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Handbook of

FIRST AID

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Handbook of

FIRST AID

LIBRARY OF
Southern Methodist University
DALLAS, TEXAS

Prepared by

U. S. OFFICE OF CIVILIAN DEFENSE

In Cooperation with

THE AMERICAN RED CROSS

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FOREWORD

The Handbook of First Aid has been prepared for the supplementary training of members of Civilian Defense Units and as a guide for continued practice after completion of the first aid course. It is not intended to replace the Textbook of First Aid of the American Red Cross, which is the standard reference for first aid workers. Its purpose is to concentrate the student's attention upon those first aid procedures which require special emphasis from the standpoint of Civilian Defense.

Students of first aid are expected to continue to practice the procedures which they studied during their course. They should assemble regularly in small groups to practice on each other. The descriptions and drawings found in the Handbook are intended primarily to serve as a guide for this "postgraduate" work.

It is recommended that nonprofessional members of Emergency Medical Field Units, Rescue Squads, Stretcher Teams, and other Civilian Defense workers take the Standard First Aid Course for Civilian Defense (20 hours) followed by the Advanced First Aid Course for Civilian Defense (10 hours), both of which are given by the American Red Cross. Holders of Standard First Aid Certificates of the American Red Cross will be given Advanced First Aid Certificates by the Red Cross upon satisfactory completion of the Advanced First Aid Course for Civilian Defense.

Recognizing the importance of thorough instruction in first aid for Civilian Defense workers, the American Red Cross and the Office of Civilian Defense cannot encourage alterations in the teaching schedule which would shorten the time available for first aid instruction and practice. First aid is one of many subjects studied by members of enrolled groups of Civilian Defense workers. To shorten the time necessary to train Civilian Defense workers, certain groups may be permitted to take 10 hours of first aid instruction for qualification as an enrolled Civilian Defense worker with the understanding that they will not receive a Red Cross certificate as a first aid worker until they have taken an additional 10 hours of instruction.

Industrial plants, business establishments, and other agencies, both governmental and voluntary, are urged to inaugurate a first aid training program and to organize Red Cross Volunteer First Aid Detachments among their employees. The local chapters of the American Red Cross are prepared to provide instructions for organization and qualified instructors to train personnel.

Individuals desiring first aid instruction should apply directly to the local Red Cross Chapter. In the event of a civilian war disaster, trained persons will be organized into Stretcher Teams to transport casualties to first aid posts and casualty stations. Other medical auxiliaries will be available for other forms of emergency first aid work.

LESSON OUTLINE

20-HOUR FIRST AID COURSE FOR CIVILIAN DEFENSE

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Dressings and bandages 10

Second hour:

Bandage practice.

LESSON II:

First hour:

Care of wounds 6

Control of bleeding 19

Shock 27

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Practical problems and practice in the care of wounds and the control of bleeding.

LESSON III:

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Transportation of the injured 53

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Practical problems and practice in the care of wounds and the control of bleeding.

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Practice and practical problems in transportation.

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Examination on artificial respiration.

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General Review.

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Practice and practical problems.

EXAMINATION

LESSON OUTLINE

10-HOUR FIRST AID COURSE FOR CIVILIAN DEFENSE

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Page

First hour:

Organization and functions of Emergency Medical Field Units 3

General instructions 3

First aid kit 5

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Care of wounds 6

Practice in the application of dressings and bandages.

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Second hour:

Bandage practice—compress bandage, large dressings, triangle bandage, sling 10

LESSON III:

First hour:

Fractures—what not to do, emergency care, immobilization, spine fractures—neck, back 30

Splints and traction procedures 36

Second hour:

Practice in the application of splints and traction procedures.

LESSON IV:

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Artificial respiration 40

Prevention and care of shock 27

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Transportation—demonstration and practice: lifts and carries, loading and carrying stretcher 53

LESSON V:

First hour:

War gases—decontamination 62

Unconsciouness 69

Second hour:

Transportation practice—loading and carrying stretcher, loading ambulance or truck.

CHAPTER I

ADVICE TO THE CIVILIAN DEFENSE FIRST AID WORKER

As a first aid worker in civilian defense you may wonder how you will behave under the conditions of an air raid—conditions which you have never experienced and find difficult to imagine. How will you react to the sight of serious wounds and of blood—how will the cries of the injured affect you? How will you bear yourself in the presence of the dead and dying?

This is a serious problem, but as soon as your imagination is confronted with the reality of the "incident," your qualms will vanish. Horror and its kindred sensations are caused by helplessness; when we have the power and knowledge to deal with horror, it disappears. The dark loses its terror when we turn on the light; a casualty's cries will cease to unnerve you when you have the power to ease the pain that causes them.

While examining and treating an injury, talk soothingly, almost as you would to a child with a cut finger. People in pain *are* like children. Encourage a casualty to talk if he can safely do so; it will bring confidence to both of you.

Be gentle and yet be firm in your care of injured persons. Carefully think out your course and then stick to it. Take your time. Do not become flustered by those around you.

Never discuss an injured person's condition or the condition of other casualties in his hearing.

He may ask how badly injured he is. You must make some answer, but remember that a doctor is the only one with enough knowledge to appraise the situation accurately. If it can be avoided, do not lie to him about his condition. On the other hand it would be even more foolish (and possibly disastrous) to tell him the truth bluntly. There is a happy medium which you must find, and it will vary according to the bearing of the patient and the nature of his injuries.

Be as quiet as possible. Try to impress the casualty with your confidence and competence.

A casualty's cries do not necessarily indicate the gravity of his condition. Those who complain the most may be only hysterical. Actually, the person who cries loudly may be less seriously injured than the one who does not, because he has more strength with which to cry.

With your limited experience it would be unwise for you to try to classify wounds as to seriousness. Persons claiming injury should be seen by a doctor no matter how trivial the wound may appear. Those who seem to be suffering only from nervous shock or hysteria may be in as much distress as the one with an obvious injury. They too should be seen by the doctor.

You must never assume on your own responsibility that a person is dead or that there is no chance for his recovery.

It is regrettable to make a mistake in caring for an injured person, but mistakes are made as easily in first aid as in anything else. If you should ever happen to make one it must be put in its proper place—under the heading "experience." By practice and study you will become

expert in first aid, which lessens your chance of making a mistake.

CHAPTER II

GENERAL CONSIDERATIONS

Emergency Medical Service in Civilian Defense

In the event of enemy attack, the local emergency medical service will operate as follows:

1. Warnings of the approach of hostile aircraft will come to the local control center from military establishments in the area and will be relayed to civilian defense officers.

2. Air raid wardens will notify the control center of the location and extent of local damage.

3. They will then enlist trained volunteers to give first aid to injured persons.

4. The control center or its substation will call out emergency squads comprised of doctors, nurses, and nursing auxiliaries.

5. These will establish casualty stations near the site of disaster to give assistance to the injured.

6. Teams, each consisting of doctor, nurse, and auxiliaries will be dispatched from casualty stations to establish advanced first aid posts close to the scene of emergency to care for the more severely injured and to evacuate them as rapidly as possible to hospitals.

7. Rescue squads sent to the scene by the control center will extricate the wounded and stretcher teams will conduct or transport injured persons to first aid posts, casualty stations, or hospitals.

8. Ambulances will be dispatched to the scene of the incident by the transport officer in the control center.

9. Severely injured persons will be transported to hospitals; others will be sent to their homes or temporary shelters.

Definition of First Aid

First aid is the immediate temporary care given by a trained person in case of accident or sudden illness before medical aid is available. It is given in order to prevent death or further injury, to relieve pain and counteract shock. To become *expert* in first aid requires many hours of training and practice.

General Directions

1. Keep the victim lying down.
2. Give immediate attention to serious bleeding and asphyxia.
3. Examine for injuries not clearly seen.
4. Keep victim warm.
5. Fill out identification tag at once.
6. Make injured comfortable.
7. Keep the crowd away.
8. See that someone calls a doctor.
9. Do not give an unconscious person anything to drink.
10. Do not permit casualty to be moved unless it is necessary and until it is safe.
11. When a casualty has several injuries, treat the most serious first, especially if it involves severe bleeding.
12. Remember you are a first aid worker and not a physician.

FIGURE 1

First Aid Kit

A belt type kit (fig. 1) similar to the Army first aid belt containing dressings, cravat bandages, and identification tags is to be supplied to Air Raid Wardens, Rescue Squads, and certain other enrolled groups. The belt should be worn at all times when the worker is on duty. The belt contains identification tags which are to be filled out by the first person to see the casualty. The tag is illustrated in figure 2.

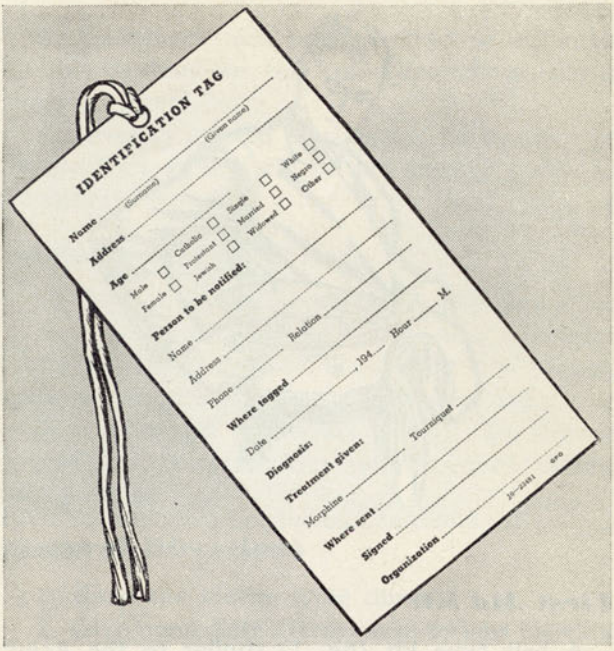

FIGURE 2

CHAPTER III

THE CARE OF WOUNDS

The chief *dangers* of wounds are severe *bleeding*, the introduction of *infection* and the development of *shock*. Bleeding should be controlled at once, for profuse bleeding may be followed by shock or result in lowered resistance to

infection. Serious infections frequently develop in neglected wounds. All wounds should, therefore, be treated by a physician.

Make no attempt to clean or wash the wound. Do not apply any antiseptic, disinfectant, or any other material such as ointments, salves, oils, or chemicals. Simply cover the wound with sterile gauze, fix it in place with bandage or adhesive plaster, and take the injured person to the doctor. The gauze used must be large enough to cover the wound and a margin of skin on all sides. It must be sterile, and therefore should be from a freshly opened package. The surface of the gauze to be placed against the wound must not touch anything before it is applied. Do not lift the dressing or slide it about after application.

Casualties with injuries which appear to be minor should be directed to a casualty station. Casualties with serious injuries must be transported by stretcher to a first aid post or sent by a doctor directly to a hospital by ambulance. Because injuries may appear minor on the surface but be severe in the depth, you should not permit an injured person to go home until he has been seen by a doctor.

Watch for bomb fragment wounds, which may be very small, often only a scratch. Such wounds have black edges. They must be considered serious because there will probably be damage to muscle and other tissue below the skin surface, and the fragment may be still embedded. A casualty with a wound in the body, however small, whether made by a bomb fragment or other missile, should be treated as for internal injuries.

Treatment for shock is important, especially

if hemorrhage is severe. Lacerated and crushing wounds are often accompanied by severe shock. The prevention and treatment of shock will be considered in chapter VII.

If a limb is severely torn or crushed it should be immobilized with a traction splint before the victim is moved. Only moderate traction should be used in these cases.

CARE OF WOUNDS IN SPECIAL LOCATIONS

Head Injuries

Head injuries are common war wounds. Severe injury may be caused by a blow on the head from falling timbers or flying debris, or the victim may be thrown against a wall or to the ground by the force of an explosion in such a way as to cause severe injury to his head. The injured person may be unconscious or dazed. Shock is usually present. He often resists efforts to help him. He may tear off bandages or clutch at the first aider as he tries to treat him.

In any case of head injury the brain may be damaged. The skull may be fractured. If this has occurred, blood stained fluid may leak from the ears.

If a casualty is dazed or unconscious and there is no obvious injury, examine the head first. Look for bruises or bumps. Even persons with slight or doubtful head injuries must be seen by a physician as soon as possible.

Wounds of the scalp are common in warfare. Because they bleed profusely they are terrifying to the beginner in first aid.

First aid.—If there is a wound of the scalp apply a sterile compress to the wound and hold

it in place with a firmly applied bandage as described on page 14. If there is bloody or watery discharge from the ears do not plug them with cotton and do not try to clean them. Simply apply a sterile dressing over the ears. Keep the victim warm and quiet. Keep him lying down with his head slightly elevated. *Fill out identification tag promptly*, for the victim may lose consciousness. Transport to the hospital on a *stretcher*.

Internal Injury

Serious injury may occur in the abdomen or in the chest as a result of penetration by a missile or crushing. Penetrating wounds about the hip joint or buttocks often cause internal injuries. Internal injury is always accompanied by internal bleeding and shock. The casualty may tear at his clothing in an effort to get more air. He may complain of thirst. If the wound is in the chest he may cough up blood.

First aid.—Treat for shock, which is always present. Keep the victim warm. Never give anything to drink. If the injury is in the abdomen keep the victim lying down, but if it is in his chest prop up the head and shoulders. All cases of internal injury must be transported on stretchers to a hospital as soon as possible. A casualty suffering from chest injuries should be propped up on the stretcher in a semisitting position, leaning toward the injured side. A casualty suffering from an abdominal injury should be transported on his back with legs slightly bent at the knees. No attempt should be made to replace protruding organs. Call a doctor.

Injury to the Face

Probably no injury is so terrifying as an injury to the face. When facial expression is lost the casualty appears to lose his identify as a human being. Bleeding is often profuse. Blood may run into the mouth or nose and strangle the victim. The jaw may be broken, in which case the tongue tends to fall backwards and obstruct the air passages.

In treating victims with facial injuries the first aid worker would do well to remember the miracles accomplished through plastic surgery. Although facial injuries are very gruesome, they are not the most dangerous to life.

First aid.—Determine whether the tongue has fallen into the back of the throat. If it has, grasp it in the fingers and pull it forward. Turn the victim onto his abdomen so that the blood will not run into his nose or mouth. Apply a liberal number of sterile gauze dressings to the wound and bind in place with a triangle bandage as described on page 13. If the tongue falls backwards pull it forward and apply a bandage to the chin as described on page 13.

CHAPTER IV

DRESSINGS AND BANDAGES

One of the most satisfactory dressings for wounds is the bandage compress. It is a piece of gauze attached to the center of a strip of bandage. The compress is to be opened without touching the inside, placed over the wound, and bound in place by the bandage tails (fig. 3).

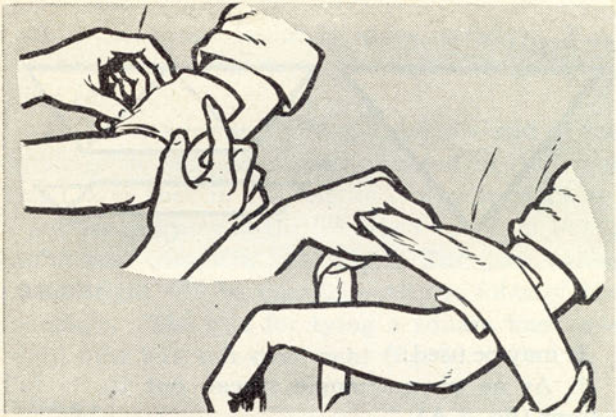

FIGURE 3

When a bandage compress is not available, use a sterile gauze pad of suitable size and thickness and bind in place with bandage or short strips of adhesive plaster. In emergency work, triangle bandages are useful for this purpose. They can be improvised from many materials. They will hold a piece of gauze in place and keep out dirt and contamination. These are intended as emergency dressings which will be replaced with more permanent dressings by the physician.

Roller bandages are excellent but are difficult to apply properly. A poorly applied roller bandage will not stay in place and will admit dirt.

THE TRIANGLE BANDAGE

The triangle bandage is very useful in first aid. It may be used to keep splints or dressings in position, as a sling to support an injured part or as a tourniquet.

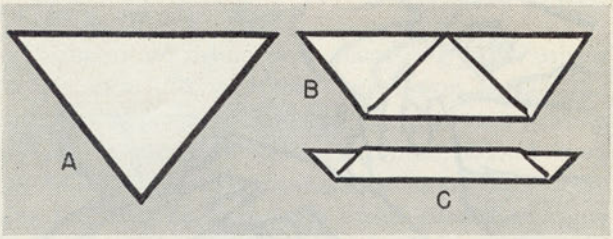

FIGURE 4

It may be used:

1. As an open triangle spread out to its full extent (fig. 4 A).

2. As a wide folded bandage (wide cravat). Carry the point (the angle opposite the longest edge) to the middle of the longest edge (B), and then fold the bandage again in the same direction (C).

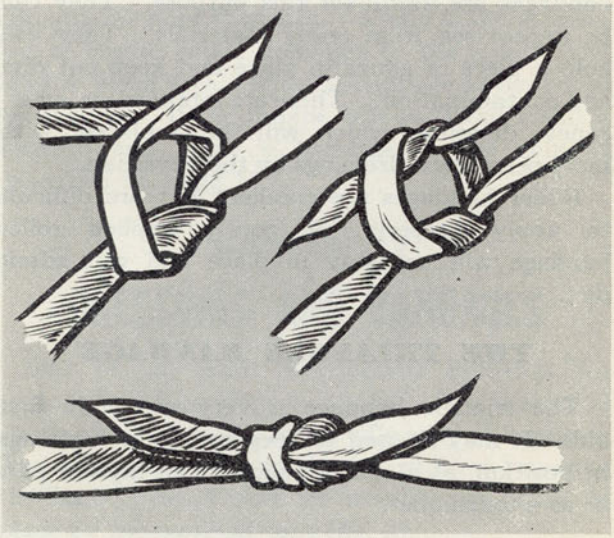

FIGURE 5

3. As a narrow folded bandage (cravat). Fold the wide cravat bandage once again, long edge to long edge.

To tie a square knot.—Take one end of the bandage in each hand, pass the end in the right hand over that in the lelt and tie a single knot. Pass the end now in the left hand over that in the right and complete the knot. The ends when pulled tight will be parallel with the folds of the bandage. The rule for tying a square knot is—right over left, left over right (fig. 5).

Slings

The large arm sling is used to support the forearm and hand. Spread out a triangle bandage on the front of the casualty with the point toward the injured arm. Pass the upper end around the back of the neck from the sound side so that it appears over the shoulder of the injured side. Carry the point behind the elbow of the injured arm; place the forearm across the middle of the bandage. Then carry the lower end up around the arm and tie to the upper end. Bring the point forward around the elbow and pin to the front of the sling.

Slings may be improvised (1) by pinning a coat sleeve to the front of the coat, (2) by turning up the lower edge of a coat and pinning it to the front of the coat, or (3) by passing the hand inside the coat and then buttoning it.

Bandaging Special Parts of the Body

1. *Chin and side of face* (fig. 6).—Put the center of a cravat under the chin. Pass one end over the top of the head to the temple on the

FIGURE 6

opposite side. Bring the other end to the temple, cross the bandage ends so that they go around the head in opposite directions. Tie at the side.

2. *The head* (fig. 7).—Take an unfolded triangle bandage and lay its center on top of the head so that its point is toward the back of the head and its long lower border lies along the forehead just above the eyebrows. Take a short fold in the long border and then pass the ends of the bandage around the back of the head above the ears (A). Cross the ends over the point of the bandage (B), bring the ends to the front again and tie in the middle of the forehead (C). Put your hand on the top of the head to steady the dressing and draw down the point of the bandage until the dressing is taut over the top of the head. Then turn up the point and tuck it under the bandage going around the head (D).

3. *Both eyes.*—Put the center of a wide cravat bandage over the eyes as a blindfold, carry the ends backward, cross behind the head and tie at the side. Never cover an eye affected by gas.

4. *One eye* (fig. 7E).—Lay a strip of narrow bandage about three and one-half feet long across the top of the head so that one end hangs down over the uninjured eye and the other end hangs

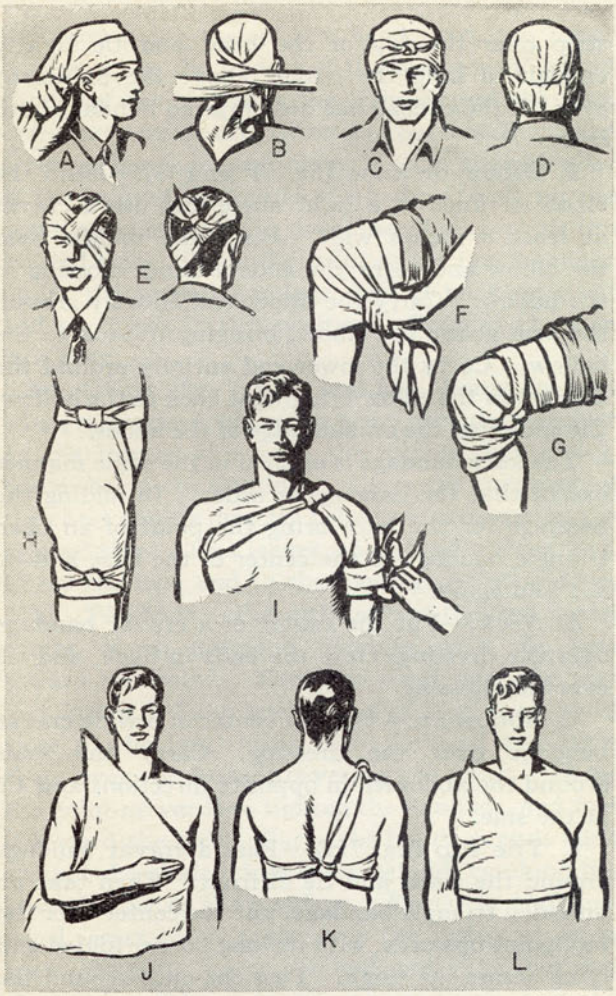

FIGURE 7

down the back. Place the middle of a cravat over the injured eye, carry the ends obliquely around the head so as not to cover the uninjured eye and tie. Carry the loose ends of the narrow bandage

strip over the top of the head and tie tightly enough to keep the cravat above the uninjured eye. If the eyeball has been injured bandage both eyes.

5. *Elbow or knee* (fig. 7F and G).—Bend the elbow or knee to a right angle and use a cravat at least 8 inches wide. Place the middle over the elbow and carry the ends around, crossing in the hollow. Carry the upper end entirely around the arm above the elbow, bringing it back to the hollow. Carry the lower end entirely around the arm below the elbow bringing it back to the hollow. Tie snugly at the outside edge of the hollow.

The knee bandage is applied in the same manner except that the bandage is wider. In folding the bandage for the knee bring the point of an open triangle bandage to the center of the base and do not fold again.

6. *Neck.*—Put the center of a cravat bandage over the dressing, cross the ends in back, and tie over the dressing.

7. *Abdomen.*— Put the center of a wide cravat bandage over the dressing. Carry the ends around the abdomen in opposite directions and tie at the side.

8. *The hip* (fig. 7H).—Pass a cravat bandage around the waist and tie in front. Then take an unfolded triangle bandage, put the center over the hip, point upwards, with its long border folded and lying across the thigh. Pass the ends around the thigh and tie on the outer side. Draw the point upwards under the bandage around the waist, turn it down over the bandage going around the waist and tie or pin in place.

9. *Shoulder* (fig. 7I).—Lay the center of an unfolded triangle bandage on the top of the

shoulder, point toward the head, with the lower border across the middle of the upper arm. Fold the lower border, carry the ends around the arm, cross them inside and tie on the outer side. Take a cravat bandage, and carry it from the shoulder of the injured side underneath the armpit on the opposite side and tie over the shoulder on the injured side. Draw the point of the first bandage under the second bandage, fold it back on itself and tie or pin in this position. Support the arm in a sling.

10. *Chest* (fig. 7 J, K, and L).—Using an open triangle bandage, place the point over the shoulder on the injured side with the middle of the long border below the shoulder. Carry the ends around the chest and tie directly below the shoulder on the injured side. This leaves a long and a short end. Carry the long end to the bandage point and tie.

11. *The foot.*—Place the sole of the foot in the center of an unfolded bandage with the toes toward the point. Turn the point over the toes and instep. Take one of the ends in each hand close to the foot, bring them forward and cross them over the instep, covering the point. Draw the point upwards to tighten the bandage, and fold it toward the toes. Carry the bandage ends back around the ankle, cross them behind, catching the lower border of the bandage. Bring the ends forward, cross them again over the instep so as to cover the point. carry one end under the foot and tie on inner side.

12. *Lower part of the abdomen.*—Pass a cravat bandage around the waist and tie. Pass the end of a wide cravat bandage under the first at the middle of the back, fold it over and secure it with a safety pin. Bring the other end forward

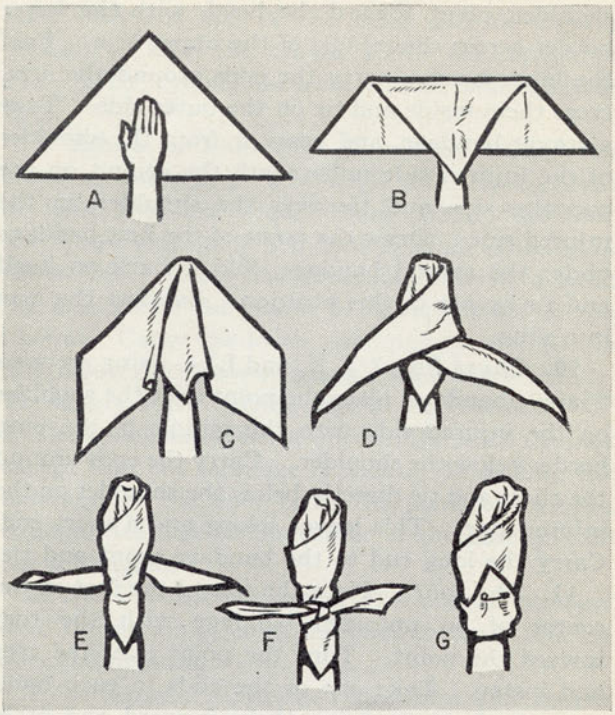

FIGURE 8

between the thighs and up to the waist bandage in the front. Pass it under the waist bandage and pin or tie.

13. *The hand* (fig. 8).—Place the hand, palm down, in the center of an unfolded triangle bandage with the fingers toward the point of the bandage (A). Bring the point over the back of the hand to the wrist (B), and pass the bandage ends around it, crossing the ends over the point (C and D). Circle the wrist and tie (E and F). Then turn the point toward the fingers and pin to the bandage (G).

CHAPTER V

HEMORRHAGE

Hemorrhage is a condition which sounds, looks and is serious. Persons with hemorrhage must have priority treatment and transport.

Although the presence of blood requires immediate attention, it is in itself a poor indicator of the severity of the wounds. A little blood goes a long way and may make a minor injury look frightening. On the other hand a severe wound, a torn off limb for example, may bleed very little because of shock.

Many people think the only way to stop bleeding is to apply a tourniquet. They fail to consider its dangers. They would be horrified to know of the number of limbs lost or paralyzed because tourniquets have been left in place without being loosened every 15 minutes.

A pad over the wound and a firm bandage combined with elevation of the limb will stop bleeding in nearly all cases.

Kinds of Bleeding

A. *Bleeding from artery*—blood *spurts* with each beat of heart unless cut artery is deep under tissues, in which case blood will well up.

B. *Bleeding from veins* will be a *steady flow*.

C. Bleeding from injury to very small vessels—*oozing*.

Control of Bleeding

A. *Bleeding from artery*.

1. *Pressure points*.—Pressure points are points where arteries lie close enough to bones to permit

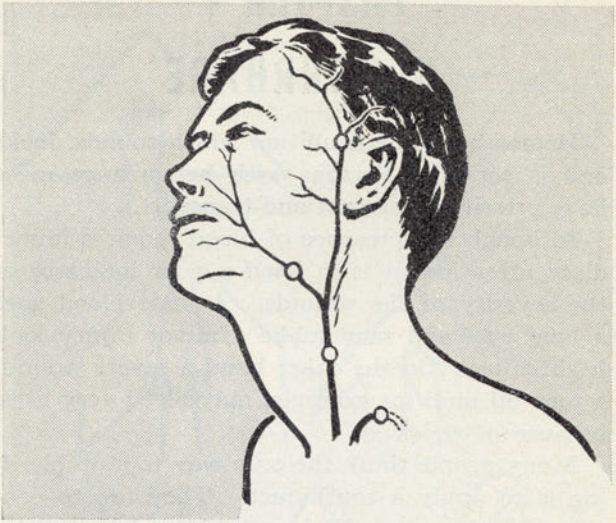

FIGURE 9

sufficient compression by the fingers to control bleeding. Hemorrhage may be controlled by pressure on these points until pressure dressings can be applied to the bleeding wound (fig. 9).

(*a*) *For bleeding from the scalp and forehead,* press with finger or thumb just in front of the opening of the ear on the side nearer the bleeding (fig. 10).

(*b*) *For bleeding from the face below the eyebrows,* press against the side of the lower jaw just in front of the angle of the jawbone on the bleeding side (fig. 11).

(*c*) *For bleeding from the neck or cut throat,* place finger tips on the neck beside the windpipe on the bleeding side, and with thumb behind the neck, press toward backbone with ball of fingers (fig. 12).

FIGURE 10

FIGURE 11

FIGURE 12

FIGURE 13

(*d*) *For bleeding from the shoulder or armpit,* tip the head toward the shoulder on the injured side and press down with thumb at side of neck, just behind the collar bone (fig. 13).

(*e*) *For bleeding from the arm,* press with fingers on inner side of the arm just below armpit (fig. 14).

(*f*) *For bleeding from the leg,* put victim on his back and press downward with straight arm pressing the heel of the hand into the middle of the groin (fig. 15).

2. *Tourniquet for arterial bleeding*:

(*a*) *Materials.*—A cravat bandage or a strip of cloth at least two inches wide folded with enough

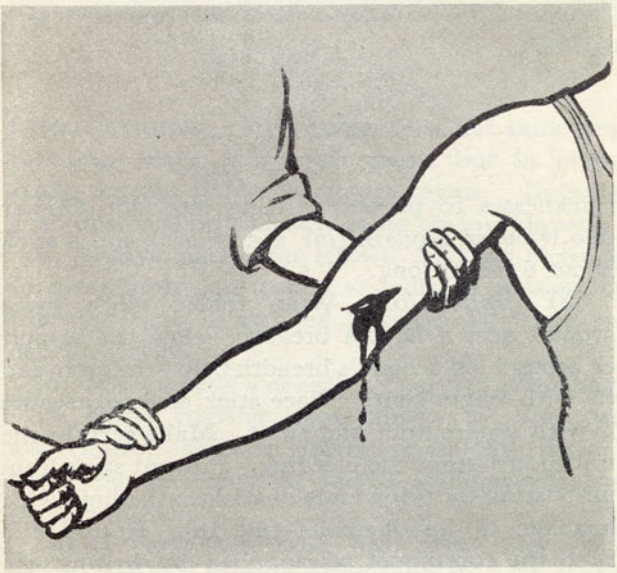

FIGURE 14

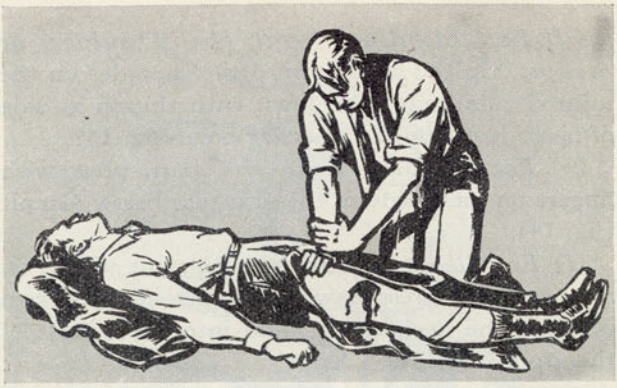

FIGURE 15

thicknesses to prevent cutting into skin (*never use wire or any similar materials*), and a stick about 6 inches long.

(*b*) *Application.*—Wrap folded cloth twice around arm a hand's breadth below the armpit or around leg a hand's breadth below the groin and tie with single knot. Place stick on knot, secure it with square knot and twist. Make certain the tourniquet stops the bleeding. Prevent stick from untwisting by tying ends of stick to the limb with bandage or handkerchief (fig. 16). Record the time the tourniquet was applied by writing the hour and minute on the tourniquet with a pencil.

(c) *Precautions.*—i. *Loosen tourniquet at end of 15 minutes.* If dressing over wound becomes more bloody, tighten tourniquet for another

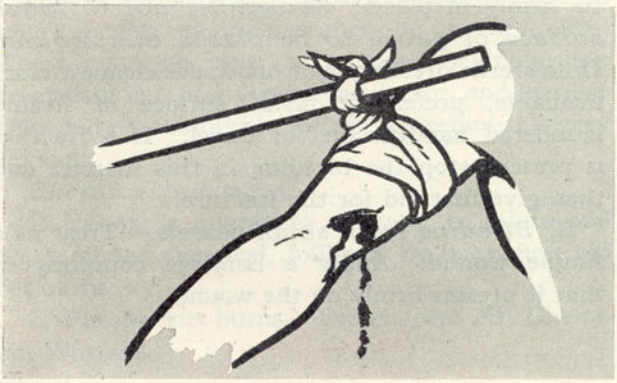

FIGURE 16

fifteen minutes. If dressing does not show new bleeding, leave tourniquet loose, but in place, ready for use if bleeding starts again. Indicate time of loosening and tightening on tourniquet.

ii. Always mark large letters "*TK*" on victim's forehead with skin pencil to indicate presence of tourniquet, so it may be loosened by those receiving victim.

iii. *Never apply a dressing over a tourniquet.*

iv. Never transfer responsibility to some one else (nurse, stretcher bearer, ambulance driver) until you make sure he knows a tourniquet has been applied.

(*d*) If part of a limb has been blown off, tightly apply a tourniquet close to the end of the stump and do not remove it.

B. *Bleeding from veins.*

1. Elevate a bleeding arm or leg unless it is fractured.

2. Apply sterile dressing over the wound and tie firmly in place. *Remember not to touch surface of gauze to be placed over wound.* If no sterile dressing is at hand, use cleanest cloth available, preferably inside surface of freshly laundered handkerchief or towel. If a fracture is present stop the bleeding in this manner and then give first aid for the fracture.

C. *Bleeding from small vessels.*—Treat as a simple wound. Apply a bandage compress so that it presses firmly on the wound.

CHAPTER VI

BURNS

Burns in warfare may be extensive and serious. They may be caused by incendiary bombs or shells, by contact with live electric wires or they may occur in burning buildings.

First aid.—The first need is to reduce pain and avoid shock. If a doctor is immediately available, apply a sterile dressing over the wound without removing clothing, wrap the victim in a blanket to keep him warm and call the doctor.

If a doctor is not available, carefully cut the clothing away from the burn. Avoid tearing or pulling. Do not try to remove bits of clothing or dirt which may be stuck to the burned area. Spread tannic acid jelly on a gauze compress,

cover the burn, bandage lightly, wrap the victim in blankets and transport immediately to the hospital.

Persons with burns should be treated for shock.

Ointments, salves, or greasy substances should never, under any circumstances be put on a burn. These materials must be removed before proper treatment can be given by the doctor, and because they will not dissolve in water their removal is very difficult.

Chemical burns.—

1. Use large quantities of water to dilute and wash off the chemical, followed by usual first aid for burns.

2. Phosphorus burns.—See chapter XI, Chemical Warfare.

CHAPTER VII

SHOCK (COLLAPSE)

Shock[1] is present to some extent in all injuries. It is a serious condition which frequently results in death when the injuries would not of themselves prove fatal. It is a depression of the nervous system and the functions of the body. There is a loss of body heat and a decrease in the amount of circulating blood. To compensate for this the heart beats faster. Severe shock may occur in the absence of conspicuous manifestations such as hemorrhage.

[1] The term shock must not be confused with apoplexy or stroke, which is spoken of as "shock" in some sections of the United States.

The first aid worker must not become so intent on the care of an injury that the victim develops severe shock because simple preventive measures were omitted. The first aid measures for the prevention of shock are so simple and commonplace that the inexperienced might see little harm in omitting them. But, simple as they are, shock treatment is vitally important for *every* case.

As the amount of blood in circulation diminishes the brain does not get enough blood. Keep the casualty lying down so that the blood will go to the heart by gravity and may be pumped to the brain. Apply blankets and hot water bottles to prevent loss of body heat. This does not consist merely of piling blankets on top of an injured person—it is important to have as many thicknesses underneath him. Warm drinks (unless the casualty is unconscious) are beneficial. Do not remove more clothes from the victim than necessary to treat his injury. Loosen clothing at the neck, chest and waist.

Shock probably causes more fatalities than any other condition. Do not underestimate its dangers.

Symptoms—Pale (especially about the face and lips),[2] *chilly, clammy sweat,* nausea, mentally confused, *weak rapid pulse,* irregular breathing. May be unconscious.

First aid.—

1. Lay flat with *head low* and *feet raised* (fig. 17).

2. Put *blankets* and *wraps under* and *over victim.*

3. *Keep warm with hot water bottles* but do not burn (fig. 18).

[2] In injured women, do not let make-up confuse you. Remove it.

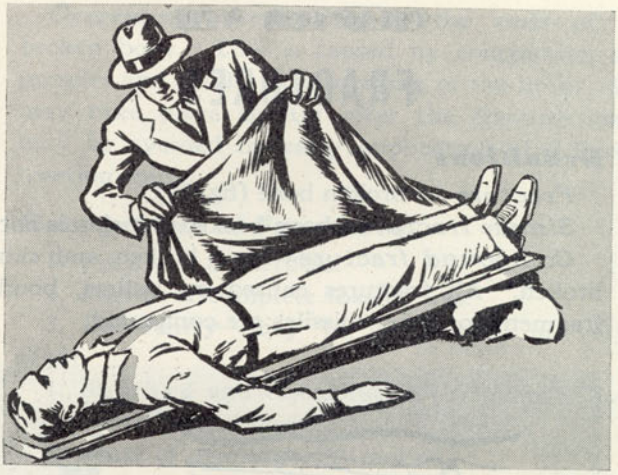

FIGURE 17

4. Give warm and sweetened drinks, but not if the person is unconscious or injured internally.

5. Do *not* give alcoholic drinks.

6. *Get a doctor* without delay.

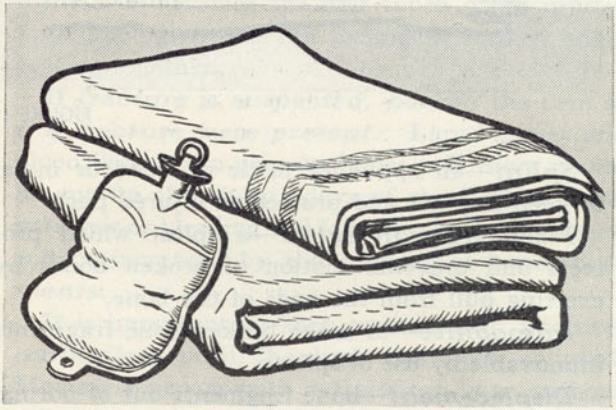

FIGURE 18

CHAPTER VIII

FRACTURES

Definitions

Fracture—a broken bone (fig. 19).

Simple fracture—bone broken but skin is not.

Compound fracture—bone broken and skin broken. All fractures caused by bullets, bomb fragments or other missiles are compound.

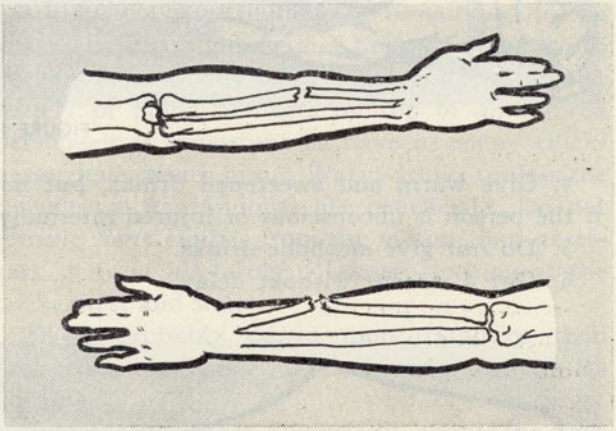

FIGURE 19

Splint—an appliance made of wood or metal to keep in place and protect an injured part.

Fixed traction splint—a splint which protects and prevents motion of broken bones by exerting pull from the ends of the bone.

Immobilize—to make broken bone fragments immovable by use of splints.

Displacement—bone fragments out of normal position.

Overriding—overlapping of the ends of a broken bone. This is caused by contraction of muscles and results in shortening of the limb. It may take place shortly after the fracture and may be avoided by early application of a fixed traction splint.

Recognition of Fractures

1. *Pain* and tenderness.
2. Partial or complete *loss of use*.
3. *Deformity*—may be pronounced or very slight.
4. *Swelling* and discoloration—frequently not present for several hours.
5. Sense of *grating* with motion.
6. In compound fractures, bone may or may not protrude through skin wound.

The Care of Fractures

In making an examination to determine whether or not a fracture has occurred, *be very gentle*. Care must be taken not to move the broken fragments. Sometimes the first touch of an injured limb may give one the feeling of broken edges grating together.

If *fracture* is *suspected, handle* the case as if *a fracture were present*. Large nerves and blood vessels run close to bones. If these should be cut by the sharp edges of the broken bone, paralysis or bleeding will follow. *Pain* and *shock* will be increased *by* the *moving* of bone *fragments*.

It is important to keep persons with fractures *motionless* until the limb has been splinted. Moving a person with a fractured bone without splints may increase shock and result in death.

Traction splints most effectively protect the victim from these dangers. Deaths from fractured thighs were halved in the World War after traction splints were applied on the battlefield.

"*Splint them where they lie.*" If you don't know how, get someone who does. If there is a compound fracture, *get a doctor*. If none is immediately available, expose the injury by carefully *cutting* away the clothing without moving the broken bone. Do not pull or tear away clothing. If there is bleeding it must be controlled. Apply sterile dressing, moving the injured part as little as possible while bandaging. The fracture should then be splinted.

Fracture of Spine

Broken backs and *broken necks* are so dangerous that they require special first aid measures. Improper care may result in permanent paralysis or death of a person with these injuries.

Broken neck.—The victim, if conscious, will complain of pain in the neck. Many cases will hold the head and neck stiff and motionless, but some will be completely relaxed and have no control of the head. Injury to the spine may cause paralysis. Can the injured move his hands? Try his grip (both hands). Record any paralysis or weakness on the identification tag.

Keep him lying in the position in which he was found and prevent motion of the head. Do not give him water as he may move his head to drink. Cover him with blankets or wraps. Get a doctor.

If a victim with a broken neck must be moved get a door, shutter, or wide board and place it beside him with the end at least 4 inches above the

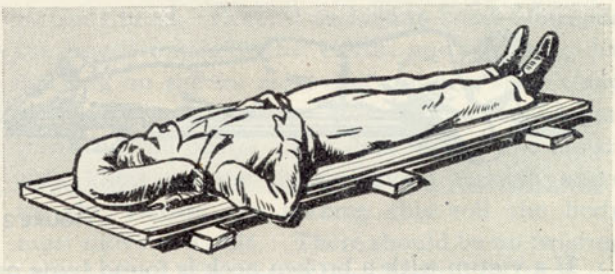

FIGURE 20

top of his head. The board should be at least 15 inches wide and 5 feet or more in length.

One person kneels at the victim's head, holding the head between his two hands and steadies the head so that the head, neck, and shoulders move as a unit with the body without bending. One or more assistants grasp the victim's clothing at the hips and shoulders and carefully slide him sideward onto the board or door so that he remains face upward, arms at his sides, head, trunk, and extremities on the board. The head must not be raised or the neck bent forward or sideways. The arms may then be folded over the chest and held together with safety pins or bandage. Several straps or triangle bandages should then be placed around the victim and the board to hold him in place during transportation. A folded sweater or coat should be placed around his head to hold it in position, or socks filled with sand or earth may be used. The board is then picked up and the victim transported as though he were on a stretcher (fig. 20).

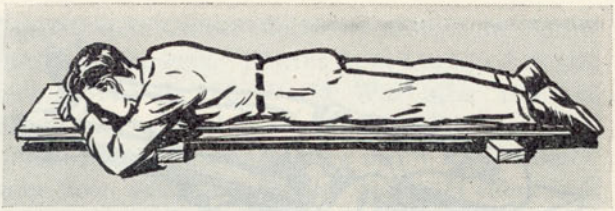

FIGURE 21

If a victim with a broken neck is found lying on his face a door or wide board should be placed beside him as described above, and the arm at that side brought above the head. The person kneeling at the head grasps it firmly at the sides covering the ear and the back end of the jaw with his hands. Assistants grasp the victim's clothing at the shoulders and hips and gently roll him onto the board, the man at the head steadying the head so that it is kept in line with the rest of the body. Moderate traction should be exerted by the hands holding the head. The head must not be allowed to tilt either forward or backward.

Broken back.—When the backbone is broken below the neck, the only symptom may be pain in the back. If the spinal cord is damaged or under pressure, the victim may be unable to move his feet, but can move his hands.

Any move which doubles the injured man forward may cause death or paralysis for life. He must, therefore, be kept motionless in the position in which he is found. Get a doctor. *Keep him warm. Reassure him. Do not let him move.* If necessary to move a victim found on his back, place a door or wide board beside him as described above. Raise the arm on the side toward the board so that it is straight above the

victim's head. Several assistants kneel alongside the board opposite the victim and, grasping his clothing on the far side, they roll him slowly and gently towards them so that he lies face downwards on the board. If a door is used the assistants kneel on the door, leaving enough space for the victim. In making this roll the body must move as a unit. There should be no twisting or jerking. Then bend one forearm so that the head will rest on it (fig. 21).

If a casualty with a broken back is found lying on his belly the door or board should be placed beside him. Assistants grasp his clothing and slide him onto the board, one person guarding his face. He remains in a face-down position. Several straps or bandages should then be placed around the victim and the board to bind him firmly in place during transportation.

Victims with broken backs should, if possible, be moved only on a rigid support. A blanket may safely be used if no rigid support is available. If the victim is on his back he must be rolled onto a blanket. If the victim is found lying on his belly he must be slid onto the blanket. If the victim is found on his side or in a crumpled condition he must be carefully straightened out. With one person at the feet, a second at the head, and one in the middle, the victim is rolled onto his back in the case of a broken neck and onto his belly in the case of a broken back.

If both the neck and back are broken, handle as a broken neck.

In case of doubt, *handle a suspected fracture as if it were actually a fracture.*

FIXED TRACTION SPLINTS

These are mechanical devices for immobilizing fractures simply by maintaining a steady pull on the affected limb. This tends to keep the broken fragments lined up in proper position. If applied early traction splints prevent overriding or displacement of the broken fragments by the muscle spasm that develops. The steady pull also prevents the broken ends from injuring nerves and blood vessels.

Fixed traction for the lower extremity.—The half ring leg splint known as the Keller-Blake Splint (fig. 22A), which has been adopted

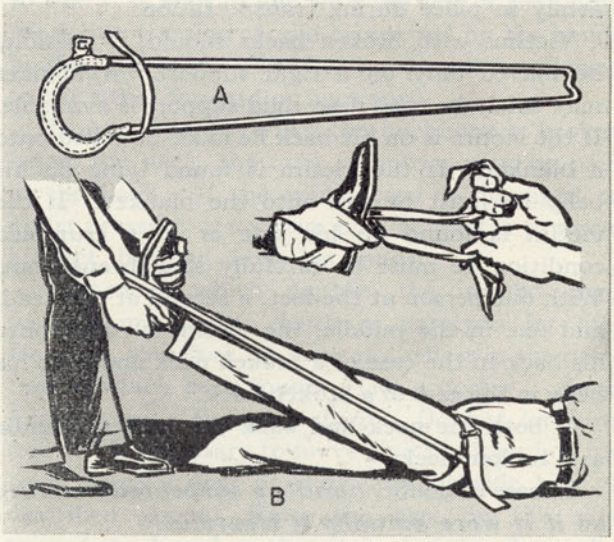

FIGURE 22

by the United States Army, should be used for a fracture of the leg at any point from the hip to the ankle. The splint may be applied without removing clothing. Two first aid workers are needed for the application of the splint.

One person grasps the foot with or without the shoe on, keeping the foot at a right angle to the leg with the toes pointing up. A steady firm pull is made. At the same time the limb is straightened to a position as nearly normal as possible and the foot is slowly raised until the heel is a foot or more above the ground.

While pull is maintained, the splint is placed in position by slipping the half ring under the upper portion of the thigh with the short side-bar inside. Move the splint upwards until the half ring meets the crotch. Then buckle the strap snugly but not tightly across the thigh to the side bar on the opposite side (fig. 22B).

Then apply a *traction hitch* to the foot as illustrated in figure 23. Tie two cravat bandages together, place the knot under the sole of the foot at the instep, so that it forms a stirrup (A). Carry ends of the bandage over the foot and around the ankle in opposite directions crossing behind and above the heel (B). Thread the ends under the folds which form the sides of the stirrup on each side (C). A free end now hangs from each side of the foot (D). These form the traction bands. Carry these ends over the notched end of the splint and tie with a square knot.

Form a Spanish windlass by inserting a stick about 6 inches long between the traction bands. Twist the bands with the stick until all slack has been removed and strong traction is established.

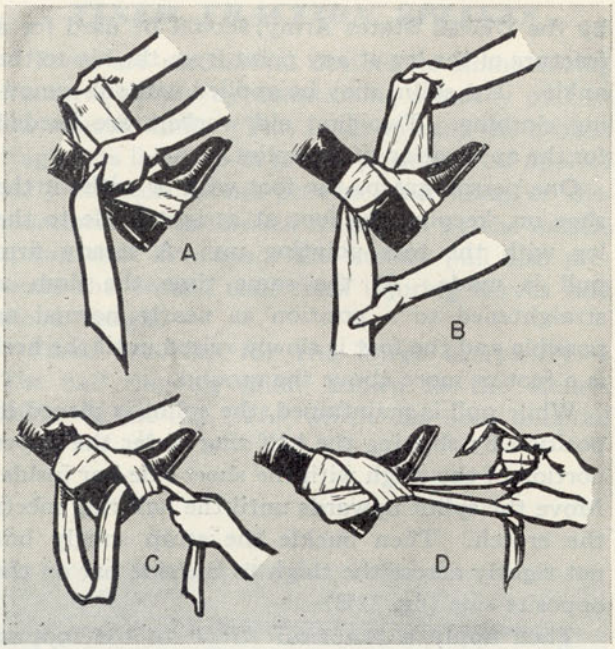

FIGURE 23

Then anchor the stick to keep the band from unwinding by tieing the ends of the stick to the sides of the splint.

Support the limb in the splint as illustrated in figs. 24 and 25. Hang the center of a cravat over

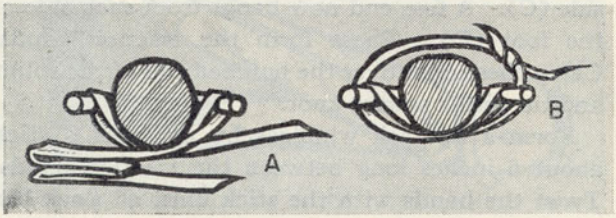

FIGURE 24

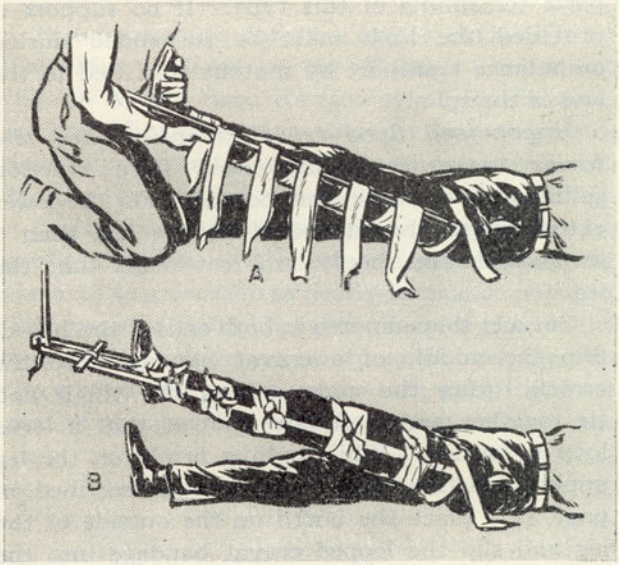

FIGURE 25

the outside bar. Pass the end toward the leg, under the leg, and up between the leg and the inside bar (A). Take one end in each hand and draw outwards sufficiently to take any sag out of the leg. Pass the ends under the leg in opposite directions and tie at the outside bar (B). Five such bandages should be applied: (1) Just below the crotch, (2) just above the knee, (3) just below the knee, (4) at the middle of the lower leg, and (5) at the ankle (fig. 25B).

After the leg has been splinted the heel must not touch the ground. A cord may be tied at the end of the splint and the leg and splint suspended or the end of the splint may be placed on some bricks, stones, block of wood, curbstone or similar object. Most stretchers are provided with sup-

ports for splints of this type. If no support is provided the limb must be suspended during ambulance transport by a stout cord tied to the end of the splint.

Improvised fixed traction splints for the lower extremity.—Improvised fixed traction splints may be made from boards. For the lower extremity the board should be not less than 4 inches wide and should be 2 feet longer than the leg.

Cut a U-shaped notch in both ends of the board. Slip the middle of a cravat bandage into the crotch, bring the ends around the thigh and tie together with a square knot so that a loose loop is formed. While pulling firmly on the leg apply a traction hitch to the foot as described on page 37. Place the board on the outside of the leg and slip the looped cravat bandage into the notch in the upper end of the board. Then tie the traction bands over the notch in the lower end of the board. Apply traction by inserting a short stout stick between the two traction bands and twist until all slack has been taken up and strong traction established. Tie cravat bandages firmly but not tightly around the leg and splint, (1) at the crotch, (2) just above the knee, (3) just below the knee, (4) half way from the knee to the ankle, and (5) at the ankle.

After application of the splint do not allow the heel to touch the ground. (See p. 39 under Keller-Blake Splint.)

Fixed traction for the upper extremity.—The Murray-Jones or the Thomas arm splint (fig. 26 A) is a fixed traction splint for the arm. It should be used for any fracture from the shoulder to a point halfway from the elbow to the wrist. It may be applied without removing clothing.

One operator grasps the wrist and applies steady, gentle traction, at the same time straightening the limb to a position as nearly normal as possible. The operator shifts his hands one at a time so the ring of the splint may be threaded over the victim's hand and passed up the arm until the lower part of the ring fits into the armpit. When the

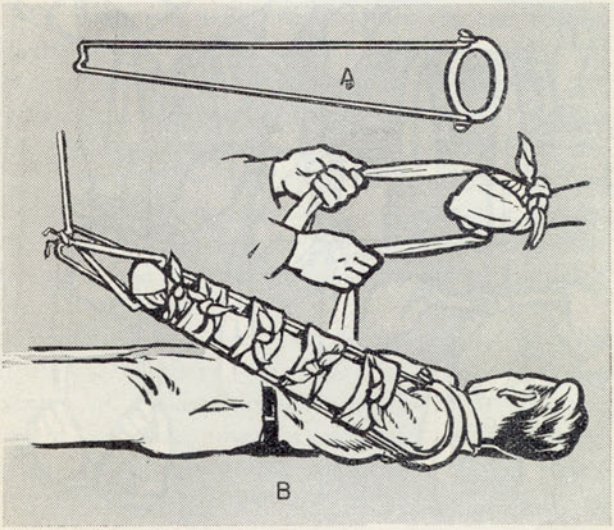

FIGURE 26

splint is in proper position the arm extends down between the sidebars with one bar on the thumb side and the other bar on the little finger side with the palm toward the victim's side.

Traction hitch (fig. 27).—Roll a stick, about 4 inches long, in a triangle bandage so that a long

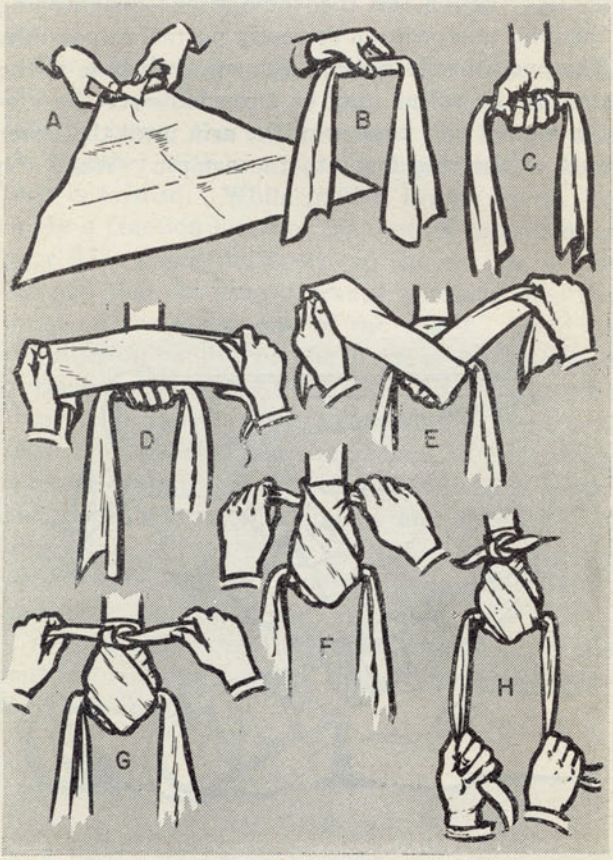

FIGURE 27

tail hangs from either end (A and B). Place the wrapped stick crosswise in the palm of the victim's hand, fold his fingers around it allowing the bandage ends to hang down (C). Place a cravat bandage on the back of his wrist (D), pass the ends around the wrist, cross them on the back of the hand, then bring them over the fingers snugly (E). Carry the ends to the palm side of the wrist (F), tie a single knot, bring the ends to the back of the wrist and tie a square knot (G), completing the hitch (H).

The bandage ends hanging from the ends of the stick form the traction bands. The traction bands are tied in a square knot over the notch at the end of the splint, with enough pull to maintain traction.

Bring the arm to as near normal length as possible using the opposite arm as a guide.

To keep the arm from moving in the splint, cradle it as follows: Hang a cravat bandage by its center over the outside bar. Pass the end toward the arm under the arm and up between the arm and the inside bar (fig. 24A). Pass the ends under the arm in opposite directions and tie at the outside bar (fig. 24B). Cradle the arm in this manner, (1) just below the armpit, (2) just above the elbow, (3) just below the elbow, and (4) just above the wrist.

Improvised fixed traction splint for the upper extremity.—A board at least 4 inches wide and 2 feet longer than the arm is used. Cut a U-shaped notch in each end. Tie a folded triangle bandage around the arm so that it forms a loose loop in the armpit with the tied ends over

the upper part of the shoulder. Apply a traction hitch to the hand as described on page 42. Insert the notch in the upper end of the board into the loop, applying the board to the outer surface of the arm. Bring the traction bands from the hand over the notch at the lower end of the splint. With one hand pull firmly on the wrist. With the other hand grasp the traction bands and push upward, pulling the bands through the notch, to make firm traction. Pass the ends around the board and tie. Encircle the arm and splint twice with folded triangle bandages and tie snugly (1) at the armpit, (2) just above the elbow, (3) just below the elbow, and (4) just above the wrist (fig. 26B).

Other types of improvised splints.—The most common form of improvised splint is a thin piece of board, which should be well padded before it is applied to the limb. The splint must be long enough to immobilize the joints above and below the fracture. The splint may be padded with plenty of cotton, a blanket, a pillow or some similar material. Splints must be applied to the inner and outer surface of the limb in such a manner that the limb will not twist inside the splint. In the case of the lower leg this may be done by having the upper end of the splint well above the knee and the lower end extend beyond the foot. Tie the splint firmly to the affected part, using cravat bandages (fig. 29).

Fracture of the lower half of the forearm and of the hand or fingers.—Apply well padded wooden splints extending from the elbow to the finger tips on the front and back of the forearm and hand. Hold these in place by encircling

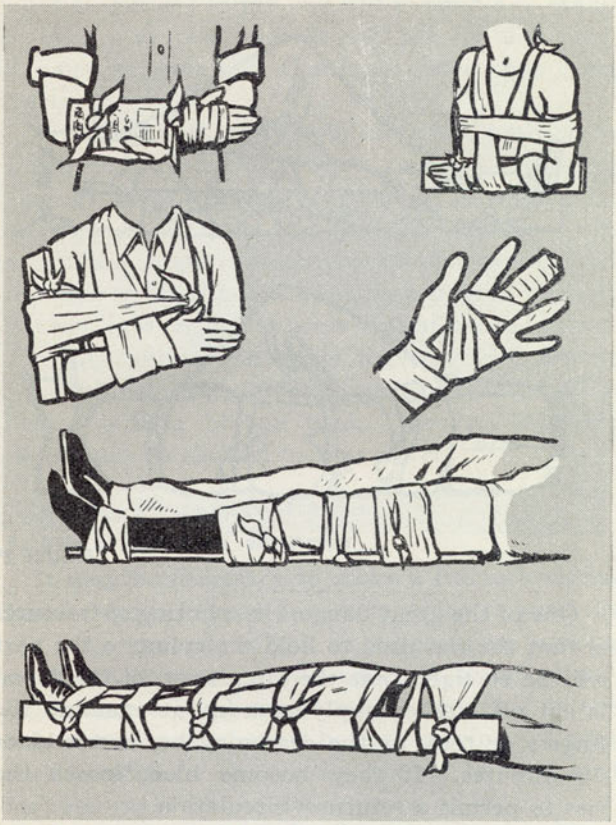

FIGURE 28

them with 3 cravat bandages. Support the forearm and hand in a sling (fig. 28).

In the absence of a piece of wood, a newspaper, telephone book, or piece of linoleum or some other material which is rigid when folded or rolled may be applied with suitable padding between it and the part.

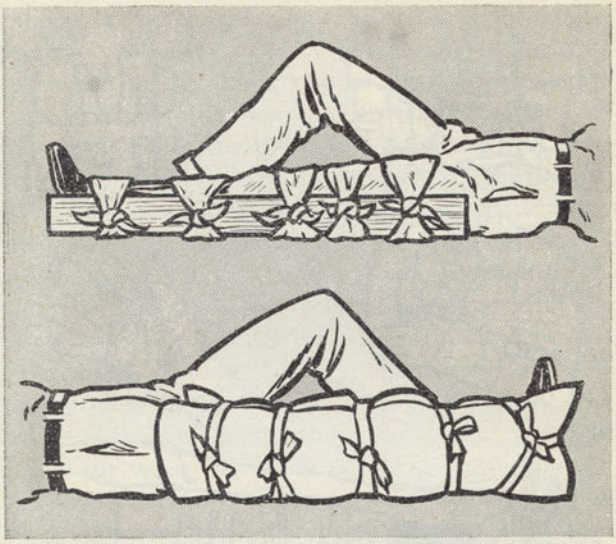

FIGURE 29

One of the great dangers in splinting of fractures is that the ties used to hold the splint to the part will be so tight that the circulation of the blood is cut off. After applying a splint examine the fingers or toes, as the case may be, every 15 or 20 minutes. If they become blue, loosen the ties to permit a return of circulation.

Fracture of the pelvis.—If after injury in the region of the hips or loins a casualty shows no

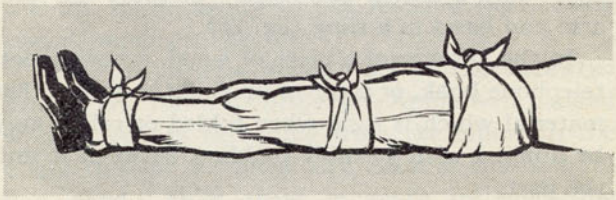

FIGURE 30

signs of damage to the legs but is unable to stand or even move his legs without pain or difficulty, it must be assumed that the pelvis has been fractured.

First aid.—Place the victim in the position in which he is most comfortable, raising or lowering his legs as he desires. Preferably he should be on his back with the legs straight but this is not essential. Apply a wide cravat bandage around the hips so that it is firm enough to give support but not tight enough to press broken bones inward. Tie both ankles and knees together with cravat bandages (fig. 30). Move him as described for a person with a broken back. (See p. 34). He should not be allowed to pass water.

Moving Fracture Cases from Points of Danger

It may be necessary to move a fracture victim from a spot of great danger in order to save his life. An example might be a person in burning wreckage, close to a wall which is about to collapse, near a bomb which may explode, or in the way of traffic which must be kept moving. Under such conditions the victim should be prepared for removal from the danger zone as follows:

1. *Fracture of arm or collar bone.*—Place a sling in position, lay the forearm across the chest with the fingers toward the other shoulder, complete the sling. Then place a broad bandage gently but firmly around the body and the arm (fig. 31). Move the person in a lying position on a stretcher.

2. *Fracture of leg.*—Tie the feet and the knees together with bandages, letting the good leg sup-

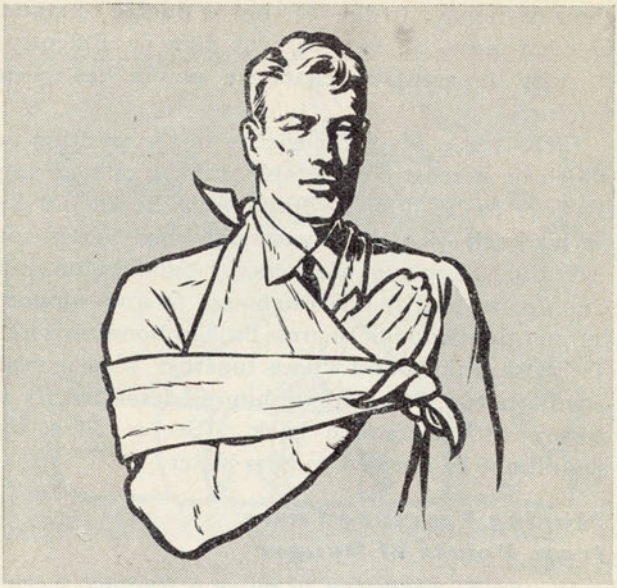

FIGURE 31

port the broken one. If possible, get a board the length of the leg and bind it to the side of the fractured leg with wide bands going around both legs and the board. Transport in a lying position with great care.

Remember that these procedures are not best for the injured and are to be only used in emergencies where it would be unsafe to delay long enough to apply a fixed traction splint. As soon as the victim has been moved to safety a fixed traction splint should be applied.

Dislocation.—Do not try to reduce a dislocation, but immobilize by splinting and take to a physician. Dislocated shoulder is best immobilized with a Murray-Jones traction splint.

CHAPTER IX

ARTIFICIAL RESPIRATION

Common Causes of Arrested Breathing or Asphyxia

1. Electric shock.

2. Carbon monoxide poisoning (illuminating gas, exhaust gas, or coal gas).

3. Drowning.

4. Concussion from explosions, or from blows on the head or abdomen.

5. Suffocation or strangulation due to external obstruction of the air passages.

6. Foreign bodies in the throat or windpipe, which obstruct the air passages.

A person who has stopped breathing from any of these causes must be made to breathe at once or he will die. Do not waste time on unnecessary things but get to work immediately, using the prone pressure method of artificial respiration. Get the victim into fresh air, clear the mouth or throat of any obstructions, and proceed as follows:

Standard Technique of Prone Pressure Method

1. Lay victim on his belly, one arm extended directly overhead, other arm bent at elbow. Turn face toward extended arm, resting the head on hand and fingers of bent arm so that nose and mouth are free for breathing and may be seen by the operator (fig. 32).

2. Kneel straddling the victim's thighs, with your knees just above his knees, adjusting your position so that you can comfortably lean

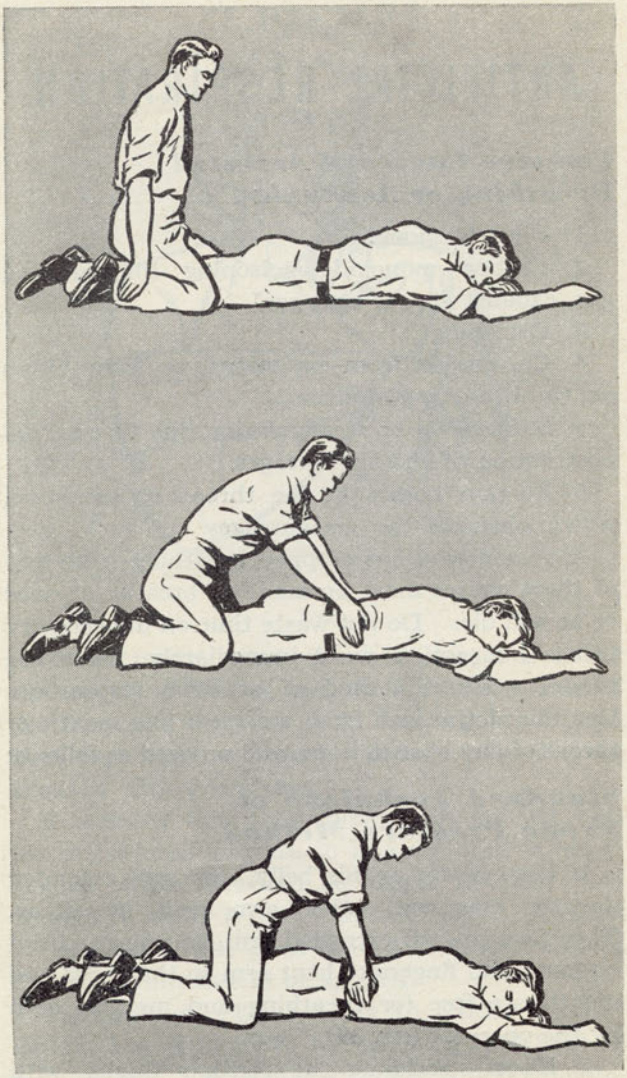

FIGURE 32

forward and place the palms of your hands on the lower part of his chest with the little fingers resting over the lowest ribs. Your wrists should be about four inches apart.

3. With your arms held straight, swing forward slowly, so that the weight of your body is gradually brought to bear upon the victim. Your shoulders should be directly over the heels of your hands at the end of the forward swing. This operation should take about two seconds. Do not bend your elbows.

4. Quickly swing backward so as to remove pressure completely.

5. After two seconds swing forward again. Repeat steps 3 and 4 regularly 12 to 15 times a minute.

6. Continue artificial respiration without interruption until natural breathing is restored—for hours, if necessary—or until a physician declares victim dead.

7. Have an assistant loosen tight clothing about the victim's neck, chest or waist. *Keep victim warm.* Do not give him any liquids by mouth until he is fully conscious.

8. Keep victim lying down after he revives to avoid strain on his heart. He should be given hot tea or coffee to drink after he is fully conscious.

9. Resuscitation should be carried on as near as possible to where victim received his injuries. Should it be necessary to move the victim from the point of the accident, artificial respiration should be carried on during the time he is being moved. He should not be moved again until he is breathing normally, and then moved only in a lying position.

10. After a temporary recovery of respiration the victim may stop breathing again. He must be watched and if natural breathing stops, artificial respiration must be resumed at once.

11. In carrying out resuscitation it may be necessary to change operators. This change must be made without losing the rhythm of respiration.

The pressure exerted by the forward swing must be regulated to meet the comparative sizes of operator and victim. Too much pressure is harmful, and the tendency is always to press too hard in an effort to make the victim breathe. The pressure empties the used air from the chest. An inrush of fresh air takes place in the rest interval when no pressure is being exerted.

Pressure must be in the correct place to force air from the chest. Make sure that your hands are in the proper position and that they do not get too low.

Be sure that the nose and mouth are free of obstruction so that air can pass in and out. If frothy bubbles collect in the mouth, they should be wiped out by an assistant.

Keep the victim warm. Blankets, wraps, or even newspapers should be wrapped around him. You can continue to work through this covering without exposing the victim to the wind.

Only by continued practice will you be able to give artificial respiration effectively under the excitement of an emergency. Therefore you should practice regularly on any willing subject. Never give up. Many persons have been revived after hours of work. Alternate with other workers when you are fatigued. Stop only when the victim has revived or the case has been taken over by a physician.

CHAPTER X

TRANSPORTATION OF THE INJURED

Do not move an injured person if it is unsafe to do so. Before moving him be sure that (1) bleeding is stopped; (2) he is breathing; (3) he is warm; (4) all fractures have been splinted.

The journey to the hospital is frequently the one thing that accident victims remember. Rough, careless or unnecessary handling may cause shock and result in death. *Be gentle and go slowly.*

Stretcher Bearing

All persons trained in first aid should be thoroughly drilled in stretcher bearing. In the event of a civilian war disaster, persons trained as stretcher bearers will assist Rescue Squads by transporting casualties to the nearest First Aid Post, Casualty Station or other place of safety.

Lifting an injured person onto a stretcher is the first step in transportation. Get all the help you need. Have the stretcher ready, with blankets in place. Arrange the blankets so that there are four thicknesses underneath to two on top.

Placing blankets on a stretcher using two blankets (fig. 33).

Fold a blanket into thirds lengthwise. Place blanket on the stretcher and turn the upper fold back so it hangs off one side. Fold the second blanket in thirds, place it on stretcher in such a

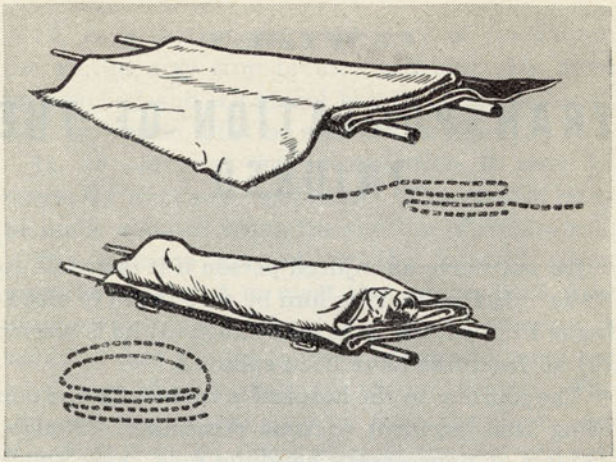

FIGURE 33

way that when the upper fold is turned back it hangs from the opposite side. Place the victim on the stretcher. Turn the hanging fold of the second blanket over him. Then turn the hanging fold of the first blanket over him. By this method the victim has four thicknesses of blanket under him and two over him.

"Lifts and Carries"

Seriously injured persons must be lifted very carefully. If possible get six or eight assistants, who line up three or four on each side. All take orders from the leader so that they will move together. Orders should be clearly given and explained when untrained persons are helping.

1. "Kneel on the knee nearest the victim's feet."

2. "Slip your hands under the victim's body, until your fingers meet those of the man opposite you" (fig. 34).

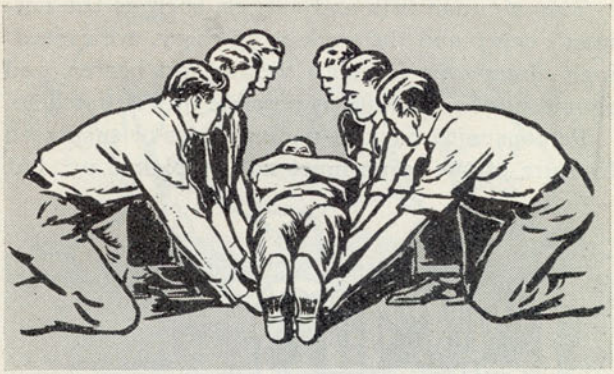

FIGURE 34

3. "All together, *Lift*." The victim is lifted to the level of the knees, and another assistant slides the stretcher between the two rows of bearers. If no one is available to place the stretcher, the bearers will continue the lift until all are standing, and then step sideways to the stretcher, which has been placed at the feet of the victim.

4. "All together, *Lower*." Gently and carefully the victim is lowered to the stretcher.

When only three bearers are available, all lift from the same side, one supporting the head and shoulders, one the waist and hips, the third the knees and ankles (fig. 35). They kneel, slip their hands under the victim, get a good hold and lift on command, resting the victim on their raised knees, to get a better hold. Then rising to a standing position, they walk to the stretcher.

When only two bearers are available, carries are limited to short distances (figs. 36 and 37). Even with a stretcher two bearers are rapidly fatigued with a victim of equal weight.

The one-man lifts and carries, such as the fireman's carry and the pack-strap carry, are exceedingly dangerous for both victim and bearer, and should not be used if it is possible to wait for help.

Persons with back or neck injuries or suspected fracture of the spine must not be picked up, but

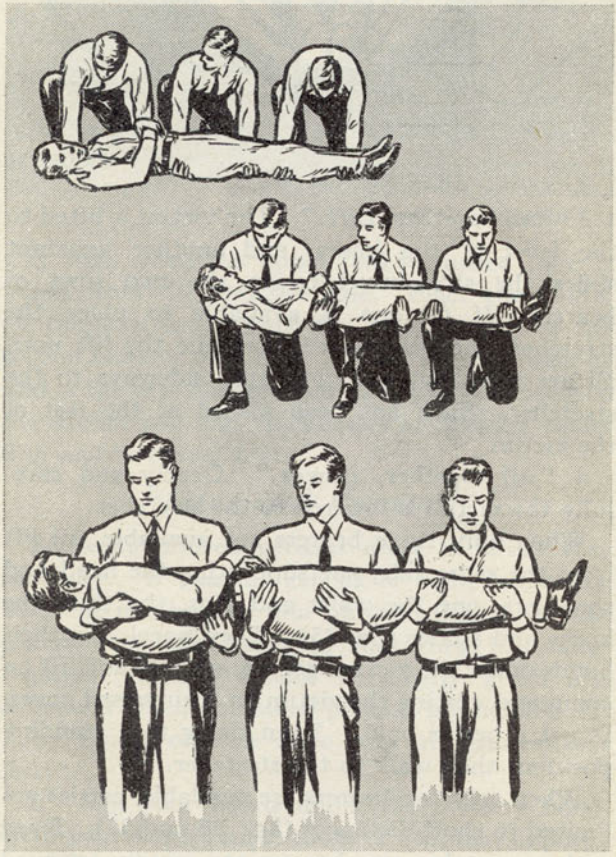

FIGURE 35

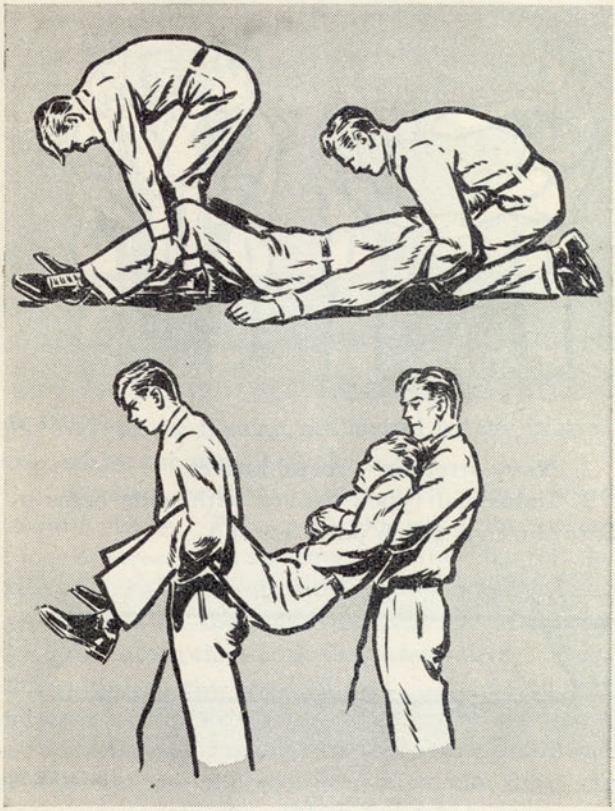

FIGURE 36

must be kept flat and rolled or slid onto a door or board, which is then lifted to a stretcher (see p. 32).

Stretchers Are of Several Types

1. Army stretcher—poles and canvas, with metal braces to spread sidepoles, and metal stirrups which serve as legs to raise it off the ground (fig. 38).

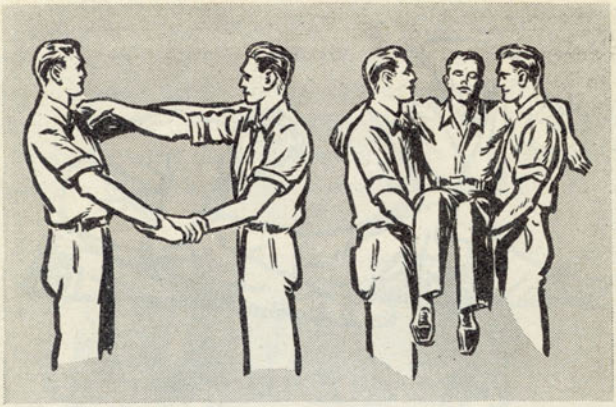

FIGURE 37

2. Navy stretcher—metal basket.

3. Industrial type—canvas with wide hems at sides through which poles are slid.

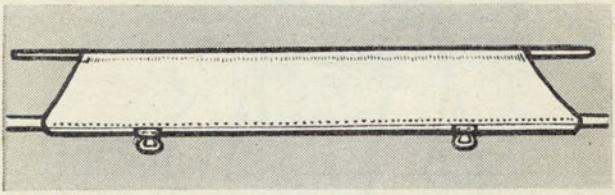

FIGURE 38

4. Improvised blanket stretcher (fig. 39), made with blanket folded in thirds over poles. Place a pole a little longer than the blanket about a foot from the center of the blanket. Fold the short side of the material over the pole toward the other side. Place the second pole on the two thicknesses about two feet from the other pole and parallel to it (A). Fold the remaining side of the blanket across the second pole toward the first (B). When the injured is placed on the blanket

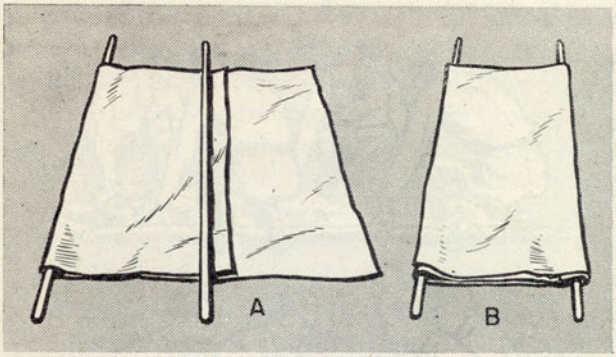

FIGURE 39

the folds of the blanket are locked by the friction exerted by the weight of the body.

5. Blanket, without poles, with edges rolled toward victim. Place a blanket on a flat surface (floor or street) and starting from the edge roll the blanket in a tight roll from each side toward the center until all the blanket except for a strip two feet wide down the middle has been rolled. Place the victim on the unrolled part. The rolled part forms a satisfactory grip. Six bearers are necessary. One pair supports the shoulders and head, the second the abdomen and hips, the third the lower extremities (fig. 40).

6. Door, shutter, ladder with boards, or chair. Any flat surface large and strong enough to support the body may be used for a stretcher. There will be considerable discomfort if the victim is carried on a hard surface for any distance and padding should therefore be provided if available.

In using a chair for a stretcher the straight-backed variety is best. Seat the victim in the chair. The chair is tipped backwards onto its

FIGURE 40

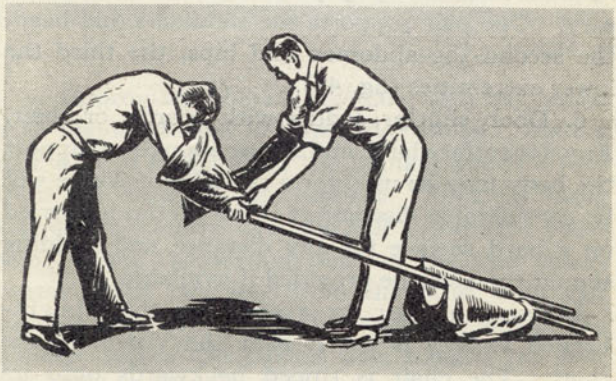

FIGURE 41

back legs. Bearer number one lifts by the front legs and bearer number two by the back of the chair, the patient being in a semireclining position.

A satisfactory stretcher may be improvised by using three or four jackets or coats and two poles. The jackets may be turned inside out and two poles are passed through the sleeves. The flaps are then turned down around the poles and buttoned underneath (fig. 41). Be sure to test the strength of the stretcher before loading it.

Before loading a stretcher, find out whether it will clear corners and narrow winding passages. The victim should be lashed to the stretcher with several cravat bandages if it is necessary to turn the stretcher up on edge or set on end to get around difficult passages or stairways.

Trained stretcher teams will load stretchers into ambulances and trucks at First Aid Posts and Casualty Stations.

When a truck stops suddenly, everything tends to slide forward. To avoid injury to the victim's head he should ride feet first, unless he has a fractured leg. In double-deck ambulances or trucks the upper stretchers are loaded first, and then the lower ones slid under them. Lower tier stretchers are unloaded first.

For their own benefit and to help maintain public morale, injured persons should be removed promptly from the scene of an accident.

CHAPTER XI

CHEMICAL WARFARE

War Gases

Irritant and poisonous chemicals which can be released as gases, smokes, or liquid sprays are called war gases.

Those rendering first aid must be able to recognize gas cases so that they may take the necessary precautions to avoid contamination of themselves and others. Avoid inhaling the fumes. Wear a gas mask. Protective clothing and gloves must also be worn when caring for cases contaminated with persistent gases.

War gases may be—

- Liberated from cylinders and carried by wind.
- Liberated from exploding bombs, shells, or grenades.
- Liberated from planes as sprays.

They act after—

- Being inhaled by the victim.
- Coming in contact with the skin, eyes, or nose.

Types of Gases

I. Nonpersistent gases.

Prevention of injury.—(1) Masks. (2) Walk against the wind to get out of contaminated zone.

A. Tear gases or eye irritants—

Odor.—Like apple blossoms, or like sour fruit.

Effects.—Burning pain in the eyes; the eyes flood with tears; victim may be unable to open his eyes.

First aid.—Generally no treatment is necessary. Do not rub eyes. Do not apply bandage to eyes. In severe lasting cases irrigate the eyes

with a solution containing 2 level teaspoonsful of baking soda in half pint of warm water.

B. *Sneeze gases or nose irritants.*

Odor.—Slightly like coal smoke. May be yellowish, grayish cloud without odor.

Effects.—Aching pain in head, face, nose, throat, chest. Sneezing and coughing. Sometimes vomiting. Mental depression—may even attempt suicide. Effects severe but temporary.

First aid.—Flush nose and throat with weak solution of baking soda (sodium bicarbonate)—(2 level teaspoonsful to half pint of warm water), or breathe fumes of bleaching powder in a wide mouth jar. Reassure victims that symptoms are only temporary. Try to allay fear and avoid panic. Prevent suicide.

C. *Choking or lung damaging gases.*

Odor.—May smell like new cut hay or mouldy hay, pungent and disagreeable or may have sweetish odor.

Effects.—In low concentrations—brassy taste, headache. Effects delayed but serious. Soreness in lungs, coughing.

In higher concentrations—coughing, throat spasm, retching, tight feeling in chest, blueness of face, increased pulse and breathing rate. Victim may collapse during exercise without previous warning.

First aid.—*Absolute rest for 48 hours is essential even when no symptoms appear.* Keep victim lying down and transport on a stretcher. Do not permit him to walk to first aid post even though he may insist that he is able to do so. Keep him warm. Do not give artificial respiration in hope of relieving difficult breathing, as it may do serious damage. Hot

coffee or tea may be given. *The victim should not be permitted to smoke.*

D. *Systemic poisons.*

Odor.—Bitter almond, rotten eggs, garlic.

Effects.—Slight headache, loss of consciousness, convulsion, may stop breathing.

First aid.—Remove to fresh air, give artificial respiration if needed, treat for shock.

II. *Persistent gases (blister gases).*—Cling to clothing, plants, implements and other objects for long periods, and injury may result from contact with such contaminated surfaces.

Prevention.—(1) Masks. (2) Gas-proof clothing. (3) Avoid contaminated surfaces. (4) Decontamination (Persons injured with persistent types of gas must be decontaminated before they are mixed with other casualties). (5) Avoid low places such as basements.

Odor.—Like geraniums, then biting (Lewisite). Like garlic or horseradish (Mustard).

Effects.—Burning of eyes with acute inflammation. Itching, burning, and blistering of skin. Severe pain in chest and brassy cough if breathed, vomiting and pain in stomach and abdomen if swallowed. Extremely powerful, persistent, and dangerous. Onset of action may be delayed as much as 24 hours but treatment must be prompt to be effective.

First aid.—Act quickly. Degree of burning depends upon promptness of First Aid given. (1) All contaminated clothing must be removed before any treatment is given. Otherwise the burning will continue. Clothing removed should be placed to one side and sent for decontamination later. Fresh clothing should be supplied the victim. (2) Irrigate the eyes with 2 level tea-

spoonsful of baking soda in half pint of warm water. (3) Daub (don't rub) skin with cloths moistened in benzene, kerosene, alcohol or ether, or with straight gasoline (not ethyl) or carbon tetrachloride (pyrene).[3] Wash off with running water and soap. (4) Before the skin becomes red, bleaching powder (chlorinated lime) made into a cream paste with water will neutralize the gas if applied to the skin. It must be washed off in a few minutes. Bleaching powder should not be used after redness appears. (5) Great care must be used in handling the victim and his clothing to avoid injury to others. (6) Wear mask, protective clothing and gloves.

Incendiaries

Phosphorus shells or bombs.

Odor.—White smoke from phosphorus smells like matches.

Effects.—The smoke alone may give a mild prickling sensation but is harmless. However, when a phosphorus bomb explodes, particles of phosphorus may strike the skin and cause severe burns, which heal very slowly.

First aid.—The phosphorus particles must be removed before giving the usual care for burns since phosphorus continues to burn unless removed. Immerse the wound in hot water, which melts the phosphorus, so it may be wiped out with a gauze pad. Particles may be removed by squeezing as for a pimple. If cold water is used, the particles will not melt, and because phosphorus will re-ignite on exposure to air, they must be picked out under water. If available, copper sulphate solution (2 to 5 percent) may be applied;

[3] The fumes of many of these solvents are explosive, therefore avoid sparks, cigarettes, or flames during this procedure. Destroy used cloths or cleaning tissue by burying or burning in open air.

this coats the phosphorus with copper and stops burning. The particles can then be lifted out. After either method of removal treat as for an ordinary burn. (See p. 26.)

CHAPTER XII

MISCELLANEOUS CONDITIONS

Injury from Heat and Cold

Enemy attack may occur at any season of the year. Both victims and Civilian Defense workers may be exposed to rain, snow or freezing temperatures for hours on end. Firemen and Rescue Squads may be subjected to intense heat in their work. The hard manual labor they must perform in clothing which tends to hold heat increases the danger of injury. It is important that the Civilian Defense first aid worker be able to recognize injuries due to heat and cold so he can administer emergency treatment.

Heat Stroke (Sun Stroke)

It is not necessary that the individual be exposed to the sun's rays to develop heat stroke. Clothing which prevents the escape of heat (gas-proof clothing or firemen's coats and boots), excessive humidity, fatigue, particularly in the absence of a current of air, increase the danger of heat stroke.

Symptoms.—Headache, dizziness, nausea. The victim may appear flushed or may have a bluish color about the face and lips. He may be unconscious. The body temperature is elevated, the skin is hot and dry.

First aid.—For mild cases wrap the victim in a wet sheet and expose to cold drafts of air, as

from a fan. For more severe cases apply ice to the temples and the back of the neck. Place in a cool bath for 20 minutes, at the same time rubbing the limbs and trunk to stimulate circulation.

Heat Exhaustion (Prostration)

Heat exhaustion is a form of shock resulting from exposure to heat. It occurs more frequently when the humidity is high. It is a serious condition requiring prompt first aid treatment.

Symptoms.—The symptoms are those of shock: face pale, cold, clammy sweat, weak and rapid pulse, slow respiration.

Treatment.—The same as the treatment for shock. (See p. 27.) *Do not confuse this condition with heat or sun stroke.* The treatment is exactly opposite.

Heat Cramps

Persons exposed to intense heat or doing manual labor lose large amounts of salt in their perspiration. As the salt is depleted, muscular cramps may develop.

Symptoms.—Spasmodic cramps of the muscles of the abdomen and limbs.

First aid.—Prevention is more important than treatment. Men at hard work in high temperatures drink large amounts of water to replace the fluid lost in perspiration. The salt lost in the perspiration should be replaced by adding a good-sized pinch of table salt to each glass of water.

After the condition has developed, treatment consists of warm baths, rest, drinks to which salt has been added. If the cramps are severe or persist, a doctor should be called.

Frostbite

Frostbite is more likely to occur in damp and windy weather.

Symptoms.—There is tingling of the skin followed by numbness. As the part becomes numb it takes on a dead whiteness. At this stage the tissues are not actually lifeless, though they may soon become so, even in warm atmosphere. The skin may then appear reddened or purplish and it may crack. Very large blisters are ordinarily formed.

First aid.—Have the victim exercise the part if he can. Do not massage it. Allow the water temperature to rise slowly. To obtain the best results the thawing process should be drawn out for several hours. Do not break any blisters. Apply a sterile dressing to the part and take the person to a doctor.

Carbon Monoxide Poisoning

There is serious danger of carbon monoxide poisoning in modern warfare. Bombs exploding near a building or home may cause collapse or blocking of a chimney or flue so that carbon monoxide gas escapes into the house from the furnace. Illuminating gas has a high content of carbon monoxide and its escape through disrupted gas mains is a serious hazard. When a bomb explodes a large amount of carbon monoxide gas may result from incomplete combustion of the explosive.

The gas is odorless, colorless and tasteless. It may produce death even in low concentrations if breathed for some time. In high concentrations it may produce death in a few minutes. The body stores carbon monoxide. People doing manual labor breathe faster than those at rest and tend to be overcome more rapidly.

Carbon monoixde poisoning steals upon the

victim in such a way that he may be overcome by the gas without warning.

Symptoms.—The symptoms are numerous, the more pronounced being headache, yawning, giddiness, ringing in the ears, weariness and a fluttering or throbbing of the heart, which is a late symptom. If the victim gets into fresh air these symptoms usually pass off, often leaving a headache. If the victim remains in the presence of carbon monoxide gas his legs collapse under him, he may stagger and sink to the ground in a semiconscious or unconscious state.

First aid.—

1. Remove the victim to fresh air as quickly as possible.

2. If breathing has stopped, is weak and intermittent, or is present only in occasional gasps, start artificial respiration at once, using the prone pressure method. If oxygen is available it should be given while artificial respiration is administered.

3. Aid circulation by rubbing the limbs, keeping the victim warm with blankets and hot water bottles.

4. Keep the victim at rest, lying down to avoid any strain on the heart.

Inhalations of oxygen for 20 minutes, when given immediately, decrease the possibility of serious after-effects. Oxygen should be given to all victims if possible.

Unconsciousness

Anyone who is unconscious is in a serious condition and should have immediate medical attention. Before the doctor arrives there are certain things which those trained in first aid should do:

A. *Bleeding?*—If so, control the bleeding and dress the wound.

B. *Breathing?—"Blue unconsciousness."*—If not breathing, with a bluish or blotched face, start artificial respiration at once. Be sure there is no obstruction in the throat. Be careful of electric shock if the victim is found in contact with wires, plumbing or heating pipes or other conductors which may have become temporarily charged. Do not expose yourself to electric shock by careless handling of the victim. Be careful of carbon monoxide gas and do not become a victim yourself. Remember that persons not breathing become chilled very rapidly and must be kept warm during artificial respiration.

C. *"Red unconsciousness."*—Red face and strong pulse. Keep victim lying down, head slightly raised, cold applications to head, give no stimulants. Prevent chilling, and transport in lying position.

D. *"White unconsciousness."*—The same as shock. (See p. 27.)

PROBLEMS

1. A man is found near a dangerous wall. His trousers are saturated with blood. His life is in danger both from severe hemorrhage and from the wall, which might collapse at any moment. There is a wound of the thigh.

2. A fireman has slipped down a ladder and has a long splinter in his leg. He wants to walk to the first aid post.

3. A casualty is found in a partially wrecked basement. She is in great pain. Her thigh and foot are turned outward. To bring her to the first aid post she must be taken up a narrow winding flight of stairs.

4. A man is found lying in the street. His foot has been blown off at the ankle. He is bleeding from the wound profusely.

5. A man is struck on the hand by flying debris. There is a fracture of the wrist and profuse bleeding from the palm of the hand.

6. A woman is struck by some flying glass. She is bleeding profusely from a point just above the wrist.

7. A man is struck on the arm by flying masonry. There is pain at the site of the injury but no blood. The victim cannot move his arm.

8. A casualty is wandering around with a severe wound of the head. He assures you he feels all right and some friends have volunteered to take him home.

9. A man is found unconscious beside some fallen masonry. Blood stained material is draining from his ear.

10. Some debris falls on a man's back while he is standing beside a building. He admits some discomfort but insists he will soon be all right. He says he can stand and wants to go home. Examination reveals nothing to account for his discomfort.

11. A girl tells you debris fell across her abdomen. Examination reveals no wound. She is cold, pale, and restless, has sighing breathing and is inclined to yawn. Her pulse is weak and rapid. Her lips are bright red.

12. A man has touched a live wire and is unable to let go. He is not breathing.

13. An exploding boiler has scalded a man from head to foot. He is in great pain. Onlookers are urging you to do something quickly and are offering advice.

14. A middle-aged man has a small wound in the region of the hip joint. The wound has blackened edges and has evidently been made by a bomb fragment. He is too deeply shocked to speak. He has his hands clutched across his abdomen as if he had great pain in that region.

15. A man lies motionless. You cannot feel his pulse or detect breathing. The body is cold and the eyes are opened and staring. There is a wound on the back of the head which has stopped bleeding.

16. A woman complains loudly that she has been seriously injured and is in great pain. Examination reveals only a few slight bruises.

17. A rescue squad has removed a man from fallen debris. His chest was severely crushed. He is bleeding slightly from the mouth. He appeals for water and a cigarette.

18. A fireman complains of weakness and nausea. His face is flushed; his skin feels hot and dry.

19. A member of a rescue squad is removed from a basement where he has been working. He is unconscious and is not breathing. Those who removed him tell you there was an odor of illuminating gas in the basement.

20. A man suffering from severe hemorrhage from the leg was found in a concentration of blister gas. He is not wearing a gas mask.

21. A man who has been near a concentration of mustard gas says he felt some splashes about half an hour before. He complains of no discomfort.

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