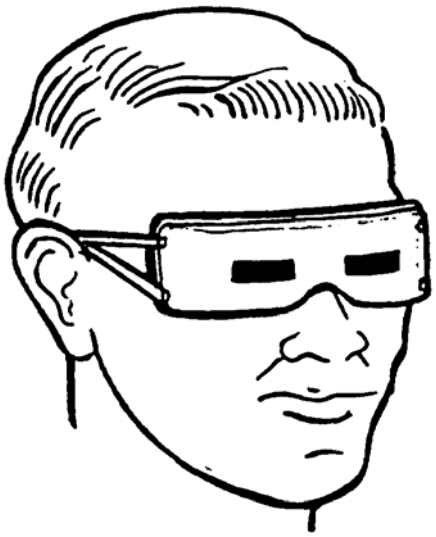

Figure 5-2. Improvised sunglasses.

b. **Cover Eyes.** If sunglasses do not help or if the casualty is not needed to perform a mission, cover the casualty's eyes with a dark cloth. The cloth will prevent light from reaching the eyes. It will also help to keep the casualty from moving his eyes, which could result in additional pain. A muslin bandage may be folded into a cravat and used to keep the cloth in place or the cravat may be used as a blindfold if another dark cloth is not immediately available. Do not put ointment in the eye.

c. **Reassure the Casualty.** Pain and decreased vision can be very frightening to a casualty. Reassure the casualty that the pain and loss of sight is temporary and that he will recover fully.

d. **Record Treatment.** Record the casualty's signs and symptoms and the treatment administered on a DD Form 1380, U.S. Field Medical Card. Attach the Field Medical Card to the casualty's clothing if he is evacuated. If the casualty is not evacuated, forward the Field Medical Card through the appropriate channels.

e. **Evacuate the Casualty, If Needed.** If the snow blindness is severe, evacuate the casualty to a medical treatment facility.

5-9. IDENTIFY FROSTBITE

Frostbite is the actual freezing of body tissue. It is produced by exposure of flesh without adequate protection to freezing temperatures, usually below 20°F (-7°C). The degree of injury depends upon the actual temperature, the amount of wind present, the amount and quality of protection, the casualty's history of previous cold injury, and the length of time the person was exposed. The ears, face, hands, wrists, and feet are usually the first parts of the body to be frostbitten. Frostbite is classified as being either superficial or deep.

a. **Superficial Frostbite.** The following are signs and symptoms of superficial frostbite.

(1) Blanching. The onset (beginning) of frostbite is signaled by a sudden blanching (loss of color) of the skin on the nose, ear, cheeks of the face, fingers, and/or toes.

(2) Brief tingling. Blanching is followed by a momentary tingling sensation in the affected part. Frostbite begins when the tingling or hurting sensation stops.

(3) Redness. After the tingling feeling stops, the affected area becomes red and swollen. In dark-skinned individuals, the affected area may appear dull and grayish.

(4) Flaking skin. Redness may be followed by a sloughing (shedding) of powdery or branny flakes of skin on the affected area.

(5) Blisters and sloughing. Blisters and sloughing of the skin in sheet-like layers may occur 24 to 36 hours after exposure to freezing temperatures. Since these signs are delayed, frostbite can enter into the deep phase without these signs being present.

b. **Deep Frostbite.** Signs of deep frostbite are always preceded by signs of superficial frostbite. Deep frostbite is most common in the feet. If frozen flesh is not rewarmed properly, gangrene and nerve damage usually result.

(1) Frozen flesh. In deep frostbite, the exposed flesh freezes. The frozen flesh feels solid or "wooden" to the touch, but is not brittle.

(2) Loss of feeling. The frozen area is completely numb and without pain.

(3) Blisters. Small blisters may appear in 12 to 36 hours unless rewarming occurs quickly. A red-violet discoloration appears spontaneously 1 to 5 days after the injury.

(4) Autoamputation. In the last stage of deep frostbite, massive tissue death (including the death of bone tissue) occurs and the affected body part may separate from the rest of the body.

5-10. TREAT FROSTBITE

a. **Seek Shelter.** A person with frostbite should be moved to the most sheltered area available.

b. **Remove Jewelry.** Remove any jewelry on the affected limb and put the jewelry in the casualty's pocket. If the limb swells, the jewelry may interfere with blood circulation.

c. **Loosen Clothing.** Loosen or remove constricting clothing which may interfere with blood circulation.

d. **Rewarm Affected Body Part.** Gradually rewarm the affected body part. If possible, rewarm the part by exposing it to warm air. If warm air from a heated source is not available, rewarm the affected area using the same procedures given for chilblain in paragraph 5-4a. Covering the affected limb with dry, loose clothing or with several layers of warm coverings is also acceptable.

(1) Do not apply ice or snow to the affected area.

(2) Do not rub or soak the frostbite area.

(3) Do not expose the frostbitten area to a very hot heat source, such as a roaring fire. The casualty cannot judge heat and the affected part may suffer burns.

(4) Do not thaw frozen feet if the casualty will need to walk any further to receive medical treatment. Thawing the casualty's feet and then forcing him to walk on them will cause additional pain and injury. If the feet refreeze, the refrozen tissue will receive additional injury.

(5) Do not give the casualty alcoholic beverages or tobacco since these items promote the loss of body heat.

e. **Protect Affected Body Part.** Protect the affected body part from the cold and additional trauma. Cover the casualty with warm, dry clothing. Dress the casualty in dry socks and boots once his feet have been warmed. Ensure that the re-warmed body part does not refreeze.

f. **Reassure the Casualty.** Reassure the casualty that you are taking care of him.

g. **Record Treatment.** Record the casualty's signs and symptoms and the treatment administered on a DD Form 1380, U.S. Field Medical Card. Attach the Field Medical Card to the casualty's clothing prior to evacuation.

h. **Evacuate.** The casualty should be evacuated to a medical treatment facility as soon as possible.

(1) Do not allow a casualty with frostbitten feet to walk if he can be evacuated by vehicle, litter, or manual carry.

(2) If the casualty must wear wet socks or boots during evacuation and his feet have been thawed, have him exercise by continually wiggling his toes.

5-11. IDENTIFY GENERALIZED HYPOTHERMIA

Generalized hypothermia occurs when the entire body, not just a part, cools to an abnormal level. Generalized hypothermia is a medical emergency. A soldier who is in excellent condition can die in a matter of minutes from severe hypothermia. As the body cools, the blood circulation in the limbs is impaired, shock develops, unconsciousness occurs, and the heart eventually ceases to beat. Being immersed in cold water for too long a period of time, such as being thrown into cold ocean water after a shipwreck, is one cause of generalized hypothermia. Another cause is the gradual cooling of the body in cool or cold weather over a period of time. This can occur when the casualty is wearing inadequate clothing to stop heat loss and he does not take measures to rewarm his body. Hypothermia is more likely to occur when the casualty is exposed to wind and when his clothing is wet.

a. **Low Body Temperature.** The presence of generalized hypothermia can usually be determined by taking the casualty's temperature rectally. The rectal method measures the temperature of the interior of the casualty's body (core body temperature). A rectal temperature below 95ºF (35ºC) indicates that generalized hypothermia is occurring. (A thermometer designed to measure low body temperatures may be needed in order to get an accurate temperature reading.) In a cold field environment, an accurate temperature reading may be difficult or impossible to obtain. In such cases, you must rely upon other signs and symptoms of generalized hypothermia.

b. **Shivering.** Shivering is caused by the involuntary contractions of muscles. It indicates the body is loosing heat faster than it is producing heat. Shivering indicates a milder case of hypothermia. As the core temperature continues to drop, the shivering will cease.

c. **Weak Pulse.** The casualty's pulse may be weak. In more serious cases, you may not be able to detect the pulse at peripheral points such as the wrist or ankle.

d. **Shallow Respirations.** The casualty's breathing may slow down and become less forceful.

e. **Pale or Gray Skin.** The skin is pale or gray and cold due to inadequate blood circulation.

f. **Numbness.** As the blood circulation to the skin decreases, the skin becomes numb. Numbness (loss of feeling) can be tested by gently pinching or pricking the casualty's skin.

g. **Mental Confusion.** The decreased blood flow to the brain can produce signs and symptoms of mental disorientation such as uncoordinated or slurred speech, listlessness, withdrawing from association with fellow soldiers, a depressed or indifferent attitude, and a "glassy" stare.

h. **Fruity Odor.** The casualty may have a sweet, fruity (acetone) odor on his breath.

i. **Slow Pupillary Reflex.** Hypothermia will slow down the reactions of the muscles in the iris of the eye. If a bright light is shined into the casualty's eye, the pupil of the eye will shrink slower than normal. When generalized hypothermia is severe, the pupils may not react at all.

j. **Frostbite.** In freezing weather, frostbite may develop on the casualty's limbs and facial areas.

k. **Cardiac Arrhythmia.** Arrhythmia (irregular heart action) usually develops when the body reaches a low temperature.

l. **Clinical Death.** Clinical death (no respiration or heartbeat) occurs in the final stage of generalized hypothermia. A casualty found in this condition must be treated aggressively and is not dead until he is “warm and dead.”

5-12. TREAT GENERALIZED HYPOTHERMIA

Rewarm the casualty's body evenly and without delay, but not so rapidly as to shock his circulatory system. If the casualty is rewarmed too rapidly, the shock can cause cardiac arrhythmia or even cause the heart to stop beating altogether. Rewarming procedures are given below.

a. **Stop Heat Loss.** Prevent the casualty from losing any more body heat by moving him out of the wind and to a protected area (inside a building, if possible). If his clothing is wet, remove the wet clothing and replace with dry clothes and/or cover the casualty with blankets or a sleeping bag.

b. **Provide External Heat Source.** The ability of the casualty's body to produce heat faster than it looses heat has probably been lost. Therefore, you cannot expect that covering the casualty with blankets and other material will result in the body being rewarmed. You must supply another source of heat so the casualty's body can absorb the heat.

(1) Outside of the medical treatment facility, the soldier must be re-warmed very carefully. Gradual warming of the soldier's trunk is necessary. Avoid excessive warming of the extremities since this can cause an "afterdrop" (the sudden release of lactic acid from the limbs that can overwhelm the body).

(2) Heat from your body or from another soldier's body can be used to rewarm the casualty. Have another soldier (or yourself if no one else is available) remove your outer clothing and boots and lie next to the casualty, whose outer clothing and boots have also been removed. Cover both individuals with blankets or other material or have both soldiers get into a sleeping bag together. The coverings will trap the soldier's body heat and allow the casualty to absorb the body heat being generated.

c. **Provide Cardiopulmonary Resuscitation, If Needed.** Administer mouth-to-mouth resuscitation if the casualty is not breathing. Administer cardiopulmonary resuscitation if you cannot detect a pulse.

NOTE: Attempt to rewarm and revive a casualty even if clinical death (no respiration or heartbeat) appears to be present. People with generalized hypothermia have been resuscitated with little or no brain damage even though pulse and respiration were not detected for several minutes.

d. **Provide Warm Drink.** If the casualty is conscious, give him something warm and nutritious to drink. Sugar or glucose tablets may be added to sweeten drinks. (The heat from the drink can be absorbed by the body and the sugar can be used by the body to produce heat.) Do not give the casualty any alcoholic beverage to drink. Alcohol causes capillaries to dilate and thus causes the body to lose heat.

e. **Record Treatment.** Record the casualty's signs and symptoms and the treatment administered on a DD Form 1380, U.S. Field Medical Card.

f. **Evacuate.** Evacuate the casualty to a medical treatment facility as soon as possible. Wrap the casualty from head to toe and attach the Field Medical Card where it will not be separated from the casualty. Handle the casualty gently and transport him in a recumbent (lying down) position.

Continue with Exercises

EXERCISES, LESSON 5

INSTRUCTIONS: Circle the letter of the response that BEST completes the statement or BEST answers the question. After you have completed all of the exercises, turn to "Solutions to Exercises" at the end of the lesson and check your answers. For each exercise answered incorrectly, reread the material referenced after the solution.

1. Which of the following conditions is considered to be a medical emergency because the casualty's life is in danger?

   a. Chilblain.

   b. Frostbite.

   c. Generalized hypothermia.

   d. Immersion syndrome.

   e. Snow blindness.

2. A soldier has been standing guard for several hours in freezing weather. An exposed area on his face looks red and swollen. When you ask if his face hurts, he responds by saying that it did "tingle," but now it feels numb. This soldier is probably suffering from:

   a. Chilblain.

   b. Frostbite.

   c. Generalized hypothermia.

   d. Immersion syndrome.

   e. Snow blindness.

3. The actual temperature is 22ºF, but there is a wind of about 15 mph. The approximate wind chill factor is:

   a. Slightly above freezing.

   b. Slightly below freezing.

   c. Slightly above 0ºF.

   d. Slightly below 0ºF.

4. A soldier has been outside in cold (about 40ºF) weather for several hours without adequate clothing. Exposed skin is red, swollen, and hot to the touch. This soldier is probably suffering from:

   a. Chilblain.

   b. Frostbite.

   c. Generalized hypothermia.

   d. Immersion syndrome.

   e. Snow blindness.

5. A soldier has been standing guard for several hours in very cold weather. He does not appear to be adequately clothed. He was shivering, but the shivering has now stopped. When you talk to him, he appears to be listless. His face is pale (or gray) and his respirations are shallow and slow. This soldier is probably suffering from:

   a. Chilblain.

   b. Frostbite.

   c. Generalized hypothermia.

   d. Immersion syndrome.

   e. Snow blindness.

6. A soldier has been standing in cold (about 36ºF), wet weather for over 12 hours. When the soldier comes into the shelter, he complains of numbness of the feet. His posterior tibial pulse is weak and the soles of his feet are gray (or white) and wrinkled. This soldier is probably suffering from:

   a. Chilblain.

   b. Frostbite.

   c. Generalized hypothermia.

   d. Immersion syndrome.

   e. Snow blindness.

7. A soldier has been marching on ground covered with snow for several hours without wearing his sunglasses. He complains of something in his eyes and a headache. This soldier is probably suffering from:

   a. Chilblain.

   b. Frostbite.

   c. Generalized hypothermia.

   d. Immersion syndrome.

   e. Snow blindness.

8. A soldier's right hand is suffering from chilblain. How should you treat the casualty?

   a. Have him rub his hand in the snow.

   b. Have him put his right hand inside his uniform and under his left armpit.

   c. Have him place his hand in a bowl of warm water.

   d. Put a protective ointment over the exposed skin and wrap the hand with a sterile dressing.

9. A soldier is suffering from generalized hypothermia. Which of the following is/are adequate for rewarming the casualty?

   a. Cover him with blankets.

   b. Place him in a tub of water (temperature 85ºF to 90ºF).

   c. Remove his outer clothing and your outer clothing. Get into a sleeping bag together.

   d. Any of the above will result in adequate rewarming of the casualty.

10. A soldier is suffering from immersion foot. What should be your first action in treating the injury?

   a. Have him place his bare foot near an open fire.

   b. Massage the foot until normal color returns.

   c. Dry the foot.

   d. Rub ice on the foot until the swelling goes down.

11. A soldier has a frostbitten foot. A battalion aid station is nearby. The military situation is such that another soldier cannot be spared to evacuate the casualty, but the casualty is able to walk to the aid station on his own. What should you do?

   a. Put ointment on his foot and have him wait until your unit is relieved before evacuating him.

   b. Rewarm his foot, then have him walk to the aid station.

   c. Rub his foot with ice or snow until you are sure it is frozen, then have him walk to the aid station.

   d. Have him walk to the aid station without rewarming his foot.

12. A soldier is having the first symptoms of snow blindness. The day is cloudy. What should you do?

    a. Have him put on his sunglasses.

    b. Put ointment in his eyes and wrap his eyes with a bandage.

    c. Blindfold the soldier and evacuate him immediately.

    d. Nothing; the problem will go away by itself.

13. A soldier's face and hands are bare. The actual temperature is -22ºF and there is a wind of 10 mph. Based upon the wind chill chart in figure 5-1, the soldier is in _____ danger of severe frostbite.

    a. Little.

    b. Considerable.

    c. Very great.

14. How does the abuse of alcoholic beverages affect a person's resistance to cold injuries?

    a. Alcohol abuse makes a person more likely to suffer cold injury.

    b. Alcohol abuse makes a person less likely to suffer cold injury.

    c. Alcohol abuse does not affect resistance to cold injuries.

15. Which of the following is a procedure that will help prevent trench foot?

    a. Lace your boots as tightly as possible.

    b. Avoid moving your feet any more than necessary when outside in cold, damp weather.

    c. Do not wash your feet after you have returned from working in cold, wet weather.

    d. Change your socks when they become wet from perspiration.

    e. All of the above are correct.

16. A person who has previously suffered a cold injury is _____ likely to suffer another cold injury that a person who has not suffered a cold injury.

    a. More.

    b. Less.

Check Your Answers on Next Page

SOLUTIONS TO EXERCISES, LESSON 5

1. c (para 5-11)

2. b (para 5-9)

3. d (para 5-2p, figure 5-1) [23ºF at 15 mph yields a chill factor of -1ºF (one degree below zero). A reading of 14ºF at 15 mph yields a chill factor of -13ºF. A reading of 22ºF at 15 mph would then yield a chill factors between these two figures (much closer to the -1ºF than the -13ºF).]

4. a (para 5-3a)

5. c (para 5-11)

6. d (paras 5-5, 5-5a)

7. e (paras 5-7, 5-7a)

8. b (para 5-4a(2))

9. c (para 5-12b)

10. c (para 5-6a)

11. d (para 5-10d(4))

12. a (para 5-8a)

13. b (para 5-2p, figure 5-1) [-22ºF at 10 mph yields a chill factor of -48ºF, which is in the considerable danger category.]

14. a (para 5-2n)

15. d (paras 5-2b, f, g, k)

16. a (para 5-2o)

End of Lesson 5