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PRACTICAL FIRST AID

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FIRST-AID

I come as a soothing angel. I am the initial step in relieving Mankind's suffering caused by accidental misfortune. A few years since few but men of science could practice my art; now many know and love me.

Governments, corporations, organizations, individuals are among the well wishers of and conjointly work for my advancement. In the hot mills, in the remote workings of the mines, in all places of industry at this time am I a necessity.

I am the fruit of the power to awaken pity, to desire to be helpful, to inculcate in each the feeling of brotherly devotion.

Throughout the land men unselfishly consecrate a portion of their time that I may exist, and by my conjuration dispel the lines of class and spread o'er mankind the mantel of faith and affection.

I encourage the thought of community feeling—the bond of common interest. It is my province to establish belief that men should aid men and that my brother's welfare is my welfare.

I am an incentive to higher ideals, to more advanced education. To future generations shall I be taught in all schools, that the young will know my value.

Though I am mighty and far-reaching, yet some are greater than I. Before first-aid should come care, the exercise of which means self-preservation, and until all men assimilate this truth I will be a necessity.

—BY C. P. SHOCKLEY IN "COAL AGE."

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PREFACE

This circular is intended to serve as a guide, which is to be augmented by actual training, demonstration and practice, to those who desire first-aid training, especially to men who need the training in order to enter the service of their country, to miners and industrial workers.

Only a brief discussion of anatomy and physiology is presented and if further information is desired it is suggested that the reader consult other books pertaining to the subject.

The form used in this bulletin is different from the ordinary form used but from a practical standpoint the author has found that it is the most useful.

The purpose of the author has been not to write a text-book on first-aid, but merely to outline the subject, and it is hoped that it may prove suggestive and helpful.

Books consulted:

American Red Cross Text-book—Miner's Edition.

Morrow—Immediate Care of the Injured.

British Red Cross Society.

United States Bureau of Mines' Circulars Nos. 23 and 8.

FIRST-AID INSTRUCTIONS

CHAPTER I.

INTRODUCTION

Among the effective agencies in saving life and in minimizing suffering from accidents, first-aid occupies an important and well-recognized place.

While the fatal and non-fatal accidents have somewhat decreased of recent years, the rates for both are still high. The experience of a large number of organizations which have done good safety work has demonstrated beyond a doubt that in the ordinary industry 75% of the deaths and serious injuries can be eliminated. The experience of

these organizations has also demonstrated that not more than one-third of the reductions which they have been able to accomplish has been accomplished by the use of mechanical guards; two-thirds has been accomplished by reaching the workmen and really interesting them by giving them an active part in the work of safety, and to this might be added with equal truth: by the proper treatment from the moment of injury in order to prevent bad results therefrom.

The following is a list of some of the companies which have made substantial reductions:

Eastman Kodak Co.....	73%
Harrison Bros. & Co., Inc.....	68%
Illinois Steel Co.....	70%
International Harvester Co.....	68%
Jones & Laughlin Steel Co.....	71%
Packard Motor Car Co.....	67%
The Pullman Co.....	70%

In 1916 the reduction of accidents has been greater than in any other year.

WHAT FIRST-AID IS

Knowledge of first-aid to the injured is a very valuable and a very cheap form of insurance but, owing to the misconception of true first-aid and to the complicated systems which have been introduced, many men who might otherwise render efficient first-aid service have become scared at the complicated array of equipments, rules, regulations and instructions, and in consequence do nothing. Others, who have acquired a little but dangerous knowledge, overdo the matter and become involved in the whole realm of diagnosis, treatment, therapeutics, medicine and surgery.

First aid to the injured from the viewpoint of the industrial worker has been aptly described as a bridge between the accident and medical or surgical assistance, and this bridge should always be kept in mind when speaking of first-aid or when applying it. Over this bridge the injured person is to be carried from the place of injury to a place of treatment, and once the bridge is crossed and the injured man is placed in the hands of a medical attendant or in the hospital, first-aid is at an end. *Thus we see that the true office of first-aid is to relieve the injured person from immediate suffering and to prevent further injury.* First aid to the injured must be learned, however, like every other subject and no one will know what to do for the ill or injured

unless he has studied it. But all that is necessary for good results is that the student have common sense and devote the small amount of time required for acquiring the special knowledge and skill.

GENERAL DIRECTIONS FOR GIVING FIRST-AID

Accidents usually occur in places far away from a doctor and death may occur from bleeding and shock; simple fractures may be converted into compound by ignorant handling; wounds may become infected; and all can be benefited by first-aid methods.

If no doctor is present when an accident occurs someone must take charge of things and the duty naturally falls on the first-aider, and in justice to the injured person and to himself interference by other people should not be allowed. The only people who should be near an injured person are those required to help. He needs all the air he can get and a crowd about him will use air that he should have.

Be calm and observant.

Know what you are doing—then do it.

Take command and give orders.

Look the injured person over carefully—find out how badly he is injured and then proceed with the work.

Don't attempt unnecessary movements.

See that the injured part is in position as nearly normal as possible, except in a compound fracture and dislocation of the hips and shoulder.

Don't wait for a doctor as delay is serious. Patient may bleed to death.

It is quite as necessary to know what not to do as well as what to do, and in the course of instruction the dangerous practices will be pointed out to you.

Loosen tight clothing—neck and waist.

Put the patient in a safe and comfortable position. The best position is on the back with the head lower than the rest of the body, unless the person is suffering from injury to the head or has a flushed face.

In case the injured person wishes to vomit turn the head to one side.

For splints, stretchers, padding, etc., use what you can find on the spot.

Don't give an unconscious person liquid by mouth.

Don't give alcohol in any form unless it is the only stimulant available, use aromatic spirits of ammonia.

The injury must be seen before one can treat it—remove the clothing carefully.

Cheer your patient and keep him warm.

SUFFOCATION AND ARTIFICIAL RESPIRATION

Suffocation is caused by electric shock, hanging, drowning and gas, or by anything which will block the air passage way, but whatever the remote cause, the immediate cause is always the interference with the supply of good air to the lungs and the escape of bad air from the lungs.

A knowledge of the respiratory system is necessary in order to understand better the need for artificial respiration.

THE RESPIRATORY SYSTEM

The essential part of respiration (breathing) is the exchange of the carbonic-acid gas in the blood for the oxygen in the air, which takes place in the lungs. The respiratory apparatus consists of the nose, pharynx, trachea (windpipe), bronchial tubes, lungs, and diaphragm.

The nose is not only an organ of respiration, but also of the sense of smell. Through the nose the air is warmed and moistened; the olfactory nerve (nerve of smell) protects the lungs to some extent from the inhalation of harmful gases. Never breathe through the mouth.

The pharynx, which is also a part of the alimentary tract, is a conical sac forming the throat or back of the mouth. It is composed of muscles and membranes. It is about $4\frac{1}{2}$ inches long and is lined with mucous membrane, which is continuous with that of the nose and throat.

Extending from the lower part of the pharynx are the openings of the esophagus (gullet) and the larynx (voice box), the former lying behind, the latter in front. The larynx forms a part of the respiratory apparatus, but has also a more special function of being the principal organ of speech.

The trachea or windpipe is a cylindrical tube about $4\frac{1}{2}$ inches long extending from the larynx down the front of the neck into the thorax, where it divides into the bronchial tubes.

The bronchial tubes divide into a great number of small branches, which in turn divide into still smaller branches, and finally terminate in numberless small dilated cavities or pouches, known as air cells.

These air cells in turn form lobules, which together make up lobes that form the lungs.

The lungs are two large, slate-colored, cone-shaped, membranous sacs composed of a soft, spongy, and very elastic tissue. The interior of the sacs communicates freely with the outside air through the bronchial tubes, trachea, etc., whereas the outside of the sacs is protected from atmospheric pressure by the walls of the chest. The atmospheric pressure on the inside of the lungs expands them until they fill the entire thoracic cavity. If the wall of the thorax is opened so as to make communication with the outside air, or if the wall of the lung is pierced so that the air can communicate with the pulmonary cavity, then at once the lung shrinks or collapses, because the pressure is equalized in the outside and inside of the sacs. The lung substance is composed chiefly of air cells. The walls of the air cells consist of very thin layers of epithelial cells surrounded by wide, thin-walled pulmonary capillaries. By this arrangement only a very delicate membrane is interposed between the air on the one side and the blood on the other, so that gases are readily exchanged between the two. The venous blood from the system is brought to the capillaries of the lungs. The air cells receive the carbonic-acid gas and waste matter with which the blood is laden. A new supply of oxygen is taken up by the red blood cells. In this manner the change from the venous to arterial blood is effected in the lungs.

The diaphragm is the large muscular partition which completely separates the thorax from the abdomen; by its descent and ascent the capacity of the chest is increased and diminished alternately.

Respiration or breathing is an involuntary act and occurs in health 18 to 22 times per minute. It is the method by which oxygen is taken into the body and carbonic-acid gas is expelled. If the body is to properly perform its function and life to continue, oxygen must be constantly supplied. Continued breathing of stuffy or stale air impairs the vitality and renders one susceptible to disease. Air low in oxygen or containing more than 0.04 per cent of carbonic-acid gas is unfit for breathing. The prolonged breathing of such air will produce a condition of asphyxia and finally death. To insure good health it is estimated that a person requires at least 1,000 cubic feet of air space, and the air breathed should be frequently renewed by proper ventilation.

From what has been said it is easy to understand that the nose and mouth and the windpipe are simply a passage way for the air going to and coming from the lungs. Naturally anything which blocks this

air in its course will interfere with the supply of air to the lungs, and complete blockage will result in early death from suffocation or asphyxiation.

A special nerve center in the brain governs breathing just as other similar nerve centers govern other actions of the body. Paralysis of this nerve center will stop the breathing as effectively and completely as blocking the passage of the air to the lungs.

Symptoms of Suffocation: At first the face, lips, tongue and nails get blue, while at the same time the suffocated person struggles and gasps for breath. Eyes show suffering and are staring. Later the struggle for air becomes greater, with all the symptoms intensified, and the last stage is complete unconsciousness with stoppage of the breathing and the skin of the whole body turned blue. The last stage is usually the only one seen.

ARTIFICIAL RESPIRATION

One who is suffocated cannot get good air into his lungs and the bad air out, but fortunately we can do this for him by certain movements imitating breathing and this consists of alternate movements which diminish the size of the chest, and then by relieving pressure permit it to regain its original size, and this is what is known as artificial respiration.

There are two general methods of artificial respiration, the Schafer and the Sylvester. The former is to be recommended because:

1. A greater amount of air can be gotten into the lungs.
2. It is not necessary to hold the tongue out.
3. One can perform it for a longer time.



Fig. 1.

4. No danger attends the practice.

Schafer Method: Rapidly feel with the finger in the patient's mouth and throat and remove any foreign body (tobacco, false teeth or chewing gum); then begin artificial respiration at once. Proceed as follows:

Lay the subject on his face with arms extended as straight forward as possible, or one arm may be bent so that the forehead rests upon it, and with the face to one side so that the nose and mouth are free for breathing. Let an assistant draw forward the subject's tongue, and place a pad under his chest. (Fig. 1.)

Kneel straddling the subject's thighs and facing his head; rest the palms of your hand on the loins (on the muscles of the small of the back), with the fingers spread over the lowest ribs, the little finger being on the last rib, or the width of two fingers from the hip bone.

With arms held straight, fingers forward, slowly swing forward so that the weight of your body is gradually and without violence brought to bear upon the subject. This act should take two to three seconds. Then immediately swing backward so as to remove the pressure, returning to the original position. Repeat regularly 12 to 15 times per minute the swinging forward and backward, completing a respiration in four or five seconds.

As soon as this artificial respiration has been started and while it is being conducted an assistant should loosen any tight clothing about the subject's neck, chest or waist. Continue the artificial respiration without interruption until natural breathing is restored (if necessary three hours or longer) or until a physician arrives. If natural breathing stops after having been restored, use artificial respiration again.

Do not put any liquid in the patient's mouth until he is fully conscious.

Give the patient fresh air, and keep him warm.

Send for the nearest doctor as soon as the accident is discovered.

Sylvester Method: Place the patient on his back, fold a blanket or coat, and put it under his shoulders so as to throw the chest forward.

Press open his mouth, grasp his tongue, draw it forward, and let an assistant hold it or tie it out with a gauze bandage or a shoestring, or tear a handkerchief into strips and tie them together, thus making a string, or use a rubber band, spring clothes-peg, or an American Red Cross tourniquet. In an emergency, the tongue can be held forward with a safety pin or a nail.

After getting the tongue out, kneel by the patient's head, grasp

both arms just below the elbows, and draw them upward and backward toward you as far as they will go.

(Fig. 2.)

This action allows air to enter the lungs, producing inspiration. Then raise the arms and bring them inward and downward to the chest, applying pressure sufficient to expel the air, thus producing expiration. These

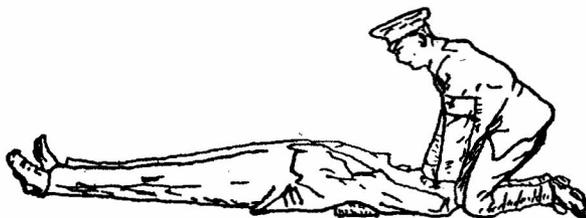


Fig. 2.

movements should be performed at the rate of 16 or 18 times per minute.

This method can be performed more advantageously by two or three men than by one.

Whatever the method of artificial respiration used, it should be kept up for at least three hours.

The further treatment is as follows:

Ammonia ampoules or ammonia on a handkerchief put under, but not on, the nose.

Feed oxygen if possible.

Keep the patient warm.

As soon as the patient begins to breathe, but not before, his limbs should be rubbed toward the heart. This will help restore circulation. The patient should then be put to bed and kept warm by the use of blankets and hot water bottles.

Open all windows in order to supply plenty of air.

Give stimulant as soon as the patient can swallow and retain it.

WARNING: Watch the patient constantly—respiration may cease and it is then necessary to continue with artificial respiration.

Do not wait for a mechanical device.

Never give artificial respiration, unless respiration is entirely suspended.

ELECTRIC SHOCK

Electric shock may paralyze the nerves by which the muscles of the respiratory organs are controlled, or it may do the same to the heart. When the heart is affected it ceases to contract as a whole but contracts in parts, and apparently quivers or fibrillates. The action is so weak and ineffectual that it fails to keep the blood circulating, and death is the result. After such quivering has commenced, no process yet discovered will restore the heart to normal action.

Alternating currents of high frequency increase the number of beats, so that fibrillation does not occur. The higher the frequency of the current, the greater the volume which can be delivered to the tissues without fatal results.

These two: respiratory paralysis and fibrillary contraction, are the chief causes from electric shock. Since the first cannot be cured, the hope of resuscitation lies wholly in proper treatment for paralyzed respiration.

Cerebral anemia (lack of red corpuscles) must be overcome within ten minutes, or if the lungs are deprived of oxygen for ten minutes, death ensues.

From this one can see why it is imperative that no time should be lost in commencing artificial respiration.

Symptoms of electric shock are the same as in suffocation. The patient may be burned also.

Treatment:

1. Rescue. Any of the following may be resorted to, if the patient is lying on the wire.
 - a. Shut off the current.
 - b. The rescuer must insulate himself by covering his hands with rubber, dry cloth, a good pair of clean, dry gloves, or silk, or by standing on something dry, such as a dry board, dry paper, or by using rubber boots. Then he can grasp the patient and lift him away from the wire.
 - c. Take a pick with a dry handle, pass the point through the patient's clothing and pull him from the wire with one motion.
 - d. Take an axe with a dry handle and cut the wire.

- e. Pass a dry cloth under the patient and pull him from the wire.
- f. Short circuit the current by *dropping* a bar, which is long enough to reach from the wire to the ground, on the wire.

If the wire is lying on the patient it can be flipped off by using a piece of dry board, or a shovel with a dry handle. In rescue work always use *dry* material as water is a good conductor of electricity.

How to Treat: As was previously stated some cases are hopeless from the beginning. It is impossible to tell this at first, therefore, an attempt should always be made to save the life of a patient by prompt treatment. The treatment is artificial respiration.

Burns from electricity should be treated as in other burns.

Lightning, or electrical shock should be treated as in electric shock.

DROWNING

Rescue the patient.

Get the water out of lungs and stomach.

Give artificial respiration.

There is very little water in the lungs, probably only two or three teaspoonsful, but there may be a considerable amount in the stomach. The water may be removed by:

Rolling the patient over a barrel, or,

Have someone get on their hands and knees to use in place of a barrel, or,

Place the patient on his face, clasp the hands around the waist, raise him by the middle and hold him up for a few seconds in order that water may drain from the stomach and lungs. Don't waste time before giving artificial respiration. Use the Schafer method and, if possible, place the patient on a slight incline with the head down. This allows the water to run out.

HANGING

Hanging is a common means of suicide, and as the rope cuts off air to and from the lungs, suffocation is the result.

Treatment: Cut down, and give artificial respiration.

GAS POISONING

In simple asphyxiation the nervous control of the muscles of respiration is temporarily paralyzed, while the heart continues to pump blood through the body. But this blood is not oxygenated by respiratory action and the heart soon ceases to beat effectively and the victim dies from asphyxia. There is no poisoning of the blood, and ordinarily air is all the lungs need, and artificial respiration when applied properly will supply it. If the victim is overcome by CO (carbon monoxide) oxygen should be used.

The affinity of the blood for CO is 250 times as great as it is for oxygen, and the blood of a victim who has been exposed to CO gradually becomes so saturated with gas that it cannot readily absorb, and cannot, therefore, convey oxygen, so the victim dies of asphyxia.

Symptoms: Are those of suffocation, but those only slightly affected may experience headache, dizziness, sick at the stomach and vomiting, weak, very sleepy, fast pulse and rapid breathing.

Treatment: Rescue the victim and take him to fresh air. The treatment is artificial respiration.

If the victim is slightly affected, artificial respiration is unnecessary, but give hydrogen peroxide, baking soda (teaspoonful in half a glass of water), beer or effervescing phosphate of soda (two teaspoonfuls in half glass of water), which will cause eructations (belching) and settle the stomach.

Give aromatic spirits of ammonia.

If a person in this stage is fairly strong he should be walked around.

HOW TO CARRY THE INJURED

All the aid which an injured person may have received from a first-aid man can be undone by unnecessary and ignorant handling. It must be remembered that your work is usually half performed after giving first-aid treatment. Accidents generally happen in places from which it is absolutely necessary to carry the injured, and unless first-aid men understand and practice the methods of transportation, very serious harm may result.

The kind of transportation will depend entirely upon the character of the injury. All serious cases should be carried on stretchers whenever it is possible, either on a ready made or an improvised one.

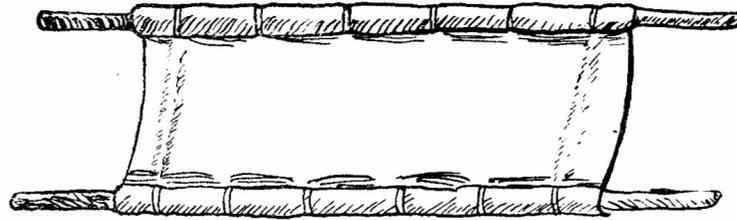
Improvised stretchers may be made as follows:

1. *Jumper Stretcher.* For this three jumpers and two 7-foot poles or drills are needed. Put the jumpers on, button the three lower buttons and unbutton the sleeves. One man assumes a stooping position, grasps the end of the poles or drills and another will "skin" the jumper onto the poles. Do this with three jumpers and you have a substantial stretcher. (Fig 3 C.)

2. Take three gunny sacks, cut holes in each corner and place on the drills or poles.

3. Take an ordinary blanket, place one pole about 1 foot past the center and fold over the short side. Place the other pole about 22 inches from the first one and fold over the long side. The same can be done with brattice cloth or canvas. (Fig. 3 B.)

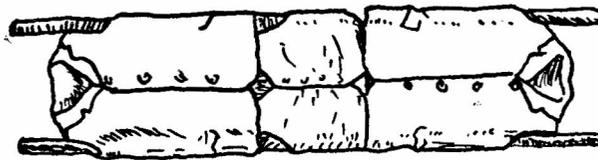
Fig. 3



A



B



C

4. Place two poles on each side of a blanket, or a piece of cloth about the same size, and roll the poles in the cloth until the unrolled part is about 22 inches wide, and tie in three or four places along the poles. (Fig. 3 A.)

For long transport it may be necessary to tie on two pieces of wood for cross-pieces, so as to prevent the poles from approaching each other when the weight of the patient is put on the stretcher.

Doors, boards, window-shutters, ladders, bed frames, mattresses, rugs and chairs are easily procured and may be utilized as stretchers.

Whatever the type of stretcher used greatest care should be exercised in transferring the patient to it, and unless he is subjected to unnecessary suffering all his bearers must work together. A pillow should be used to support the head unless the patient is suffering from shock.

STRETCHER DRILL

Each Stretcher Squad Consists of Four Men.

OBTAINING, OPENING, CLOSING, AND RETURNING THE STRETCHER

The necessary commands for executing these movements will be given and the movements described, but as none of them has anything to do with actual carrying of the patient, and, therefore, does not demand that bearers work together at the word of command, their study and practice may well be omitted if the following plan is adopted. First, each member of the squad must be given a number from 1 to 4. Any member of the squad is sent by No. 1, the leader, to get the stretcher, to bring it to the patient, to open it, and to place it at the patient's head in line with his body. Then at the command, *At Patient's Right (or Left); Pos's*, all bearers take position as in movement 15, give first-aid and proceed as described. Following the same plan as soon as the patient has finally been carried to his destination and the stretcher is no longer required, any member of the squad may be directed to close it and to dispose of it as desired.

1. *Fall In.* The four men form in line and count off, beginning with No. 1 at the right. No. 1 commands the squad and gives the orders. In his absence No. 4 takes command; if Nos. 1 and 4 are both absent the duty falls on No. 3.

2. *Procure Stretcher; March.* No. 3 steps one pace to the front and, facing in the direction of the stretcher, proceeds thither by the shortest route, takes the stretcher and places it on his right shoulder. He then returns to his place in line. The order, of course, is given by No. 1.

It should be noted that most orders are in two parts. The former as in this case, "Procure Stretcher," tells what is to be done. The latter, here "March," is the command of execution. Then, and not until this is given, does the movement begin.

3. *Carry; Stretcher.* No. 3 drops the upper handles forward; No. 2 steps forward and catches the front handles with his left hand; Nos. 1 and 4 advance to the middle of the stretcher, to the right and left, respectively; Nos. 2 and 3 hold the stretcher between the hand and the hip, grasping the lower handles.

4. *Open; Stretcher.* Nos. 2 and 3 open the stretcher and stretch the braces, then lowering it to the ground, Nos. 1 and 4 take positions opposite the center of the stretcher at the right and left, respectively. No. 3 is between the handles at the rear and No. 2 at the front.

5. *Close; Stretcher.* The movements are reversed and the position of "Carry Stretcher" is taken.

6. *Shoulder; Stretcher.* This movement is made from "Carry; Stretcher." At "Shoulder" No. 3 places his left hand under the stretcher. At "Stretcher" No. 3 puts the stretcher on his right shoulder, No. 2 helping by jerking the front end upward. All take their positions, Nos. 1, 2 and 4 stepping back in line with No. 3.

7. *Return Stretcher; March.* No. 3, with the stretcher on his shoulders, marches to the place where the stretcher is to be left and returns to his place in line.

8. *Fall Out.* The squad is broken up.

MARCHING WITH THE STRETCHER

9. *Forward; March.* The bearers all march straight to the front, Nos. 1 and 4 keeping their positions at the sides of the stretcher. All step off with the left foot if the stretcher is at "Carry." If the stretcher is "Open," with or without a patient, No. 3 steps off with his right foot.

10. *Incline to the Right (or Left); March.*

A slight change of direction to the right or left as the command requires.

11. *Stretcher Right or Left; March.*

A change in direction at a right angle to the previous line of march is made.

12. *Stretcher Right (or Left) About; March.*

The change of direction is total instead of half as in 11.

13. *Take Posts to Load Stretcher; March.* Nos. 1 and 4 run ahead and take positions at the patient's right and left sides, respectively, examine the patient and give him first-aid treatment; Nos.

2 and 3 follow with the stretcher. This movement may be made from a halt but is usually performed in march.

14. *Lower; Stretcher.* Nos. 2 and 3 lower the stretcher one yard from the patient's head and in line with his body. This command is given by No. 3. If the stretcher is not open before giving the command, "Lower; Stretcher," No. 3 commands "Open; Stretcher."

THE LOADED STRETCHER

15. *At Patient's Right (or Left); Posts.* Nos. 2 and 3 take posts at patient's right (or left) ankles and shoulders, respectively, with No. 1 always at the right hip and No. 4 at the left hip. They then assist Nos. 1 and 4 in first-aid work. When the patient is ready for the stretcher, the next command given by No. 1 is:

16. *Prepare to Lift.* All bearers kneel on the knee nearest the patient's feet, right for his right, and left for his left; No. 2 passing both his arms under the patient's legs; Nos. 1 and 4 passing their arms under his loins and thighs; No. 3 passing one arm under his shoulders, and the other under his neck to the further shoulder, thus supporting the head. In case of a fracture, the bearer nearest to it supports the part and looks after it.

17. *Lift; Patient.* All lift together and raise the patient slowly and gently to the knees of the three bearers who are in line; then the odd bearer, No. 1 or 4, rises and passing by the shortest route to the stretcher, grasps it by the middle, one pole in each hand, and places it in front of the bearers and against their ankles.

18. *Lower; Patient.* No. 1 or 4 stoops and assists the other bearers to lower the patient gently to the stretcher and then all resume their respective posts.

As patients are usually carried feet first, No. 2 will take post at the foot end of the stretcher and No. 3 at the head end between the poles. No. 1 is opposite the right hip and No. 4 opposite the left hip.

19. *To Carry Head First; March.* This command is necessary when for some good reason the patient is to be carried head first. All take the same positions, but face about. This will still leave No. 1 at the patient's right hip, No. 4 at the left hip, No. 2 at the feet and No. 3 at the head, but the positions of all in reference to the marching stretcher will, of course, be reversed. This command is best given as soon as the bearers have taken their posts.

20. *Prepare to Lift; Lift.* At "Prepare to Lift," Nos. 2 and 3 stoop, place the slings over their shoulders—if the stretcher has slings—grasp the handles and at the word lift they rise and stand erect.

21. *Forward; March.* With the loaded stretcher the bearers march with a short, sliding step of about 20 inches; Nos. 1, 2 and 4 step off with the left foot and No. 3 with his right, forming a "break step." The patient, as stated, is usually carried feet first. For change in direction see 10, 11 and 12.

22. *Halt; Lower Stretcher.* Nos. 2 and 3 lower the stretcher gently to the ground. When lowering or lifting a stretcher, the rear bearer must always watch the front bearer and move simultaneously with him.

23. *At Patient's Right (or Left); Posts.* At the command "Posts," positions are taken in 15.

UNLOADING THE STRETCHER

24. *Prepare to Lift.* The bearers standing at their respective posts, kneel and adjust their hands as in lifting to load the stretcher.

25. *Lift; Patient.* The bearers lift the patient to their knees and No. 1 removes the stretcher.

26. *Lower; Patient.* Nos. 2, 3 and 4 or 1, lower him to the ground, or if he is to be put on a bed, they rise from their knees and side-step to the bed, the stretcher having been placed one yard away and in line with the bed, with the head of the patient toward the bed.

When there are only three bearers, the patient is lifted or lowered to the knees of two, while the third places or removes the stretcher; or he may be carried on a two-handed seat, his legs being supported by the third bearer.

TO CROSS AN OBSTACLE

Halt and lower the stretcher about 3 feet back from the obstacle.

27. *To Cross Obstacle; March.* No. 1 at the right and No. 2 at the left grasp the right and left poles of the stretcher, respectively, at the forward end, while Nos. 3 and 4 do the same thing at the rear end.

28. *Prepare to Lift; Lift.* At "Lift," all lift the stretcher and move forward to rest the front end on the obstacle. No. 2 climbs over the obstacle and receives the stretcher as it is passed to him; Nos. 1 and 4 then climb over and again taking the stretcher poles pass it entirely over the obstacle and lower it to the ground. No. 3, who has been holding the head of the stretcher, now climbs over, they all resume their former positions and proceed, the proper command being given.

Transportation across a ditch is effected by Nos. 1 and 4 bestriding the ditch in a narrow place, or descending into the ditch to support the stretcher. If the ditch is deep and wide, the stretcher must be

halted and lowered with the handles near the edge; then Nos. 1 and 4 descend and proceed as before.

TO LOAD AN AMBULANCE OR WAGON

Carry the stretcher to within one yard of the rear of the ambulance, about march, halt, and lower the stretcher to the ground; Nos. 1 and 3 take positions at the patient's left and right shoulders, respectively. At the command *Prepare to Load*, No. 2 faces about and stooping, grasps his handles, and Nos. 1 and 3 the poles on their respective sides. No. 4 opens the doors and sees that everything is in proper condition.

At the command *Load*, the bearers lift the stretcher to the height of the ambulance floor and advance, keeping the stretcher level. The legs of the stretcher are placed on the ambulance floor by Nos. 1 and 3, the stretcher is pushed in by No. 2 assisted by the others.

Whenever it is possible all the bearers should accompany the ambulance, Nos. 1 and 3 occupying the seats inside, No. 2 inside at the patient's head, and No. 4 standing on the footboard outside.

TO UNLOAD AN AMBULANCE OR WAGON

At the command *Prepare to Unload*, No. 4 opens the doors, if necessary, No. 2 grasps the handles of the stretcher and at the command *Unload*, draws out the stretcher, assisted by Nos. 1 and 3 who, facing inward, support the poles until the inner handles are reached. The stretcher must be kept level and lowered about a yard from the vehicle. Then No. 4 closes the doors and all take their posts at the stretcher.

GENERAL DIRECTIONS

The loaded stretcher should never be lifted or lowered without orders.

Never carry a stretcher on your shoulders.

Always carry a patient feet forward except:

1. When going uphill with a patient whose lower limbs are not injured.
2. When going downhill with a patient whose lower limbs are injured.

In such cases carry headforemost. Keep the stretcher as level as possible.

TRANSPORTATION WITHOUT A STRETCHER

One Man Carry. Place the victim on his back, fold his arms and tie with two triangular bandages. Kneel straddling the patient, pass your head under the victim's arms, then stand erect. The victim will be "hanging" on your neck with his face to yours. Place the patient's back against a prop, a building, or another person, and this will aid

the bearer to get his back to the victim's face. Then, with your back to the patient, stoop, grasp his thighs, and bring him well up on the back. (Pick-a-back.) This method is very useful when it is necessary to drag a patient, to rescue a patient from a low place, or to carry a patient up or down a ladder.

Fig. 4.



In lowering a patient the motions are reversed.

2. Place the patient on his back with his right arm at a right angle to his body; lie down beside him on the right with your feet toward the victim's head; place the hip in his arm-pit; grasp his left wrist with your right hand. The bearer then rolls over, pulling the victim with him. Rise to the knee, always keeping hold of his hand. With your left spread his legs apart; clasp the thigh with the arm passed between the legs, your left seizing the victim's right wrist. Stand on the right foot, place the right elbow on the right knee and stand erect. Reverse the holds for the opposite side. (Fig. 4.)

Two Man Carry. If the patient has not lost consciousness and can use his arms the four-handed seat can be used.

To form it two men grasp each his left wrist with his right hand, and with his left hand grasps his fellow's wrist; the patient then throws his arms over the bearers' shoulders. (Fig. 5.)

2. Take two blankets, roll, fold or twist into a cylindrical form. Tie the ends together. Put one knot on the right shoulder of the right bearer, and the other on the left shoulder of the left bearer. Place the patient in a sitting position on the loops and hold the patient with your right and left arms.

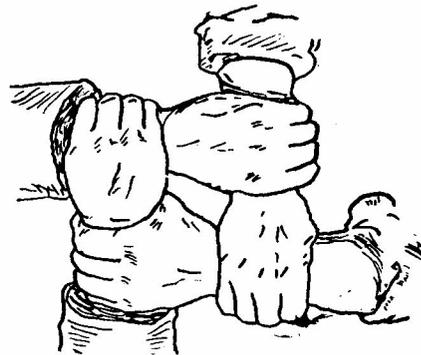


Fig. 5.

CHAPTER II.

In order to give first-aid intelligently, it is necessary to know a few facts concerning the structure and uses of the various parts of the body.

BODY

The body is composed of soft and hard parts. The muscles and internal organs are the soft parts and the bones are the hard parts. The bones together make up the skeleton.

The skeleton (Fig. 6) :

1. Forms a strong and rigid framework for the body.
2. Protects vital organs from injury.
3. Supports and carries the soft parts.
4. Forms joints so that movements are possible.
5. Gives attachment to muscles.

The skeleton is divided into three parts:

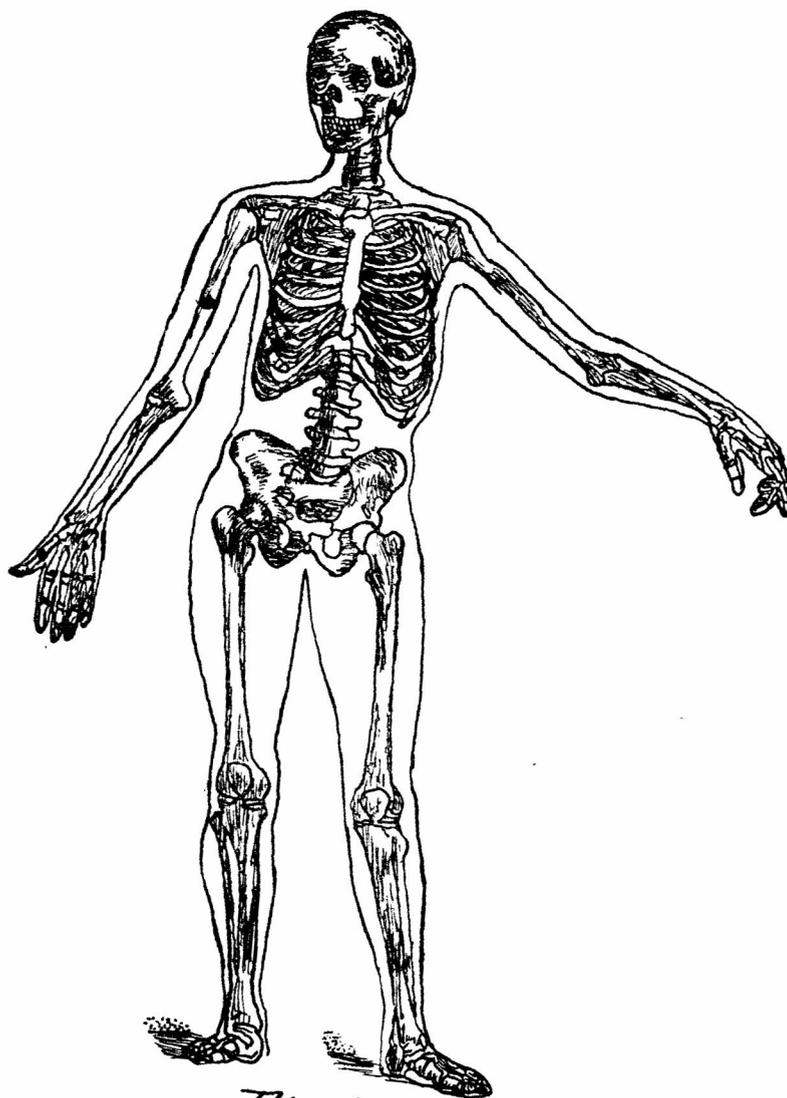
1. The head, which contains eight bones, is made up of the cranium, a bony case which encloses and protects the brain, and the face, containing fourteen bones, with the ears, eyes, nose and mouth. The only movable bone in the head is the lower jaw.

2. The trunk includes that part of the body between the head and the lower extremities and is divided into two parts by the diaphragm. The upper part is the chest, formed by the breast bone and ribs in front and the upper part of the spine behind. It contains the lungs, heart, gullet and some of the large blood vessels. The lower part is the abdomen and it contains the stomach, kidneys, liver, bladder, intestines and other organs.

The trunk is formed of several bones:

- a. The *spinal column*, which is ordinarily termed the spine, is made up of 33 bones called vertebrae with cartilage between them. This arrangement enables a person to bend easily and assume a different position without injuring the spinal cord, which is enclosed in the spinal column and is a continuation of the brain. The spine supports the head and the ribs, and itself is supported on the pelvis.

- b. The *ribs*, 24 in number, 12 on each side, form the greater part of the walls of the chest and are connected to the spine behind. The first seven are connected to the breast bone in front, the next three are connected by cartilage to the seventh rib, and the last two are not connected in front, and are known as the floating ribs.

*Fig. 6.*

c. The *breastbone*, which forms the front of the chest, is flat. Above, it forms joints with the collarbones.

d. The *pelvis*, which is composed of 4 bones, is a wide bony basin formed of the haunch bones. It supports the trunk and forms joints with the lower limbs.

3. Upper and lower extremities.

Each upper limb is made up of the shoulder blade, a flat triangular bone at the back of the shoulder; the collarbone, a curved, long, slim bone placed across the upper part of the chest above the right rib; the humerus, the bone of the upper arm; the radius and ulna, the bones of the fore arm; and the hand which has eight small bones in the wrist, five bones in the hand itself and fourteen bones in the fingers and thumbs, making thirty in each arm.

Each lower limb is made up of the femur or thighbone; the kneecap; the tibia and fibula, the two leg bones and the foot. The foot contains twenty-six bones, seven forming part of the ankle, the heel and instep; five for the middle of the foot and fourteen in the toes, making thirty in each leg.

The principal interest which bones have for the student of first-aid is that they may be broken or fractured, one of the commonest accidents.

JOINTS

Where two or more bones are in contact or touch each other they form a joint. Joints are either movable or immovable. We find examples of the former in the limbs at the hip, knee, elbow and fingers. The latter are met with between the bones of the skull, pelvis, etc.

Movable Joints. The surface of the bones where they meet to form movable joints are covered by gristle or cartilage. Cartilage serves to smooth the bony surfaces, to allow of free and noiseless movements, and to break the shock consequent upon the pressure due to the weight of the body. Within the joint is lubricated by a clear fluid, called the synovia. This fluid is secreted and kept in place by a delicate membrane passing from bone to bone, termed the synovial membrane. This membrane is strengthened by fibrous tissue spread out in the form of a capsule and the bones are firmly held in place by thick fibrous bands termed ligaments, passing at intervals between them. The ligaments, while they fasten the bones together, allow movement peculiar to each joint. Of the movable joints some are arranged as:

1. Ball and socket: which permit movements in all directions, as the hip and shoulder.
2. Others, such as the knee, elbow, etc., are known as hinge joints.
3. Gliding joints as in the hands and feet.

Immovable Joints. These joints are more in the form of seams and appear like the cracks between the bones, as in the skull and pelvis. The movement is very slight or absent.

MUSCLES

The muscles give shape to the body and form two-fifths of the body by weight. They are made up of a number of fibers which have the power of contracting, so that if one end of the muscle is fixed and the muscle is contracted the other end will pull on and move whatever it is attached to. By doing this muscles cause all the movements of the body. All muscles are somewhat on the stretch as otherwise prompt movement would be impossible.

Muscles are of two varieties:

1. Voluntary.
2. Involuntary.

Muscles of the limbs, neck, face and eyes, etc., are capable of movement at the will of the individual, and are therefore termed voluntary.

Along the whole length of the alimentary canal, from the throat to the end of the intestines, the walls of the digestive tract possess a muscular structure, which, from the fact that the elements of which it is composed are independent of the will, is termed the involuntary muscular system.

Heart Muscle. The heart muscle belongs to neither of these divisions of the muscular system, but consists of special fibres which are but very indirectly under the control of the will and emotions.

TENDONS

Tendons are strong fibrous cords which serve to attach muscles to bones. They vary in thickness and length and may be round or flat; they are inelastic and are useless unless attached to a muscle.

SUBCUTANEOUS TISSUE

This tissue is the fatty layer or padding which lies immediately beneath the skin. In this are found many small blood-vessels and nerve endings.

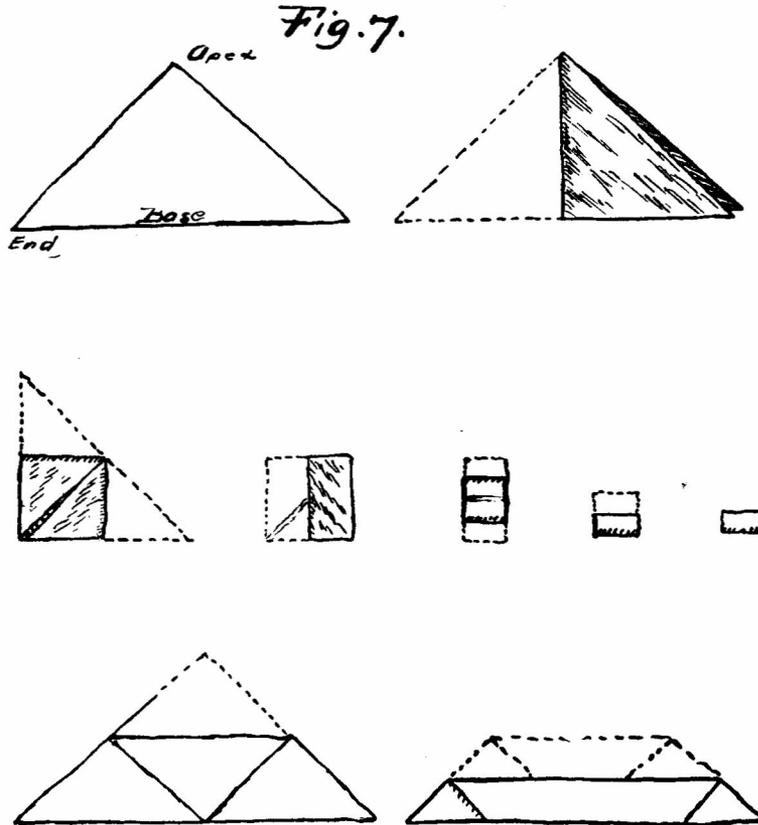
BANDAGES

The first-aidler must learn to use his hands as well as his head, and to know how to bandage well is necessary for him. Practice makes perfect and the first-aidler should learn how to bandage as early as practical.

Kinds of Bandages:

1. The triangular bandage.
2. The roller bandage.
3. The four-tailed bandage.

The Triangular Bandage. This bandage is best suited for first-aid work, as it can easily be made, is not difficult to apply as a temporary dressing and is not likely to be put on so tightly that it will cause injury by stopping the circulation of the blood. It can be used open or folded. The bandage is commonly made from unbleached



muslin, though any strong cloth will answer. The bandages are usually cut from material thirty-six to forty-two inches square. The latter measurement will be found best suited for general purposes. To make a triangular bandage from a square, cut from one corner, or

fold the square to form a triangle and cut along the folded part. To make a cravat bandage or a pad proceed as shown in Figure 7.

TO SECURE THE BANDAGE ENDS

A reef knot, or what is commonly called a square knot, should always be employed to fasten the ends of the bandage. Never use a granny knot because it is apt to slip.

To Tie a Reef Knot. Pass a narrow fold bandage around your arm or another person's neck, make the first half of the knot—this is the same for a granny or a reef knot. You will observe that there is an upper and a lower end to the bandage. Bring the upper across the lower end and with it complete the knot. The ends when pulled will be found lying parallel to the course of the bandage. (Fig. 8.) In a granny knot the tying is opposite and the ends are at a right angle to the course of the bandage.

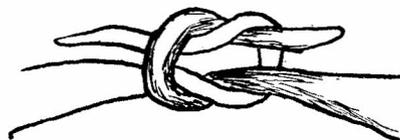


Fig. 8.

Tucking the end of the bandage away out of sight after the knot is completed is a necessary part of applying the bandage; when the bandage is completed the ends should never be seen. Knots should be placed where they do not cause discomfort and where they may easily be reached.

2. *The Roller Bandage.* The roller bandage is invaluable for the surgeon but this is not the case with the first-aidier. The latter must, however, know how to make use of any appliance at hand. These bandages are usually made from muslin, cotton cloth, gauze, or cheese cloth, and they may be improvised by tearing strips from a sheet and rolling them up.

The roller bandage is applied by holding the roll in the right hand, the loose end being in the left, and laying the outer side of the end on the place where it is desired to start the bandage. Always leave about four inches of the end exposed to tie to when the bandage is finished.

The simplest method of application is the *circular* but this can be used only when the part to be bandaged is of nearly the same circumference throughout.

Where the part is larger at one end than the other, at the start a

few turns should be made round and round the part to be bandaged, then begin to move up the limb using the circular method as long as a turn overlaps the preceding one about one-third. It will be found as soon as the limb increases much in size that if the bandage lies flat, uncovered spaces will be left.

To prevent the spaces the *reverse* must be employed. The reverse is generally considered to be the most difficult point to learn in the application of any bandage.

To make the reverse, place the thumb of the left hand on the lower edge of the bandage to hold it in place, slacken the bandage between the hands (about three inches) and turn the roller one-half

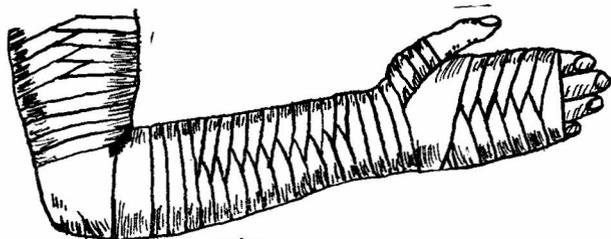


Fig. 9.

over toward you. Pass the roller under the limb, keeping the lower edge of the bandage parallel with that of the turn below;

reverse again at the proper point and so on. The reverse should be made so they lie in the center of the limb or to its outer side and all reverses should lie in one line up the limb. (Fig. 9.)

The figure of eight bandage is found especially useful about joints. It consists of a series of loops each overlapping the one below about two-thirds the width of the bandage. The middle part is over the bend of the joint while the loops lie one below the other above it.

The spica is a modification of the figure eight bandage, having one loop much larger than the other.

3. *Four-Tailed Bandage.* This is very useful in injuries to the lower jaw and head. It is made from a piece of cloth three to six inches wide and two to three feet long. The bandage should be doubled on itself and torn or cut until a piece four inches long is left undivided in the center.

PRECAUTIONS TO BE OBSERVED IN APPLYING BANDAGES

1. See that it accomplishes its purpose.
2. Do not put on too tightly.
3. Bandage firmly.

4. Always in bandaging a limb, leave the tips of the fingers and toes exposed.
5. Place the part to be bandaged in the position in which it is intended to leave it. A change of position may tighten the bandage and cut off circulation of the blood.
6. Never use a wet bandage. It may shrink and become too tight.
7. Remember that swelling occurs after an injury and this should be allowed for in placing a bandage.
8. Do not tie a knot in contact with the flesh.

USES OF BANDAGES

1. To keep dressings in place.
2. To stop bleeding by pressure.
3. To hold splints in place.
4. As slings.

APPLICATION OF BANDAGES

Bandages applied in the following manner are recommended to the student of first-aid. In bandaging the head always stand behind the patient.

Bandages for the Head:

1. Fold a hem on the base of the bandage and place it low on the forehead; gather the ends together and carry them around the



head, just above the ears, to the back. Cross the ends over the apex at the back of the neck, bring back to the forehead and tie. Fold the apex neatly. (Fig. 10.)

2. *For the Forehead.* Place the center of a cravat bandage a little past the center of the forehead, pass one end around the head

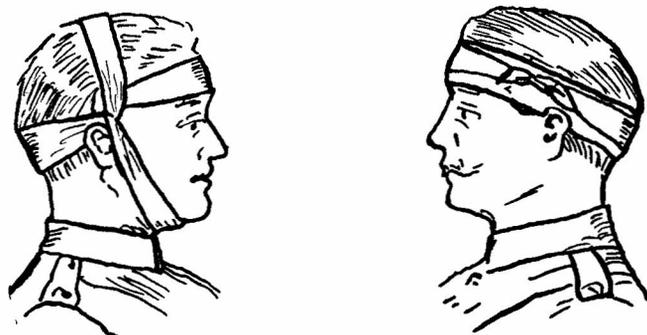


Fig. 11.

and at a point just in front and a little above the ears, cross the ends, taking one end under the chin and the other over the head. Tie the ends on the bandage above and in front of the ear, or, simply cross at the back of the neck, bring to the front and tie. (Fig. 11.)

This bandage or a four-tailed bandage can be applied to any part of the head.

Nose Bandage. Place the center of a four-tailed bandage on the nose, cross the ends, carry one pair above and one pair below the ears and tie at the back of the head.

(Fig. 12.)



Fig. 12.

Eye Bandage. Place a strip of cloth (18 inches long) or a piece of roller bandage over the uninjured eye and diagonally across the head. Bandage both eyes by using a cravat bandage.

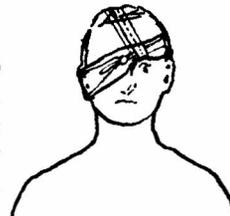


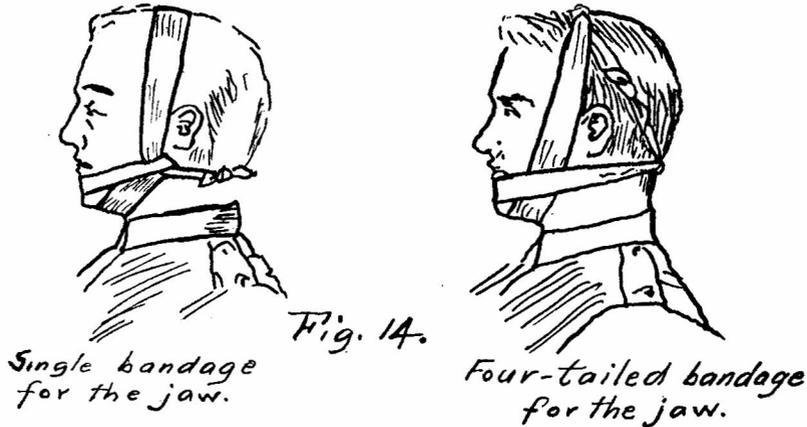
Fig. 13

The end nearest the injured eye is taken below the ear, the other end above the ear, crossed at the back, returned to the front and tied. Now bring the two ends of the roller bandage or strip of cloth to the top of the head and tie. This leaves the uninjured eye exposed. (Fig. 13.)

Jaw Bandage:

1. Use two cravat bandages. Place the center of the first bandage on the chin just below the lip; carry the ends to the back of the neck

and tie. Place the center of the second bandage under the point of the chin, carry the ends to the top of the head and tie. Tie the ends of the two bandages together. (Fig. 14.)



2. Place the center of a four-tailed bandage on the chin. Carry the two lower ends to the top of the head and tie. Bring the two upper ends to the back of the neck and tie. Then tie the four ends together at the back of the head. (Fig. 15.)



Neck Bandage.

1. Place the center of a cravat over the part to be bandaged, carry around the neck and tie as convenient. (Fig. 16 A.)
2. For high up on the back of the neck: Fold a piece of cardboard in the center of a wide folded cravat and tie as above.
3. For the front of the neck: Place the center in front, cross the ends behind the



neck, carry each under the arm-pits and tie on the chest. (Fig. 16 B)

4. For the back of the neck: Reverse the above.

Chest Bandage:

1. Place the apex of an open bandage high up on the shoulder. Carry the two ends around the body and tie on the back, then tie one end to the apex. (Fig. 17 A.)

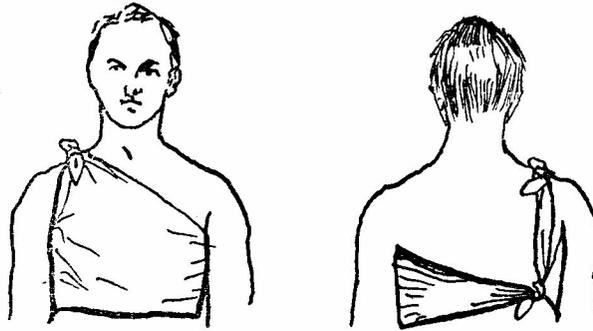


Fig. 17 A.

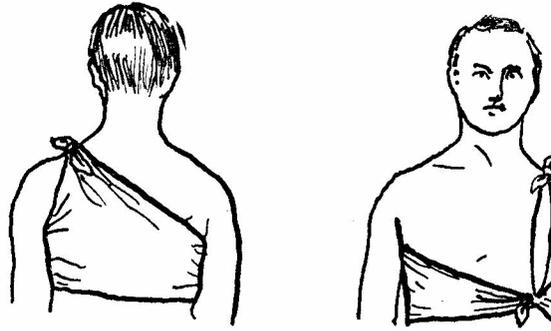


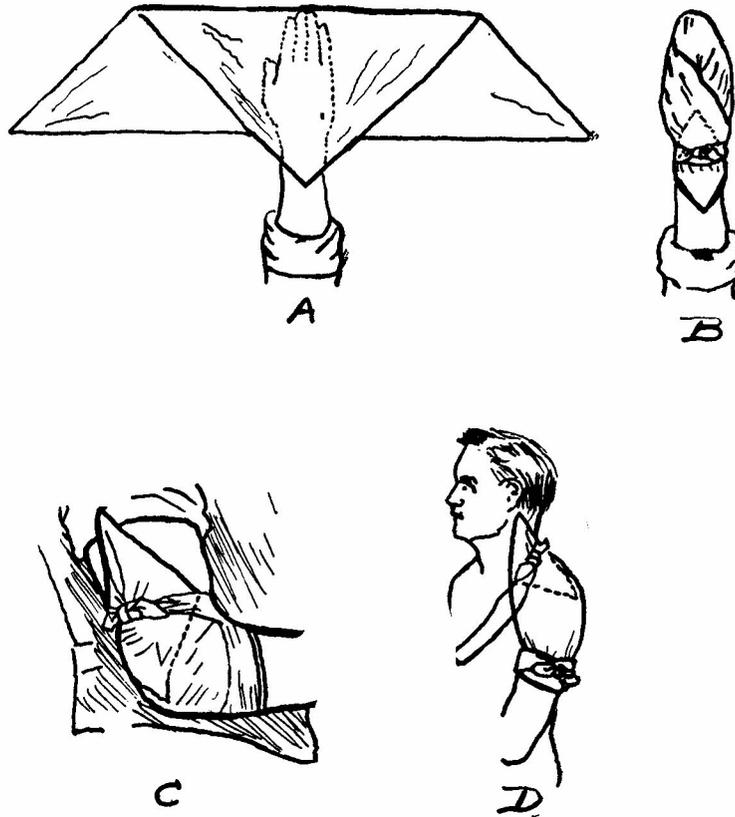
Fig. 17 B

2. Use a wide folded cravat. Carry the ends around the body and tie on the back.

Back Bandage. Reverse the chest bandage. (Fig. 17 B.)

Shoulder Bandage. Place the apex of an open bandage high up on the neck. Fold a hem and pass the ends under and around the arm and tie on the outside. Take a cravat bandage, place the center in

Fig. 18.



the opposite arm-pit and tie over the apex. Fasten the latter by folding under the cravat. (Fig. 18 D.)

Abdominal Bandage and Front of Chest. Lay an open bandage base upon the chest and tie behind. Place a second one on the abdomen, base down and tie behind. (Fig. 19.)

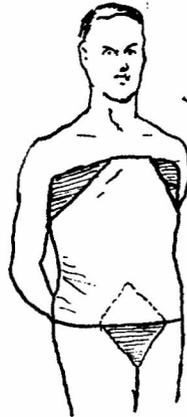


Fig. 19.

Arm Bandage. Any part of the arm can be bandaged by the aid of a narrow or wide folded cravat. (Fig. 20.)

Elbow Bandage. Place the apex of an open bandage on the point of the shoulder. Fold a hem of about four inches on the base, pass the ends under the arm and tie above the elbow on the outside. Drop the apex over the knot. (Fig. 18 C.)

Hand Bandage:

1. Place the center of the base of an open bandage on the inner side of the wrist. Bring the apex down over the palm and pass it over the tips of the fingers, back over the back of the hand to a point above the wrist. Pass the ends

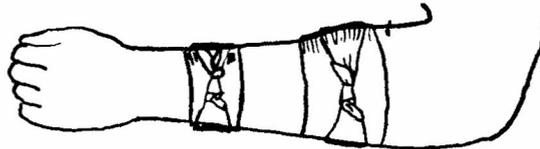


Fig. 20.



Fig. 21.

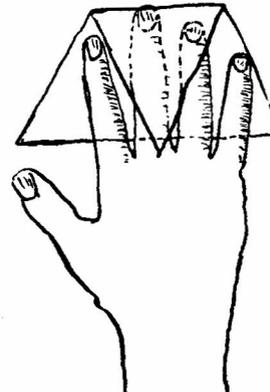


Fig. 23.

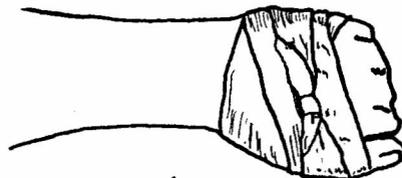


Fig. 22.

around each side of the wrist and tie. Drop the apex over the knot. (Fig. 18 A-B.)

2. Place the center of a cravat in the palm of the hand, bring one end up between the forefinger and thumb and the other around the little finger side of the hand; then bring the ends up the back of the wrist, cross them, bring around the wrist and tie. (Figs. 21-22.)

Finger Bandage:

1. For this use a triangular bandage made from a piece of cloth ten inches square, apply in same way as for the hand. (Fig. 23.)

2. In case the first, second, or third finger or all three fingers have been cut off: place a cravat bandage with two-thirds of the bandage on the back of the hand over the injury; grasp the bandage at the back of the wrist with the left hand and with the right hand pass the end to the front of the wrist over the other end; pass the latter back over the injury and bring the former to the center of wrist in the back; twist the ends, take to the front and tie.

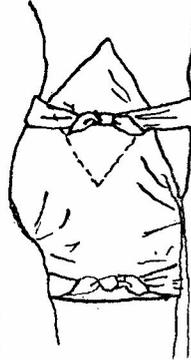


Fig. 24.

Hip Bandage. Place the apex of the bandage on the hip, fold a hem, carry around the thigh and tie in front. Pass a cravat around the waist and tie over the apex. (Fig. 24.)

Groin Bandage. Same as above except the apex is placed lower and the cravat is passed around the leg. (Fig. 24.)



Fig. 25.

Leg Bandage. Any part of the leg may be covered by using a cravat bandage, using a circular dressing. (Fig. 25.)

Knee Bandage. Same as for the elbow. (Fig. 26.)



Fig. 26.

Foot Bandage:

1. Same as for the hand. (Fig. 27.)
2. Place the center of a cravat on the sole of the foot; bring the ends up over the instep and around the ankle, crossing the instep in front, then around the leg and crossing behind to the back of the ankle. Bring the ends to the front and tie. (Fig. 28.)

Crotch Bandage. Tie a cravat bandage around the waist. Tie a second one to the first bandage at the back, bring between the limbs and tie to the center in front. (Fig 29.)

Collarbone Bandage. Place a wide folded cravat over the point of injury with one end in front and one behind. Take a second



Fig. 27.



Fig. 28.

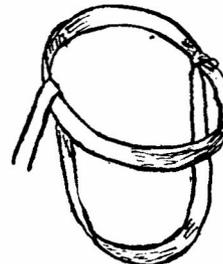


Fig. 29.

bandage, pass around the body over the first bandage under the arm-pits and tie in front. Tie the ends of the first bandage together. (Fig. 30.)

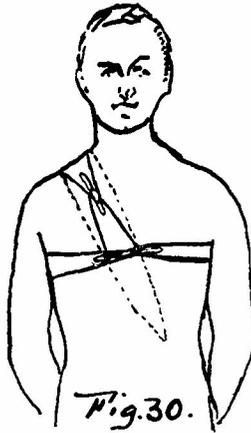


Fig. 30.

Arm-pit Bandage. Place the center of a cravat bandage in the arm-pit, cross on top of the same shoulder passing one end in front of the body and one behind and tie the ends together on the opposite side. (Fig. 31.)

Pelvis Bandage. Use two wide-folded cravats and use the circular dressing. (Fig. 32.)

Bandages for Splints. Use narrow or wide folded cravat bandages and use the circular dressing.

Slings. Slings can be made from open or folded triangular bandages, two handkerchiefs, roller bandages, etc.

1. Open bandage for a sling:
Hold the apex in the right hand and one end in the left; lay the bandage on the front of the body, placing the apex between the left side of the body and the left elbow; carry the end held in the left hand over the right shoulder

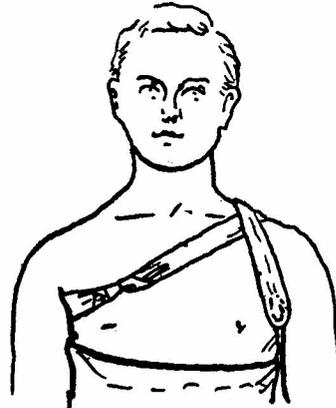


Fig. 31.

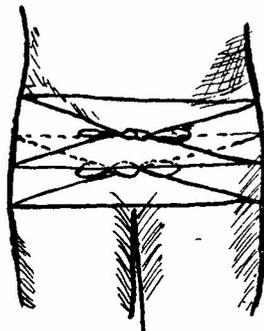


Fig. 32.

round the lower part of the neck, and bring forward over the left shoulder to a point a little below the left collarbone; bend the elbow; bring up the lower end of the bandage over the forearm and tie

the ends just below the left collarbone. Tuck in the apex. (Fig 33.)

Do the opposite for the other arm.

2. Folded bandage for a sling: Lay one end of the bandage

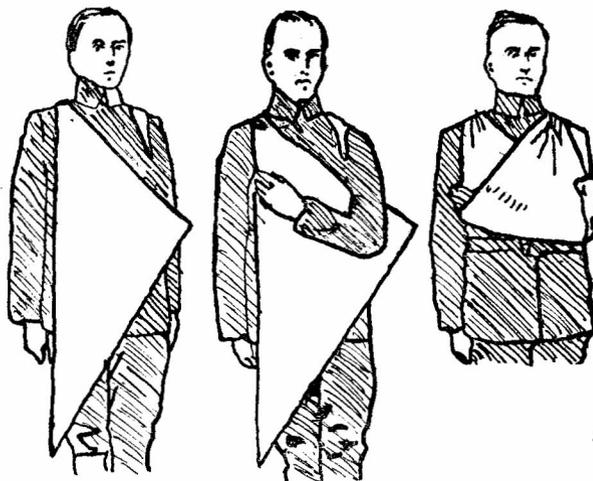


Fig. 33.

across the sound shoulder, bring it around the back of the neck to below the collarbone on the injured side; bend the elbow so that the forearm is at right angle to the arm, and lay the hand in the bandage; bring up the lower end and tie below the collarbone of the injured side. The bandage should support the hand, wrist and the lower part of the forearm. (Fig. 34.)



Fig. 34.

CHAPTER III

INJURIES IN WHICH THE SKIN IS NOT PIERCED OR BROKEN. SHOCK.

Shock is caused by all injuries, by fright, anger, and operations, and it must be thought of and treated when necessary. It is described as a more or less profound impression on the nervous system.

For the convenience of the student of first-aid the body is divided into various systems and perhaps the most important of these, because it governs the action of all the others, is the nervous system. It is very delicate and easily disturbed.

Symptoms of Shock. Pale face with an anxious expression, the eyes are dull and the pupils are large, the eyelids droop, the skin is cold and sweaty, the patient is more or less stupid and is partly or totally unconscious. He will usually lie perfectly quiet unless disturbed. His breathing is shallow and his pulse rapid and weak. In deep shock the eyes are turned backward in the head.

Not all these symptoms will be seen in every case. Shock is usually recovered from, the improvement being gradual, but it may grow worse and death occur.

Treatment for Shock. Send for a doctor and in the meantime place the patient on his back with the head lower than the rest of the body except in injury to the head and in sunstroke. Warm and stimulate in every way possible.

Don't give whiskey unless it is the only available stimulant. It acts as a stimulant only.

The best stimulant is aromatic spirits of ammonia (one teaspoonful in a half a glass of water). This is a universal recommendation and should be used in the place of whiskey. In the first place it is better and in the second place the bottle is not so apt to be found empty. Hot coffee, hot tea and hot water are good stimulants.

All stimulants taken internally are best given hot when possible as heat itself is a powerful stimulant whether employed internally or externally. Heat can be applied by using hot water bottles, bottles filled with hot water, hot bricks or stones, cloths wrung out of hot water; by using blankets, coats, etc. In applying heat make sure that it will not burn when applied to the patient, and to get the best effect it should be applied between the limbs, between the arms and the body and over the heart.

CAUTION:

1. The symptoms of shock and bleeding are very similar and when treating for one be sure that the other is not present.
2. Unconscious people cannot swallow, due to the fact that the epiglottis fails to work. Inhalation stimulants should be used in such a case.
3. The blood of an unconscious person is in a coagulated state and if rubbing the body is resorted to in order to stimulate a patient, it is possible to force this blood to the heart causing stoppage of the valves, and death will be the result.

BRUISES

A bruise is an injury to the subcutaneous tissue and is caused by a blow or a fall. The pain is due to the rupture of the blood-vessels and the pressure of the escaping blood on the nerves. The swelling and discoloration are due to the escaping blood.

Treatment. The object is to limit the swelling and decrease the pain. Elevate the injured part, apply hot and cold applications alternately or use witch-hazel or alcohol. These have a tendency to contract the blood-vessels and to deaden the nerves.

STRAINS

A strain is an injury to the muscles, due to overstretching and is caused by trying to lift a heavy weight. The blood-vessels are sometimes broken and the blood escapes into the muscles which cause pain, swelling, discoloration, stiffness and lameness. The pain is increased by movement.

Treatment: Let the patient rest and if severe call a doctor.

RUPTURE OR HERNIA

There is a weak point in the lower part of the abdomen and when one indulges in severe muscular efforts the intestines may be forced through. This is called rupture.

Symptoms:

1. Lump in the groin.
2. Faintness and vomiting.
3. Great pain.

Treatment. Lay the patient on his back with the knees raised up toward the abdomen. Support with pillows or jackets. Apply cold cloths over the hernia. Call a doctor.

SPRAINS

These are injuries to joints and are due to violent stretching, twisting, or partial breaking of the ligaments about the joints.

The blood-vessels may be broken and the blood and blood-serum escape around and into the joints. It is accompanied by severe pain which is increased by movement. Swelling is always present, and there may be more or less shock.

Treatment. Absolute rest. Elevate the injured part, bandage tightly and apply hot and cold applications alternately. In severe cases it is recommended to use one or the other from 24 to 48 hours. Consult a doctor.

In bruises, strains and sprains always make sure that there are no broken bones.

DISLOCATIONS

Dislocations are injuries of joints and are due to the head of a bone slipping out of its socket. They are very painful because they are accompanied by wrenching and tearing of the ligaments about the joint and are sometimes complicated by a rupture of the muscles and injuries to surrounding blood-vessels and nerves.

Symptoms. Pain, swelling, discoloration, unnatural position and altered length.

Treatment. Reduce the dislocation in the following manner:

Jaw. Wrap both thumbs in several layers of cloth then place them in the patient's mouth, resting them on his lower teeth on each side while the finger seizes the jaw on the outside. Make pressure downward and backward and when the jaw begins to slip back into place, the thumbs should be slid off the teeth to the inside of the cheeks. When the dislocation is reduced, put on the jaw bandage (Fig. 15) and send the patient to a doctor.

Fingers. Grasp the wrist of the injured hand with your left, take hold of the injured finger with your right hand and pull straight out away from the patient's hand. With a sufficient pull the head of the bone will slip back into place. No bandage is necessary.

Thumb. The first joints of the thumb can be reduced the same as the joints of the finger. The second joint can be reduced by pressing down on the head of the bone and pushing the thumb in the direction of the wrist. It is not necessary to bandage the thumb but if there is much swelling or discoloration the patient should be sent to a doctor.

Shoulder. A first-aid man should never attempt to reduce a dislocated shoulder. When it is necessary to treat one proceed as follows:

Place the forearm across the body at a right angle to the upper arm; fold a coat, place it under the elbow well up into the arm-pit.

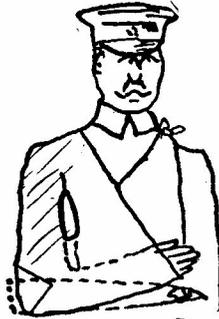


Fig. 35.

Take a wide-folded bandage and put the arm in a sling, take a second bandage and tie the elbow to the body, passing over the point of the elbow. This should be tight enough to relieve, as much as possible, the pressure which is caused by the head of the bone pressing on its socket. Take a third bandage and place the wide part over the front of the elbow, down under the pads, up across the back to the top of the opposite shoulder, raise the point of the shoulder as high as possible and tie. (Fig. 35.) Send the patient to a doctor at once.

Hip. Usually dislocations of the hip are backward dislocations. (Fig. 36.) In this case the foot of the injured leg is drawn up and is turned toward the ankle of the opposite leg, the knee is bent and raised and is turned outward; the leg appears much shorter and there is an enlargement back of the hip joint. Unnecessary movement should be avoided.

Procure a board one inch thick, fourteen inches wide and seven and one-half feet long. Pad the board heavily with folded blankets or other soft material. Place the injured person on the board in such a manner that there will be no pressure on the hip bone. Fill in with padding the space between the board and the knee and between the legs. Secure the patient to the board by tying a bandage across the chest close to the arm-pits, one at the pit of the stomach, one across the hips just above the joint, one across the thighs, one across the shins and one across the ankles. Treat for a shock and take the patient to a doctor.

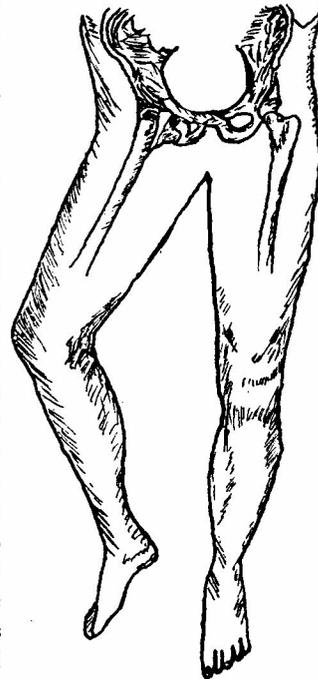


Fig. 36.

FRACTURES

When a bone is broken it is called a fracture. If a bone is broken and there is no wound in connection, it is a simple fracture. When there is a broken bone and a wound, which has been caused by the bone, it is known as a compound fracture. There are several other kinds of fractures but in this connection only simple and compound will be considered.

Symptoms of a Simple Fracture. Pain and tenderness at the point of fracture, swelling, deformity, the limb may be shortened or bent, discoloration, and crepitus.

Symptoms of a Compound Fracture. The symptoms are the same as in a simple fracture and are accompanied by a wound. Shock is present and must be treated.

Treatment of a Simple Fracture. The object is to prevent further injury. Set the bone as nearly normal as possible and apply the necessary splints.

If it is a compound fracture, stop the flow of blood if necessary and cover the wound with a dressing, being careful not to touch the wound or dressing with fingers or anything else. Do not attempt to set the bone but apply the splints accordingly.

Never in any fracture attempt to transport the injured person until the broken bone is firmly held in position by splints.

More or less shock accompanies all fractures and must be treated. After treatment for fracture and shock send the patient to a doctor.

SPLINTS

Splints are used for fractures and suspected fractures and their object is to prevent movement in order to prevent further injury. Generally they have to be improvised and should be long enough to prevent movement at the joints above and below the fracture. They should be as wide as the part to be splinted, rigid and well padded.

Padding can be made from bandages, clothing, towels, pillows, blankets, straw, hay, waste, shavings, etc.

Fracture of the Skull. The patient will probably be unconscious. Apply a bandage compress on the point of fracture and tie in place without pressure. Put the patient in a lying position with the head slightly raised. Keep quiet, treat for shock by applying heat over the heart and extremities.

Fracture of the Lower Jaw. Place the first bandage described in bandage for the jaw. Place two pieces of wood about the size of two matches in the mouth and then tie on the second bandage. Re-

move the pieces of wood. (Fig. 15.) The wood prevents the first-aid man from applying the bandage too tightly.



Fig. 37.

Fracture of the Upper Arm. Apply one padded splint to the inner and one to the outer side of the arm. They should reach from the arm-pit and the point of the shoulder to one inch below the elbow. Tie in place with two cravat bandages and put the arm in a sling. (Fig. 37.)



Fig. 38.

Fracture of the Forearm and Wrist. Apply two padded splints, one to the outer and one to the inner side of the forearm. The inner one should be long enough to reach from one inch past the elbow to one inch past the tips of the fingers; the other, one inch past the elbow to the second joints of the fingers. Secure with three cravat bandages and put the arm in a sling. (Fig. 38.)

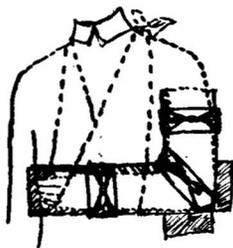


Fig. 39.

Fracture of the elbow. Make a splint in the form of an "L," pad well, place on the arm and secure with three cravat bandages. With one cravat use the figure-of-eight at the elbow. Support the arm with a sling. (Fig. 39.)

Fractured or Crushed Hand. Procure a splint as wide and a little longer than the hand, pad well, and tie to the hand with a cravat bandage as described in bandage for the hand. Support the hand with a sling. (Fig. 40.)

Fractured Nose. Put in a natural position, pad on each side of the nose and hold in place with adhesive plaster or a four-tailed bandage. (Fig. 12.)

Fracture of the Finger. Use a narrow padded splint and secure with a strip torn from a triangular bandage.



Fig. 40

Fracture of the Collarbone. Fold a pad about five inches in diameter and place it in the arm-pit; place the forearm across the

body at a right angle to the upper arm; take two cravat bandages, place the centers in the center of the shoulders in front, taking one



Fig. 41.

end over the shoulder and one under the arm-pit; tie the left upper end and the right lower end together; tie the other ends together, having them tight enough to pull the shoulder as far back as possible. This will prevent

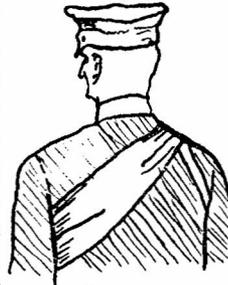


Fig. 42.

movement in the collarbone. Take a second cravat bandage, pass it around the body,

over the point of the elbow, through the fingers and tie. With the pad in the arm-pit and pressure on the point of the elbow a lever is formed and by tying the bandage tight overlapping of the collarbone will be prevented. (Fig. 41.)

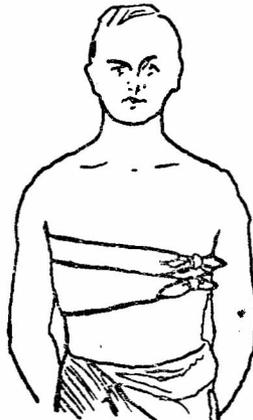


Fig. 43.

Fracture of the Shoulderblade. Put the arm in a sling; place a bandage compress over the seat of injury and hold in place with a wide-folded cravat bandage. (Fig. 42.)

Fracture of the Ribs. Place a wide-folded cravat over the seat of injury and tie half a knot. Have the patient expell all the air out of his lungs then finish the knot. This will limit chest motion and decrease pain. (Fig. 43.)

Fracture of the Pelvis. Obtain a splint made from a board one inch thick, fourteen inches wide, and seven and one-half feet long. Pad heavily and

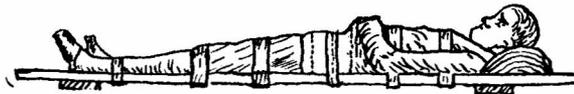


Fig. 44.

place the patient on the splint. Take two wide cravats and tie

around the pelvis. Secure the patient to the splint with one cravat close to the arm-pit, one at the pit of the stomach, one over the thighs, one below the knees and one over the ankles. (Fig. 44.)

Fracture of the Thigh. For this use two splints, one long enough to reach from the arm-pit to one inch below the heel, the other from



Fig. 45.

the crotch to one inch below the heel, and have them as wide as the limbs. Pass three cravat bandages under the body, placing one close to the arm-pits, one at the pit of the stomach and one over the hips. These bandages can be passed under the body at the small of the back. Double a cravat bandage, pass it under the knee and slide it to the crotch ; ; put

a second one above the knee, a third below the knee and a fourth at the ankle. Pad the splints and put them in place.

Tie one bandage

above and one below the break, then the other two on the leg and the last three over the body.

To tie the bandages around the leg: Pass one end through one side of the loop, the other end through the other side and tie on the outside of the splint. Tie the feet together and untie after placing on the stretcher. (Fig. 45.)



Fig. 46.

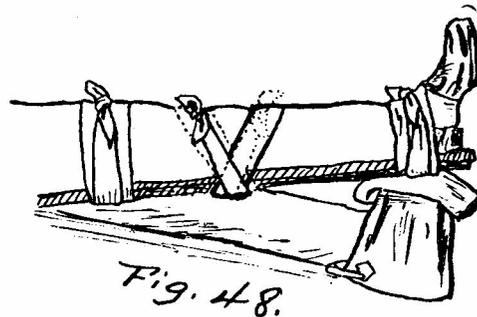


Fig. 48.

Fracture of the Leg. Same as fracture of the thigh or use two short splints. Both should reach from the crotch to one inch below the heel. Secure the splints to the

limb as described in a fractured thigh. (Fig. 46.)

Fracture of the Ankle. Same as for a fractured leg, using the two short splints, or use a box splint as shown. (Fig. 47.)

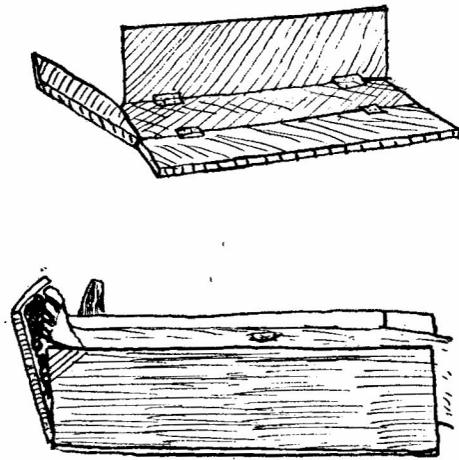


Fig. 47.

Fracture of the Knee. Place a three-foot padded splint under the leg. Place the center of a cravat bandage just above the knee, cross underneath, bring the ends below the knee and tie. Put a small pad under the knot. With a second bandage start below the knee, cross underneath, bring the ends above the knee and tie. Put a third bandage over the thigh, and a fourth over the ankle. (Fig. 48.)

Fracture of the Foot. Use the box splint as in the ankle. (Fig. 47.)

Broken Back. Procure two splints 1 inch thick, 4 inches wide and 7 feet long and three 1 inch by 1½ inches by 18 inches. Fasten together with bandages, screws or nails. (Fig. 49.)

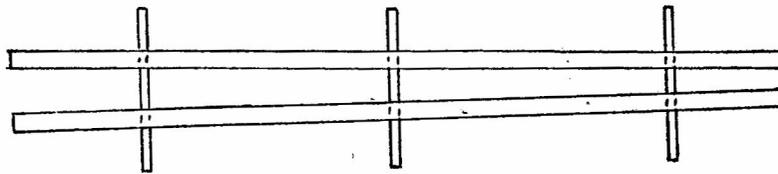


Fig. 49.

For padding use two blankets which have been made into rolls. Procure ample assistance to lift the patient. Use twelve cravat bandages. Tie one close to the arm-pits, one at the pit of the stomach, one over the hips, one in the crotch, one above the knees, one below

the knees and one at the ankles. Tie the feet together, then the



(FIG. 50)

hands. Place a small pillow under the head and tie the head to the splint. A small padded splint should be placed on the chest and stomach under the three bandages which pass over that part of the body.

To tie the leg bandage: Pass one end under the splint, bring the center between the legs, passing one end through the loop on one side, and the other end on the other side, tighten and tie. (Fig. 50.)

The greatest care must be exercised in handling a patient with a broken back. Let a physician handle from the beginning if it is possible to do so.

CHAPTER IV.

BLEEDING

The circulation consists of the heart, arteries, capillaries, veins and the blood.

The Heart. The heart is about the size of a man's fist, and is situated a little to the left of the breast-bone. The beat of the heart is its contraction, and by this contraction the blood is forced through the body. After the heart contracts the chambers fill with blood and it becomes larger. The next contraction again forces the blood throughout the body and this continues as long as a person is alive. The heart contracts normally 72 times in a minute and when we feel the pulse we are feeling the contraction of the heart. It is a double acting pump, the right side pumps the bad blood to the lungs where it is purified. From the lungs it flows back to the left side of the heart from where it is forced through the body.

Arteries. The blood, which is bright red in color, leaves the heart through the aorta, the largest blood vessel in the body, and flows in spurts. From the aorta it passes to smaller arteries, and in a few seconds the blood is distributed to the entire body. As the arteries get farther away from the heart they get smaller and smaller, and the blood finally loses its pulse.

Capillaries. When the arteries become very small they are called capillaries. The color of the blood now is brick red.

Veins. From the capillaries the blood passes into the veins and through them back to the heart. The blood is now dark blue in color and flows in a steady stream.

The following points are necessary for each first-aid man to know:

Arteries. The blood flows in spurts, and is bright red in color. To stop the circulation, pressure must be made between the heart and the wound.

Capillaries. When cut the blood escapes by oozing. It is brick red in color and the flow can be checked by direct pressure.

Veins. The blood flows in a steady stream, is dark blue in color, and to control bleeding pressure must be made on the side away from the heart.

The Blood. The blood carries properly prepared food, oxygen and heat, to feed and warm all parts of the body, from which it removes waste material.

When blood issuing from a cut comes in contact with a foreign material it clots. This is what is termed coagulation. The coagu-

lation of the blood plays an important part in arresting hemorrhage. When the blood comes to the surface through a wound it clots and forms a seal or crust, while inside the blood in and around the blood vessel coagulates and plugs the mouth of the bleeding vessel. This is nature's method of stopping the flow of blood, and, unless the blood vessel is very large, it is generally successful.

Symptoms From the Loss of Blood. Pale face, faintness, cold skin, thirst, weak pulse, dizziness, sighing, and there may be loss of consciousness.

Bleeding can be stopped by pressure, position and hot or cold applications.

TREATMENT OF WOUNDS WITH SEVERE BLEEDING

Check the blood.

Put the patient in a lying position with the head lower than the rest of the body, except in bleeding from the head. See that the patient gets plenty of good air and is kept warm. Do not give stimulants unless he is very weak.

Arterial Hemorrhage:

1. Send for a doctor at once. The loss of one-third of the blood will result in death—so prompt action is imperative.
2. Cut off the clothing if necessary.
3. Press your finger or thumb on the artery between the bleeding point and the heart.
4. Apply a tourniquet at the point where pressure is being made.

Tourniquets. A tourniquet is an instrument to stop bleeding. It must consist of a strap to go round the limb, a pad, and some means by which the pad may be made to press on the artery. It can be made from a triangular bandage, a towel, handkerchief, etc. Use a small cork, stone, or some object which has been wrapped in a cloth, for a pad. Place the pad over a point near the wound where the artery comes close to the surface, hold in place with a cravat bandage, or something similar, and apply sufficient pressure to stop the circulation of the blood.

Do not use rope, bell cords, wire or fishline.

Warning. When you cut off the circulation of the blood death of the part may follow. Therefore, loosen the tourniquet in twenty minutes, but do not remove it. If there is no further bleeding do not re-apply it. If bleeding persists, permit the artery to spurt once or twice, and again apply the tourniquet. Repeat in one hour. A

tourniquet may be left in position for two hours without danger of mortification.

Venous Hemorrhage:

1. Send for a doctor.
2. Remove the constricting bands.
3. Elevate the part so as to assist the flow of the blood back to the heart.
4. Apply a compress directly to the wound and bandage tightly.

Varicose veins are veins which have become very large from weakening of their walls. If one should burst, send for a doctor. Put the patient on his back. Remove all bands above bleeding point. Remove the clothing and raise the leg. Place a bandage compress on bleeding point and bandage firmly in position.

Compound Fractures: These belong under wounds. Use extreme care in treating a compound fracture. The tissues have been damaged more or less due to the bone protruding through the flesh and the slightest movement may injure them even more.

Treatment:

1. Expose the wound by removing the clothing.
2. If there is severe bleeding, apply a tourniquet.
3. Put a bandage compress over wound.
4. Straighten the limb but do not pull the bone back into place. Any dirt which the bone has collected on its way through the skin and clothing will be pulled into the wound and blood poisoning will be sure to develop.
5. Apply splints. The kind used and where to place them will be governed by the protruding bone. The splints may be put on in the usual way by making an arch over the bone with padding.

There are several points on the body, where, by applying slight pressure, the circulation of the blood in the arteries can be controlled. These points are located in the following places (Fig. 51):

1. In front and even with the top of the ear. (Fig. 51a.)
2. In the hollow of the jaw bone one inch from the point of the jaw. (Fig. 51b.)
3. Along the inner side of the large muscle in the neck. (Fig. 51c.)
4. In the hollow of the shoulder just above and behind the center of the collarbone. (Fig. 51d.)
5. In the arm-pit. (Fig. 51e.)
6. In the center of the upper arm in a line with the seam of the coat. (Fig. 51f.)
7. In the center of the bend in the elbow. (Fig. 51g.)

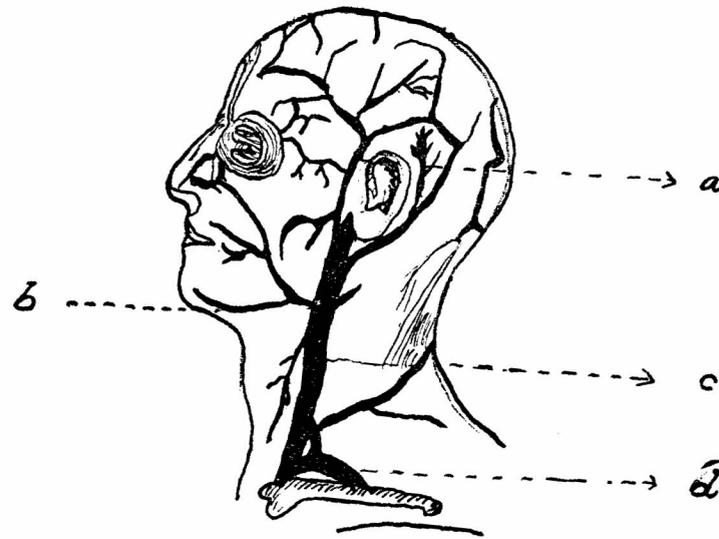
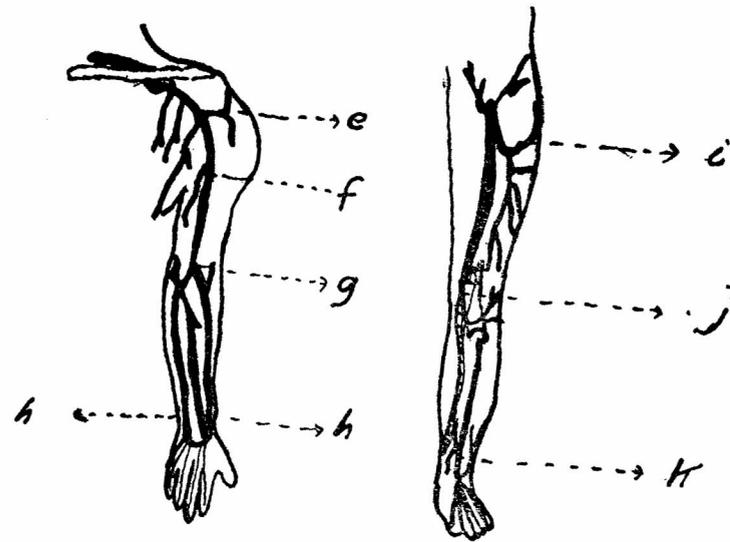


Fig. 51.

8. At the pulse on the inner and outer side. (Fig. 51h.)
9. Four finger breadths below the fold of and in the center of the groin. (Fig. 51i.)
10. In the center of the back of the knee. (Fig. 51j.)
11. Around the ankle. (Fig. 51k.)

In bandaging wounds on different parts of the body proceed as follows:

Scalp, Temple or Face. Place a bandage compress directly on the wound and tie tightly. Cover with head bandage.

Side of the Head. Apply pressure at a point in front of and even with the top of the ear. Put a compress on the wound and cover with a cravat bandage.

Nose. Place a piece of rolled paper, about as large as a lead pencil, between the upper teeth and lip.

Neck and Throat. Make direct pressure on the bleeding point with the fingers and replace with a bandage compress.

Shoulder. Apply direct pressure with a bandage compress. Put the center of a cravat bandage over the compress, pass the ends under the arm-pit and tie on the opposite side of the body.

Arm-pit:

1. Put a 1-inch roller bandage, or some other object about the same size, in the arm-pit. Hold in place with a cravat bandage. Put the center over the object, cross the ends over the top of the shoulder, and tie under the opposite arm-pit.

2. Place a 3-inch roller bandage in the arm-pit, secure the arm firmly to the chest wall with a cravat bandage, and put the arm in a sling.

Arm. Make pressure on the artery in the middle of the arm. Cover the wound with a compress and put on a bandage.

Arm Torn From the Socket. Cover the hand with a piece of gauze and pinch the blood vessels. Pack the wound with sterile gauze and bandage tightly.

Forearm. Place a 1-inch roller bandage in the elbow, bend back on itself and tie. Cover with a compress and bandage.

Wrist. Apply direct pressure and cover with a compress and bandage.

Hand. Stop the circulation of the blood at the wrist. To do this take a cravat bandage and tie two knots near the center. Place the bandage on the wrist with one knot over the artery on the outer side, and one over the artery on the inner side. Pass the ends around the wrist and tie firmly. Cover the wound with a bandage compress and a triangular bandage.

Palm. First place a compress in the palm, cover with a hard substance, close the hand over the two and tie.

Finger. Cover with a compress and tie firmly.

Back. Cover with a compress and hold in place with a back bandage.

Chest. Cover with a compress and hold in place with the chest bandage.

Hips and Groin. Cover with a bandage compress and secure with the hip or groin bandage.

Thigh. Apply tourniquet at the point as described and apply a wound dressing.

Leg. Place a pad about the size of a billiard ball in the bend of the knee. The joint is bent on it and is bandaged in this position.

Foot. Apply a bandage compress and tie firmly. If the bleeding does not stop apply tourniquet.

Toes. Apply a bandage compress and tie firmly.

INTERNAL HEMORRHAGE

Stomach. The blood will be dark blue in color and will be vomited. Place the patient in a lying position. Feed cracked ice or give 15 drops of turpentine in a little warm milk every two or three hours. Give no stimulants.

Lungs. The blood will be bright red, frothy and will be coughed up. Put the patient in a lying position with the head lower than the rest of the body. Apply cold applications to the vicinity of the lungs.

INJURIES IN WHICH THE SKIN IS PIERCED OR BROKEN

Wounds and their treatment are the most important subjects which we have to consider under the whole subject of first-aid, because in nearly every accident a wound is present. The manner in which the first dressing is applied will govern the time necessary for the wound to heal.

SKIN AND GERMS

The skin is the special organ for the sense of touch and is the covering for the entire body, and when it is broken, germs can gain entrance to the tissues and there set up what we commonly call blood poisoning. These germs are very small and can be seen only with a microscope. They live on the skin, in the clothing, in fact they exist everywhere, unless special means have been taken to de-

stroy them. Some are absolutely harmless but the greater majority are the opposite, especially pus germs, which cause inflammation and blood poisoning. Germs do not float around in the air so there is no danger from exposing a wound to the air.

Any injury in which there is a break in the skin is liable to additional and, perhaps, very great danger due to pus germs.

WOUNDS

There are a number of varieties of wounds, but only three will be considered.

1. Incised wounds in which the skin and underlying tissues are cleanly divided by a sharp instrument. There is likely to be severe bleeding, and unless too many germs are carried into the body the blood will wash most of them out. Those remaining will be taken care of by the cells.

2. Torn or lacerated wounds, in which the tissues are torn rather than cut. The blood vessels as well as other tissues are crushed; severe bleeding is not likely to occur, but on account of the character of the injury, dirt is likely to be ground into the tissues, and they are so extensively torn and destroyed that infection followed by inflammation and matter or pus is extremely common.

3. Punctured wounds are caused by knives, daggers, bullets, etc. The bleeding usually is slight, but may be great if a large blood vessel is injured. Infection is not uncommon as germs may be carried deep into the wound.

Treatment of Wounds:

1. In deep wounds call a doctor.
2. If there is severe bleeding apply a tourniquet.
3. Turn back the clothing so that it will not touch the wound.
4. Do not touch the wound.
5. Do not wash the wound or apply a dirty bandage. Everything is dirty in a surgical sense unless it has been sterilized or made antiseptic.
6. Do not wash a wound.
7. Do not use strong solutions of bichloride of mercury or carbolic acid. They destroy the cells of the body which dispose of the pus germs before they kill the latter.
8. *Do not use hydrogen peroxide.* It is not strong enough to kill the germs and it washes them into the uninfected parts of the wound.

9. Do not suck a wound.
10. Never use plaster of any description.
11. Do not use tobacco, cobwebs or waste.
12. If the injured part does not bleed freely, encourage bleeding by squeezing, then apply a wound dressing.

A wound dressing consists of everything which is used to cover a wound. The dressing applied directly to the wound is called a compress. This is covered with a triangular bandage and the dressing is complete. Always use a sterile or antiseptic dressing. In a sterile bandage the germs have been killed by heat, and in an antiseptic bandage by an antiseptic, usually bichloride of mercury.

In applying a dressing to a wound be very careful not to touch any part of the bandage which is to touch the wound.

How to Make a Compress:

1. Take a clean piece of cloth and boil for ten minutes.
2. Soak a clean piece of cloth in a 1-1000 solution of bichloride of mercury for ten minutes.
3. Wash and iron a handkerchief.
4. Use the ashes of a baked cloth.
5. Soak a clean cloth in alcohol.
6. Soak a clean cloth in iodine.

If iodine is available apply directly to the wound, apply a bandage compress and cover with a triangular bandage. This dressing is to be recommended to all others.

Wounds on any part of the body may be dressed by applying a bandage compress and covering with a triangular bandage as explained in the previous chapter.

SPECIAL WOUNDS

Eye Wounds, Including Foreign Bodies in the Eye. The eye is the organ of sight. Owing to the sensitiveness of the covering of the eyeball much pain and distress is caused when a particle gets under the eyelids. In any injury to the eyeball, cover both eyes with absorbent cotton or soft cloths, soaked in cool water, so as to keep the eyelid still, and bandage them into place with the eye bandage. Be careful not to put the bandage on too tightly and in order to prevent inflammation keep it constantly wet with cool water until the services of a doctor can be procured. While boiled water is safer for this purpose, there is little danger in the use of any clean water.

Splinters in the eye should be pulled out if possible. If they can-

not be removed, put a few drops of olive or castor oil in the eye. Whether removed or not, the eyes should be treated in a manner just described, and a doctor should be consulted as soon as possible.

Never rub the eye, as this will be likely to rub a foreign body into its delicate covering.

To remove foreign bodies, close the eye so that the tears will accumulate and the foreign body will frequently wash out into view, so that it may be easily removed. If this fails, pull the upper lid over the lower two or three times, close the nostril on the opposite side with the finger and have the patient blow his nose hard.

If the foreign body still remains in the eye, examine first under the lower, then under the upper lid. When the foreign body is located brush it off with the corner of a clean handkerchief.

In removing foreign bodies from the eye never use sharpened or burnt match sticks, toothpicks, pencils, blades of knives, steel picks or men's tongues, but use harmless things like a clean horsehair loop, absorbent cotton on a toothpick, or a corner of a clean handkerchief, or go to a doctor immediately.

Abdominal Wounds. Place a sterile dressing on the wound and keep moist with a weak solution of salt and boiled water.

Poisoned Wounds. Bites from snakes are very poisonous and must be given prompt attention.

Snake Bite. Call a doctor as soon as possible. Apply a tourniquet above the wound to stop the circulation of the blood. This can only be done in the limbs.

Lance the wound and

Soak the wound in hot water if possible.

Squeeze or suck the wound in order to free it of poison. Do not do the latter unless the mouth is in perfect condition.

Wash with potassium permanganate, sodium carbonate (common baking soda), nitric acid, ammonia or whiskey.

Burn with a hot iron or place gunpowder in the wound and light with a match.

Dose with stimulants.

After the bite has been treated, put on a wound dressing. At the end of an hour loosen the tourniquet long enough to let a little blood flow back to the body and tighten immediately. Watch the effect. If there are no serious effects this may be done every few minutes, and finally the tourniquet may be removed. If the patient weakens, poison still remains in the wound and the tourniquet must be kept in place.

Cat and Dog Bites. Treat as in snake bite. Then remove the tourniquet.

Bee and Wasp Stings. A sting from a bee may occasion severe symptoms, in some instances having a fatal ending. Following the pain of the sting, the person stung feels a slight chilliness all over the body, which is occasionally succeeded by a feeling of faintness, palpitation of the heart, pallor, vomiting, swelling of the face, hands and feet and sometimes delirium or unconsciousness. A wasp sting may induce similar consequences.

Treatment. The part stung should be firmly squeezed between the finger and thumb to eject, if possible, the actual sting or the poisonous fluid conveyed by it. The pressure should be maintained some minutes, and the part meanwhile wiped freely with spirits of wine, whiskey, brandy, or gin for some five or ten minutes. A solution of permanganate of potash well rubbed into the part has also highly beneficial results. Shock must be treated if the constitutional symptoms are severe.

Bites From Centipedes, Tarantulas, or Other Venomous Insects. These bites should be freely sponged with spirits of wine, whiskey or brandy, and a solution of permanganate of potash rubbed into the wound or injected beneath the surrounding skin. If the bite is in a part of the body where a tourniquet can be applied, this should be done.

CHAPTER V.

INJURIES DUE TO HEAT AND COLD AND UNCONSCIOUSNESS

Burns are caused by very dry heat such as fire, electricity, explosions of gas or powder and by hot metal. Scalds are caused by hot oil, boiling water and steam.

Burns and scalds are divided into three classes:

1. First degree. Sunburn is a good example.
2. Second degree. Blisters have been formed.
3. Third degree. The skin is off and the burn has affected deeper parts.

Treatment. Remove the clothing, if necessary, using the greatest possible care. If the clothing sticks cut around that part and let the doctor take it off. Burns or scalds are very painful and the first thing to do is to exclude the air. This can be done by applying any one of the following:

1. A thin paste made from water and starch, flour or baking soda.
2. Castor oil, olive oil, carron oil (one-half lime water and one-half linseed oil, linseed oil, lard, cream, butter, ordinary vaseline, carbolyzed vaseline, or sterile petroleum.
3. Grated potatoes, a normal salt solution, or the whites of eggs.
4. Picric acid gauze, or use ordinary gauze which has been dipped in a 1 per cent solution of picric acid (one-half teaspoonful in a pint of water). Before using picric acid gauze, moisten with boiled water, steam, tea or coffee. Picric acid may increase burning slightly but will lessen it later.

In using grease or oil of any description be sure that it is sterile. The bacteria and dirt found in most grease or oil does more than enough harm to compensate for the good.

After applying any one of the above, cover with a sterile dressing, cover the latter with cotton and apply a triangular bandage. Never put cotton directly on the burn.

In bandaging, never bandage surfaces together.

Treat for shock.

Burns from Alkalies. Wash off as quickly as possible. Neutralize with vinegar, lemon juice or hard cider. After neutralizing, treat like other burns.

Burns from Acids. Wash off as quickly as possible. Apply lime water, soapsuds or a mixture of baking soda and water.

In carbolic acid burns apply alcohol.

Sunstroke. This is caused by exposure to the sun's rays, especially when the air is moist, and by exposure to excessive indoor heat.

Symptoms:

1. The face is red and flushed.
2. The skin is hot and dry.
3. No perspiration.
4. Pulse slow and full.
5. Breathing labored and sighing.
6. Enlarged pupils.
7. Patient always unconscious.

Treatment. Call a doctor.

Reduce the temperature as quickly as possible by removing the person to a cool place. Take off the clothing and apply cold to the whole body in any way possible. A good way is to place the patient in a cold bath. If this is done, rub continually to prevent shock and to bring hot blood to the surface.

Do not give stimulants.

Heat Exhaustion. This is caused in the same way as sunstroke but is very different from it. The symptoms are exactly opposite from sunstroke.

Treatment. The same as for shock.

Frost-bite and Freezing. Frost-bite usually happens to the ears, nose, fingers and toes. There will be no feeling in the part affected, and it will be white in color. Gradually restore to normal temperature. Rub with ice, snow or cold water.

Freezing is caused by long exposure to cold.

Treatment. Put the person in a cold room and restore the natural temperature of the body by rubbing the limbs toward the body with cloths wet with cold water. Gradually increase the temperature of the room and the water. Give stimulants as soon as patient is able to swallow.

UNCONSCIOUSNESS

The common causes of unconsciousness are electric shock, bleeding, shock, sunstroke, freezing, fits, fainting, apoplexy, injury to the brain and some poisons.

The last five will now be considered.

Fainting. This is due to a lack of the blood to brain. Usually occurs in ill-ventilated, overcrowded places.

Treatment. Place the patient in a lying position, with the head

lower than the rest of the body. Apply cold to head and chest and ammonia to the nose. Give a stimulant when the patient is able to swallow.

Fits or Epilepsy. This is known as falling sickness, and is a nervous disorder.

Symptoms:

1. Person falls to ground with convulsions and usually gives a loud cry or scream.
2. Unconsciousness.
3. Muscles stiff.
4. Breathing stopped for the moment.
5. Head turned to one side by jerks.
6. Face pale at first then livid. This stage lasts about a half minute, followed by rolling of eyes, biting of the cheeks and tongue. This lasts a few minutes and consciousness returns.

Treatment. Place the patient on his back, and as soon as possible put a gag in his mouth. Cover him with blankets, loosen clothing, cold water to face and chest, and let rest.

ALCOHOLIC POISONING (SPREE) AND APOPLEXY

Alcoholic Poisoning Symptoms:

1. Paralysis.
2. Unconsciousness, partial or complete.
3. Face flushed or bloated.
4. Skin cool and moist.
5. Eyeballs red but *not* insensitive to touch.
6. Pupils natural and large.

Treatment:

1. Give an emetic.
2. Give a stimulant.
3. Warm the body.

Apoplexy. This is often confused with alcoholic poisoning and is caused by the bursting of a diseased blood vessel in the brain.

Symptoms:

1. Pupils unequal in size.
2. Eyeballs sensitive to touch.
3. Paralysis.
4. Face red.
5. Unconsciousness.

Treatment: Place in a lying position with the head lower than the rest of the body.

2. Cold cloths to head.

3. No stimulants.
 4. Rest.
- Patient should be in a dark, cool room.

INJURY TO THE BRAIN

Symptoms:

1. Hemorrhage from nose, ears, mouth and eyes.
2. Unconsciousness.
3. Pale face.
4. Pupils large and unequal in size.
5. Breathing labored.
6. Pulse slow and full.
7. Eyeballs insensitive to touch.
8. Paralysis.

Treatment. Same as in apoplexy.

CARBOLIC ACID POISONING

Symptoms:

1. Vomiting and great pain.
2. Strong smell of carbolic acid.
3. Lips, tongue and mouth burned white by pure, and black by impure carbolic acid.

Treatment:

1. Rinse the mouth with pure alcohol or whiskey.
2. Give Epsom Salts in water.
3. Give raw eggs.
4. Give castor or sweet oil.
5. Stimulant.
6. Treat shock.

EXCERPT FROM ARIZONA MINING CODE

SEC. 4069. It shall be the duty of the mine operator, superintendent, or anyone in charge of a mine, where ten or more men are employed, to keep at the mouth of the tunnel, shaft, or stope, or at such other place about the mine as may be designated by the mine inspector, a stretcher and a woolen and waterproof blanket, in good condition, for use in carrying any person who may be injured at the mine. Where more than one hundred persons are employed two or more stretchers with woolen and waterproof blankets shall be kept, and at all mines a supply of first-aid remedies shall be kept readily accessible for the treatment of anyone injured.

There should be maintained a first-aid dressing station at each mine, containing a stretcher, woolen blanket, waterproof blanket, set of splints, first-aid cabinet and first-aid packets. The blankets and stretcher should be protected from moisture.

The first-aid box should contain:

- 12 sterile triangular bandages.
- 12 small bandage compresses.
- 12 medium bandage compresses.
- 6 large bandage compresses.
- 1 dozen finger dressings.
- 6 picric acid gauze one yard long.
- 2-ounce bottle of aromatic spirits of ammonia.
- ½ dozen paper cups.
- 2 tourniquets.
- 1 scissors.
- 1 spoon
- 1 bottle half strength iodine.
- 1 dozen ammonia ampoules for inhalation stimulant.

One first-aid cabinet should be available for every 100 men or less and at least one out of every ten men should carry a first-aid packet—metallic case preferred.