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FIRST AID
IN
THE ROYAL NAVY
1943

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FIRST AID IN THE ROYAL NAVY

B.R. 25

CONTENTS.

FIG. 1.—*First aid bag carried by first aid parties.*

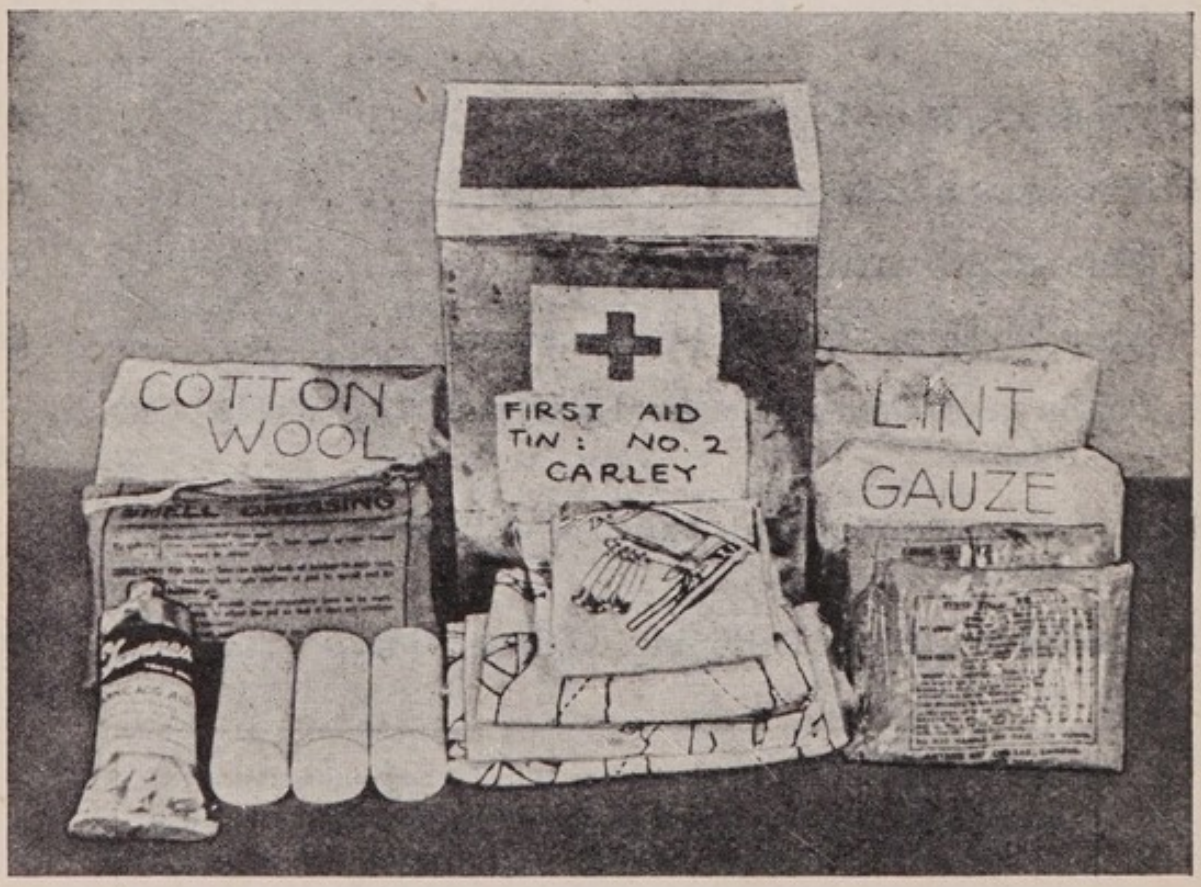


FIG. 2.—*First aid tin distributed in H.M. ships at action stations and on floats Note.—In some ships a haversack is provided in place of a sealed tin. Examples of the contents are shown*

INTRODUCTION

The objects of first aid, from the medical point of view, are to save life, relieve pain and to prevent injuries becoming worse. It is concerned only with temporary measures until more complete medical attention is available. From the point of view of the Service, its purpose is to maintain the fighting efficiency of H.M. Ships by helping to return casualties to duty with the least possible disability and in the shortest time.

All routine drills and exercises in the Royal Navy are designed to form a training for war and the practising of first aid parties is no exception. Therefore, the teaching in this book is arranged to enable you to deal particularly with war hazards and injuries. It is a helpful comparison to think of first aid as the damage control and salvage of personnel; with this in mind you can easily see that just as you have become capable of using the shipwright's tools or a collision mat when the ship is damaged, so you must have the training to carry out first aid when men are wounded.

In many actions in the past and even during this present war, it has often been a popular belief among ships' companies that first aid is only to be given by First Aid Parties, and that wounded men must be taken to Medical Distributing Stations at once. This is not true. It has been proved again and again that **wounded men are best treated where they fall.** In order to do this every individual officer and rating must be able to perform first aid, combined with a sure confidence in himself and also in the usefulness of what he is doing. **Everyone must accept this as part of his duty,** realising that the treatment of casualties cannot always be left to the Medical Department alone. First aid tins or haversacks are distributed throughout H.M. Ships at action stations and you must know what is in them and how to use their contents.

First aid on the spot not only prevents injuries and pain becoming worse but also avoids taking fit men away from more important duties in order to provide transport. Thus, there is no interference with ammunition and repair parties and the fighting power of the ship is not slowed down.

Although this book gives you knowledge which you will want most of all while at war, the rules that it contains are just as useful for peacetime; so you need to know its contents for the accidents which may occur then.

Objects of first aid are to—

1. **Save life**
2. **Relieve pain**
3. **Prevent injuries getting worse**

by treatment on the spot.

CHAPTER 1.

SHOCK: GENERAL NOTES ON HOW TO LOOK AFTER INJURED MEN.

The subject of shock is explained to you first of all because it will often be necessary to mention it in the subsequent chapters. If you have learnt what it is and what to do for it from the beginning, it can be spoken of later on without further explanation. Also, by learning about shock you will get to know the general rules of how to look after all casualties.

The term "shock" is used to describe the state in which you will find **anyone who has had an accident or injury.** It varies from a slight feeling of sickness and faintness to complete collapse, which is failure of strength—with or without loss of consciousness. The severity of the shock depends on the constitution of the injured man and the seriousness of the damage done to his body. The injury and the pain are its immediate causes. In men with painful conditions like fractures and burns, shock develops very rapidly and very seriously so that it becomes a grave danger to life.

However, in the heat of action a man will often carry on even with very serious injuries. In such a case, where it is only a tough fighting spirit which is keeping him going, as soon as there is a lull he may crack badly. Then shock is often far worse than if it had come on in the first place. Do not be misled by the endurance of such a man and, having seen him carry on for so long, think that he is in little need of first aid. On the contrary, you should in some cases urge him to stop his duties—for example, if he has bad bleeding. You must use your **common sense** and decide what to do according to the circumstances.

When shock is well marked in a wounded man, you will usually see him lying quite still, taking very little notice of what is going on around him. His breathing will be slow and shallow, his whole body pale in colour, cold and clammy. He will tell you that he feels faint and thirsty; he may vomit, and if the condition gets worse, he may become unconscious.

The body tends naturally to recover from shock, but there are several things which make it worse. These are: loss of blood, exposure to cold and wet, severe pain, movement (such as attempts by the man to walk or by messmates to manhandle him), mental worry, fear and thirst. The treatment of shock must therefore be directed towards minimising and, if possible, removing these things so as to assist the natural recovery which normally tries to take place.

These are the things that you must do :—

1. Stop all bad bleeding.
2. Lay the injured man on the deck with his head flat.
3. Loosen any tight clothing.
4. Get him warm.
5 Give him a drink.
6. Relieve his pain.
7. Cheer him up.

Learn these seven points by heart. You will see their meaning as you read on and you will also learn many things which will help you to make your injured messmates comfortable, just at the time that they want your aid so much. It will help you to remember each point if they are separately explained.

1. Stop all bad bleeding.

When a man is bleeding badly, **you must stop it at once,** because he will surely die if you do not. How to do this is fully described in Chapter 3, but the fact that you must do it before anything else is stressed here because **bleeding makes shock much worse** even if it is not bad enough to endanger life.

2. Lay the injured man flat.

The bodily weakness which is part of the state of shock means that wounded men will often have collapsed on to the deck by the time that you are able to look after them. However, some particularly robust people are able to remain standing even with the most severe injuries, and you should get such men to lie down at once. You have already read in the introduction that casualties are best treated where they fall, and this rule should be followed except in certain instances. For example, if a man is wounded on the upper deck in foul weather, or where he will interfere with the work of others, it will be necessary to get him behind or under some shelter and out of the way of those who are continuing to fight the ship. If a man is injured in a compartment which is burning or flooding, he must obviously be taken to a safe place before anything else is attempted. Except in such emergencies, you should give first aid on the spot.

When you have got the injured man lying on the deck in a convenient place, you should raise his feet by resting them on a folded coat, a shell case, upturned locker or whatever is available. Do not place his head on a pillow but see that it is flat and turned to one side. (The head is kept low because his faintness is due to his brain having insufficient blood flowing to it, and by lowering his head the blood will get there more easily.) Provided that you have lowered the head you should not forcibly alter any position that the

injured man has found for himself, because it is he who knows best what position causes him least pain. In manhandling a wounded person and also when arranging blankets and assisting him in other ways, you must at all times use the very greatest possible **gentleness.** Remember that any unnecessary twinge of pain that you may give him will increase his shock.

3. **Loosen tight clothing.**

It is necessary to loosen all tight clothing to allow a free circulation of blood and also to prevent any collar or belt impeding the movements of the chest and belly in ordinary breathing; but **do not remove any more clothing than is necessary to carry out treatment,** as this not only disturbs the man, but also allows him to get cold and so increases shock. Men have died from exposure after having too many clothes cut away.

4. **Get him warm.**

We have already said that a shocked person is very cold, so every form of warmth that can be given will make his condition better. Covering the man with coats or blankets is a step that can nearly always be taken at once; you should also place a blanket, splinter protection mat or cushion **under** the casualty, as he will never get warm lying on a cold steel deck. Sending someone to fetch hot water bottles from the sick bay, pantry or galley should also be done as soon as possible. Alternative ways of giving warmth, such as filling beer and other bottles with warm water (only warm so as not to crack them) must be sought according to the circumstances. It is important that bottles are well wrapped up and not too hot to touch. It is very easy to burn a shocked man and bottles should never be placed next to the skin, but always outside at least one layer of clothing or a blanket. The difficulty of providing an adequate amount of warmth in H.M. Ships, particularly in destroyers and other small ships, is one which may not be easy to overcome. There are even occasions in very cold or rough weather when, despite the seriousness of the shock, it is advisable to carry an injured person to the engine-room flat, galley or bakery so that he may have the warmth that these spaces alone can give. The very greatest **common sense** is needed in deciding when this course should be adopted; remember that the moving of an injured man is nearly always the worst thing that you can do and it is only on very rare occasions that it is justifiable. When you are in the tropics, there may be no need to give warmth to shocked men and you must be careful not to cause harm by overheating a man in these circumstances.

5. **Give him a drink.**

Provided that the casualty is not suspected of having any internal injury (make sure that he has no bruise or wound of his

belly) and provided that he is conscious and all bleeding has been stopped, hot sweet drinks should be given to allay his thirst and to assist in getting him warm.

Drinks should only be given in sips (large quantities will almost certainly make him vomit) and hot sweet tea or black coffee are the best ; plain water, perhaps flavoured with meat extracts, or sweet fruit juices are also good. It is better to give cold water than nothing at all, except, as just said, if there is a wound of the belly, when to give fluid of any description is forbidden. Rum and other alcoholic drinks are never to be given except on a Medical Officer's instructions as they may increase bleeding.

6. **Relieve his pain.**

Morphia is needed by all men who are shocked and who have a lot of pain. It is therefore part of your duty to find, or send a message to, one of the officers who is carrying this drug. Tell him where the casualty is and how badly he is wounded. When morphia has been used, you should attach a label to the man's clothing, showing at what time and in what dose it was given.

FIG. 3.—*A casualty receiving first aid for shock. Note—Blankets below and above ; the drink, padded hot-water bottles and morphia being given.*

Next, you should relieve pain by giving first aid to the injury which is causing it. Remember that stopping the bleeding, laying the man down, loosening his clothing and getting him warm have

only taken a moment or two, and you should find yourself treating whatever injury the man may have within a few minutes. Later chapters will teach you what to do for the many different kinds of injuries for which you may be called upon to apply first aid dressings, etc.; here it is only necessary to repeat that, as you carry out your first aid, you must take the utmost care to be gentle, while at the same time being quick, firm and precise in doing what is required. Pain can also be relieved by appropriate adjustment of the man's position with suitable support before, during and after dealing with the wound or injury, and by the avoidance of unnecessary handling or movement.

7. **Cheer him up.**

Any man who has been wounded and is suffering from shock, who is therefore cold and trembling, has, of-course, been subjected to a frightening experience and it is an essential duty of all who carry out first aid to gain the confidence of the injured man, to cheer him up and when necessary to convince him that he is all right so that he does not think of "chucking his hand in." Remember that a casualty is wondering what has happened, whether he is going to live or die and whether, if he lives, he is going to be scarred or mutilated for life. His thoughts are turning in a lonely little personal world of fear, no matter how brave a man he may be. All this mental worry serves to increase his shock and it can be lessened very much by a sympathetic messmate. Talk to him, be natural to him in such a way that he will realise that he is in good hands. And while talking near wounded men, never whisper. Although you want to avoid extra noises, do not hush your own voice so that casualties cannot hear. If you do, they will at once think you are talking about them and may be anxious to know what you are saying. Give him a cigarette, even if you have to light it for him, and then to hold it for him. The small puffs taken will often greatly help towards getting him back to normal. If he is very weak or has had morphia, there is still no harm in his having a smoke, provided you help him and take care that he does not burn himself.

The hope that comes to him with the friendly words of his pals can perhaps only be realised by those who have themselves been casualties, but it is assuredly a wonderful way of assisting his strength and preventing shock becoming worse. When you have finished bandaging or whatever you may have had to do, if you have no other wounded men to look after, or other duties, stay with him; if you cannot, try to get someone else to be beside him all the time, who can continue to talk with him and make him comfortable by wiping his face and eyes and giving him sips of fluid to moisten his

dry lips. Action noises usually seem very loud to shocked men, and if gunfire or the whistle of falling bombs is going on you must plug their ears with cotton wool or cover them with a bandage to shut out these sounds which now have a much greater meaning to them.

The scope of the first aid treatment for shock is very wide, as you can see from the number of things that you have read in this chapter. Remember that every wounded or injured man is going to suffer from shock to some extent and that you will have to bear in mind all the points for preventing or treating shock every time you deal with any casualty, besides giving first aid to whatever particular injury may have caused the shock. If you are single-handed, you must do all you can and the most important things first. Your own judgment of the circumstances will have to decide for you what to do when it is a question of leaving a casualty alone to fetch such things as drinks and blankets; obviously, you would first attend to his wounds and see that all bleeding has stopped. Usually, however, in H.M. Ships there will be many helpers for each case, and then the senior rating who is confident that he can do all that is needed will take charge and direct others to fetch such gear as is wanted.

As a rule the moving of an injured man to the Sick Bay or Medical Distributing Station should be delayed until the return of colour and warmth to his face and the disappearance of the beads of cold sweat show that you have effectively done all that was necessary for his shock.

SUMMARY.

First Aid for Shock is—

1. **Stop bleeding.**
2. **Lay the injured man flat.**
3. **Loosen tight clothing.**
4. **Get him warm.**
5. **Give him drinks.**
6. **Relieve his pain.**
7. **Cheer him up.**

You should do these things as soon as possible for all casualties. Use your **common sense** to decide how much you can do. Remember that first aid at once on the spot can do far more good than expert medical treatment later.

CHAPTER 2.

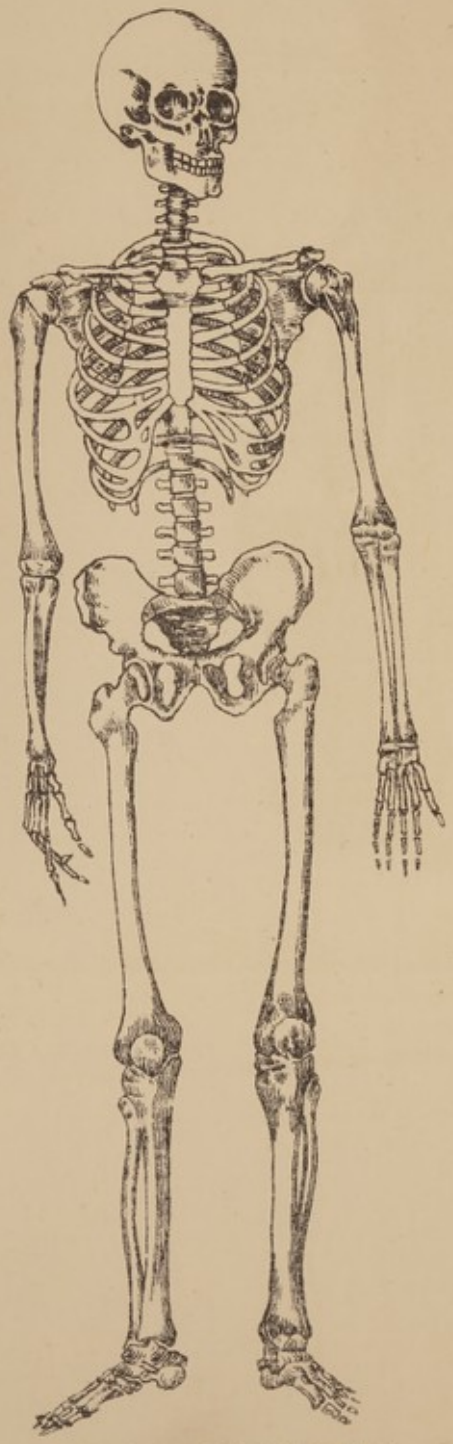
THE SKELETON. FRACTURES AND THEIR TREATMENT.

1. THE SKELETON.

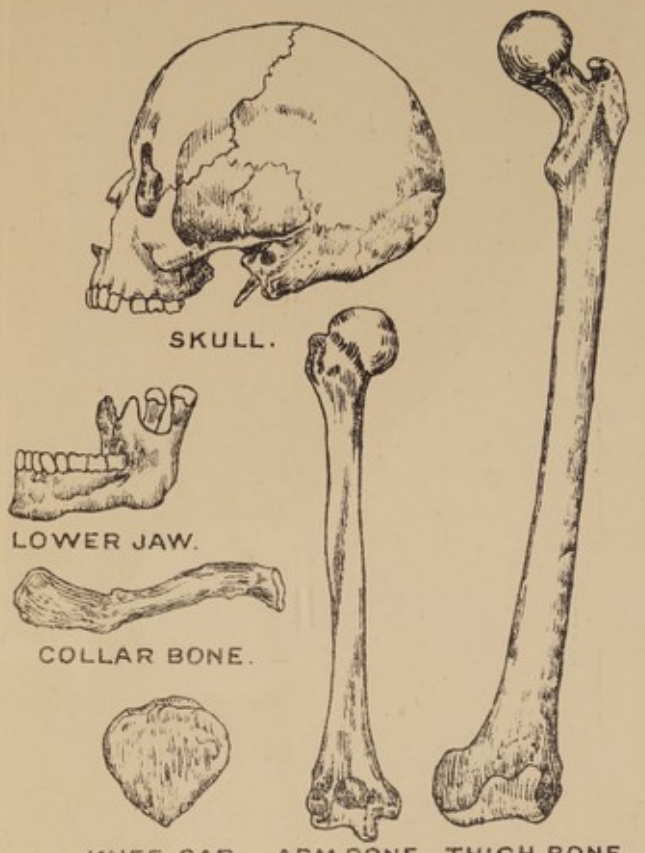
The diagrams of the complete human skeleton and of the larger individual bones must be looked at carefully. Look again and try to retain in your mind's eye the shapes of the bones and their names. As you read this section and find that each bone is mentioned, look once more at the appropriate drawings and also feel through your own skin those parts of the bones which lie close under it. Try to imagine how your own bones are lying in your own body and see them through your flesh (as an X-ray photograph shows them).

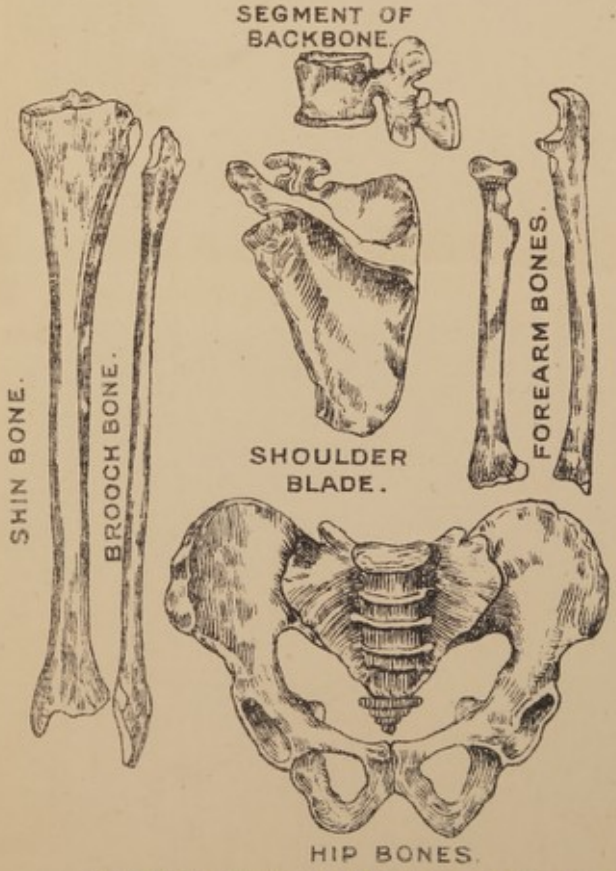
The **head,** or skull, forms a case which contains and protects the brain. It consists of many bones firmly joined to one another, except for the lower **jaw** which moves at a joint just in front of the ear. The skull rests on the upper end of the **backbone** which is made up of a series of small bones like cotton reels placed on top of each other. Let us now follow the backbone down to the lower limbs and then return to the ribs and upper limbs. At the lower end of the backbone are the **hip bones,** one on either side, which together form a basin to support the contents of the belly. On the outer side of either hip bone is a cup-shaped socket into which the rounded head of the thigh bone fits. Thus the so-called " ball-and-socket " hip joint is formed. The **thigh bone** ends at the knee where it forms a hinge-like joint with the strong **shin bone** which can be easily felt under the skin. On the outer side of the shin bone is attached the slender **brooch bone,** so named because of its resemblance to the pin of a brooch. In front of the knee joint lies the **knee-cap,** the shape of which can be particularly easily felt on yourself. Its use is to take the rub of the thigh muscles off the front of the knee joint. At the ankle the foot is joined to the lower ends of both the shin and brooch bones by another hinge joint. The **foot** is made up of many small bones of peculiar shapes which it is not necessary for you to learn.

We will now return to the ribs and upper limbs ; on either side, **twelve ribs** are attached to the backbone. Each rib, with the exception of the two lowermost on either side, curves round the chest from the backbone behind to the **breast bone** in front. As you can see in the diagram, the lowermost ribs have no attachment to the breast bone in front. The ribs enclose the chest and protect the lungs, heart and other internal organs. When you take a deep



HUMAN SKELETON.





SEPARATE HUMAN BONES.

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breath you can feel the way in which your ribs move: slightly upwards and outwards so as to expand your chest. The breast bone, flat and dagger-shaped, lies close under the skin of the front of the chest and to its upper end is attached a **collar bone** on either side. This bone (remember to feel its curved rod-like shape on yourself) goes out horizontally to the point of the shoulder and it acts like an outrigger in keeping the shoulder in position. The outer end of the collar bone joins with the **shoulder blade** which is a triangular bone lying at the upper and outer part of the back of the chest on either side. Each shoulder blade has a shallow socket into which fits the rounded upper end of the **arm bone.** At the elbow the arm bone forms another hinge-like joint with the two **forearm bones** and these join with the hand at the wrist. The **hand,** like the foot, is made up of many small bones, the shapes and names of which you need not learn.

It is worth while noticing that there is a general similarity of arrangement between the upper and lower limbs. Both are joined to the body by a ball-and-socket joint, then there is a single large bone, the lower end of which makes a hinge-like joint with two parallel bones; these connect by another hinge-like joint to the hand and foot, both of which are composed of many small bones. The cause of this similarity is that man was once a quadruped and at that time all his four limbs were very much alike. When, however, he assumed the erect posture by standing on his two hind legs, his upper limbs became modified to suit the new conditions.

2. CAUSES OF FRACTURES.

A fracture is a broken bone.

Fractures may be caused in several ways. A **direct blow** on the body may break a bone at the point of contact; for example, an ejected shell case may strike the leg of one of a gun's crew and break his shin bone. An **indirect blow** may also cause a fracture. For example, when a man falls heavily on his outstretched hand he may break his collar bone; in such a case the collar bone has not been hit directly but has broken as a result of the strain put on it by the force or blow applied to the hand, Thirdly, the action of a man's **own muscles** may break a bone; the arm bone has occasionally been fractured by the strength of the muscles attached to it when throwing a cricket ball violently. The knee cap may be broken in half by jumping.

Bones are often fractured **in action.** Bullets and metal splinters may penetrate the flesh to fracture a bone by a direct blow on it; men may be blown against bulkheads and machinery by the blast of explosions and have their bones broken by both direct and

indirect blows ; the weight of fallen debris on men who are trapped may cause bones to " give way." This latter happens more often during air-raids on shore establishments than in action at sea. When a ship is struck by a **mine,** many men may sustain fractures of the bone of the heel (one of the foot bones), the shin bone, hip-bone, backbone and skull as a result of the explosion causing a sudden heave to the decks. For example, a sloop was mined in 1941, and 19 men were injured. The casualty list read as follows : Fractured foot, 5 cases ; Sprained ankles, 5 cases ; Fractured leg, 2 cases ; Sprained knees, 3 cases ; Fractured thigh, 1 case ; Bruised knee, 1 case ; Head injuries, 2 cases. As fractures are serious injuries, you must take special care to find out if they have occurred when a ship is mined.

3. KINDS OF FRACTURES.

There are two principal kinds of fracture called **closed** (or simple) and **open** (or compound). (The names in the brackets are often used to describe them. They are only shown here in case they are already known to you, so that you may connect them with the easier and less confusing words which are used in this book.)

A **closed fracture** is one in which the flesh around the broken bone is only very slightly damaged and there is no opening through the skin to the air. The bone itself may be broken in several places and the injury may be very serious, but because it is closed (meaning that nowhere, at no time, does air reach the broken bone) it is never so bad as an open fracture.

An **open fracture** is one in which air is able to reach the broken surfaces of the bone either through a wound in the skin nearby or, rarely, because the sharp jagged ends of the fracture protrude through the skin. Such an injury is one of the most dangerous accidents that can happen because when air can reach the bone so also can all kinds of dirt from the surroundings ; thus a poison may find its way into the bone and cause an abscess there and sometimes deadly blood-poisoning.

All fractures due to bullets and metal splinters from bomb and shell bursts are, of course, open because the missile itself has made an opening down to the bone.

4. HOW TO RECOGNISE A FRACTURE.

A man who has a fracture will also have some degree of shock ; it may be very serious shock. Knowing what was said in Chapter 1, you will see this first of all and treat for shock straight away, without waiting to find out whether it is, in fact, a fracture which is causing it.

While you are doing this, ask the man what has happened. Listen to his story of the accident, because very often it will lead you to suspect that a bone has been broken. You have already been told some of the causes of fractures and if, for example, he tells you that he has dropped a 100 lb. projectile on himself you have good reason to suppose that he has broken the small bones of his foot. When he does not know what has happened, or is unconscious and unable to speak for himself, other men who saw the accident can be very helpful ; they may either have heard a snap when the bone broke or have seen what object or missile struck the man. But the casualty himself will usually be able to tell you what has happened and also that he felt something " give way," that he at once had great pain and that he is now unable to use the injured part. These things, the story, the shock, the pain and the loss of use of one part of the body, will, in most cases, indicate to you the likelihood of there being a fracture. Now you must make sure of your suspicions by examining the place that hurts. Remember that while you are doing this you must be very **gentle ; do not increase the shock by giving unnecessary pain and do not make the fracture worse by mishandling it.**

In order to look at the injured spot properly, clothing should be cut away so that you can see the skin. It is usually better to cut clothes to inspect a fracture rather than to take them off ; in this way you need not move the limb at all and you will remove no clothing more than is absolutely necessary. In handling the man to do this, it is wise to get any men standing by to lend a hand ; tell them to support the limb which is injured and to allow it to move as little as possible. When this has been done, you will be able to see other things which will enable you to be sure that there is a fracture. First, as you run your fingers very lightly over the bones where the injured man tells you something is wrong, you will find that there is one particular spot which is very tender and where you may feel an irregularity in the bone itself ; this may hurt the casualty, and once you have found the spot do not touch it again ; take your hands away and only use your eyes for the next second or two. You will be able to see that the place is swollen (and, of course, if there is a wound you will know that the fracture, if it is there, is open). The skin may be blue or black because of bruising, and may look an unusual shape—a limb may even be bent or twisted—and unnatural movement may occur. But should this kind of movement happen, although it has proved to you that there is a fracture, you know that your helpers are not supporting the part carefully ; having seen it once, make sure that it does not happen again.

If in doubt as to whether a part of the body looks unusual, you should compare the injured with the uninjured side.

To summarise what has been said above : an injured man with a fracture has—

1. Shock.
2. Pain.
3. Loss of use of part of his body.
4. Tenderness of the broken bone.
5. Irregularity of the broken bone.
6. Swelling and bruising of the flesh around it.
7. Unusual position.
8. Unnatural movement.

Learn these eight points by heart so that whenever you have to look after an injured man who may have a fracture, you will be able to say them to yourself and look for each in turn. You must not expect to find all of them in every case, but the discovery of two or three usually gives enough evidence that there is a broken bone, although some of them may be found without there being a fracture at all.

If there is any doubt in your mind, always assume that there is a broken bone and give the correct first aid for it. If a Medical Officer later finds that it was not really necessary, he will only commend your sensible care. On the other hand, should he later find a fracture that you overlooked, then he will know that you have failed badly.

5. FIRST AID FOR ALL FRACTURES AND EQUIPMENT NECESSARY.

You already know that an open fracture is far more serious than a closed one. It is therefore obvious that if you are giving first aid for a closed fracture **you must keep it closed.** Remember that if you fail in this you will cause the injured man extreme pain, make his shock worse and give him the risk of blood poisoning. It would have been better if you had never seen him.

It is movement by a casualty and movement as a result of your improperly handling him which can create an open fracture by causing the sharp jagged bone to break through the skin. Hence the first rule is to **leave the man where he is lying until you have put on a splint.** (The only exception to this is that you must, of course, move a man a few paces to a convenient place when there is a danger of fire or flood.) This rule is also the first step towards treating the shock, so it is vital for two reasons. To assist yourself in keeping the man still, tell him what you are doing and encourage him to leave everything to you.

If you are dealing with an open fracture from the beginning, there may be bad bleeding from the wound. You must therefore **cover the wound with a bandage to stop the bleeding.** This also prevents dirt getting into it. If the end of a broken bone is already protruding through the skin, cover it with a bandage at once just as though there was only a wound with no bone to be seen in it. **Never try to do anything to put the protruding bone back.**

Thus we have made two general rules for first aid for fractures:—

1. Treat the shock.
2. Bandage the wound—if there is one.

In these two ways you will have done a lot towards the first aid which is necessary and you will now be dealing with a man lying on the deck, whose bleeding (if any) has been stopped and whose wound (if any) has been bandaged, and who is covered with at least a blanket or coat.

The next thing you must do is to support the broken bone and **keep it still** by means of bandages, splints and slings.

Some broken limbs are obviously bent and of unusual shape, particularly if they have been broken by bullets or bomb splinters. You must realise that **it is NOT the job of a first-aid man to try and " set " a fracture.** Many important structures lie very close to bones and it is terribly easy to make the sharp ends of a broken bone pierce blood vessels or nerves, even if they do not actually come through the skin. Your aim is to **keep the broken part fixed firmly in the position in which you find it.** It is movement which hurts the patient, hardly ever the actual abnormal position ; if you fix the limb just as you find it there will be no more pain than if it had been straightened.

Splints.

Some pieces of wood, already cut to the necessary sizes, should be at the first aid posts and in the first aid bags. The way to use such " splints " is to secure them with bandages alongside a broken bone to keep the latter from moving.

They should be of such a length that when they have been secured, they keep still not only the broken bone but also the joints both above and below it, *e.g.*, if a shin bone is broken, you should have the splint extending from the ankle to above the knee.

Splints should be as wide as, or just a little wider than, the limbs to which they are applied.

If there are no cut splints available, you can make use of many objects which you or your helpers can find in the ship, *e.g.*, bayonet, scabbard, broom handle, shovel, strips of tin, zinc or other metal,

boat hooks, boats' stretchers, bottom boards or other light spars; the bottoms of drawers from cabin furniture or duckboards; anything stiff, light and flat as much as possible like the wooden splints. All splints should be padded with something soft, for example, cotton waste, table coverings, flannel, etc., and this padding should extend well over their edges. Unpadded splints press painfully against such places as the ankles and knees.

When you have secured a splint, an injured leg or arm should be supported and raised on a pillow or a bundle of clothing, or with a sling.

The injured man's own body is an excellent splint in certain cases, *e.g.*, if his thigh bone or shin bone is fractured, bandage his injured leg to his sound leg; if his arm bone is broken, bind this to the side of his chest.

If you have a stretcher and cannot obtain anything to take the place of a splint, then securely bind the injured man on to the stretcher with rope, a sheet, or a blanket wrapped completely round him.

Bandages.

You will find triangular bandages with most first aid gear. As the diagram shows, they may be folded in various ways according to what purposes you are going to use them. (They may be used as a tourniquet, as a sling or to retain a wound dressing as well as to secure splints.)

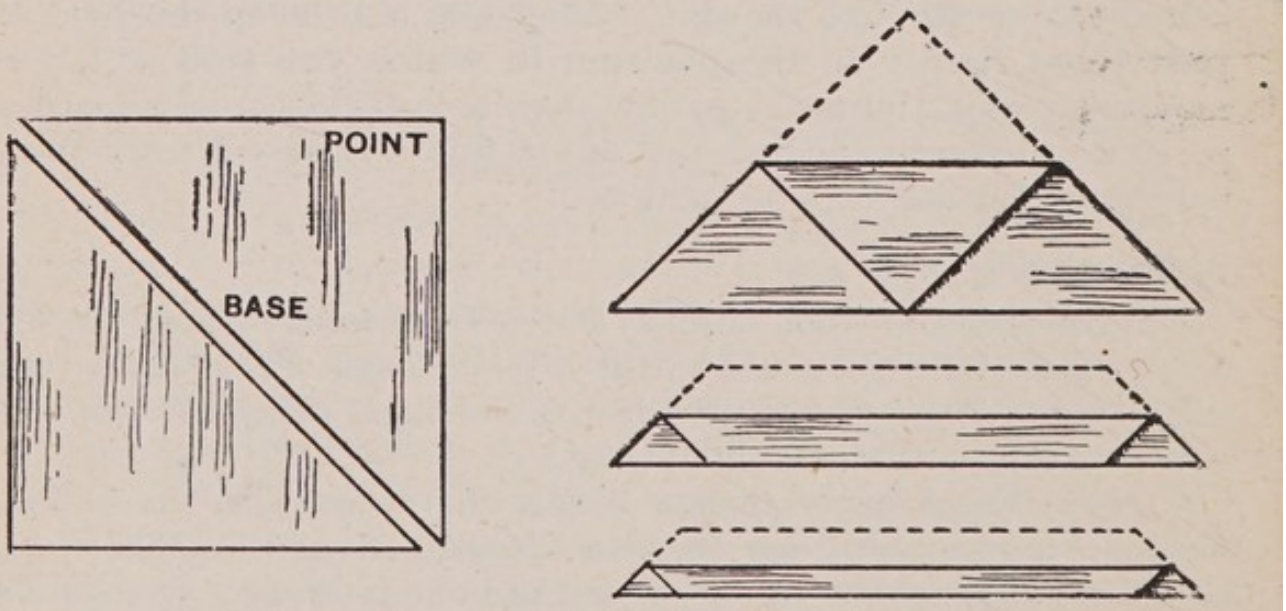


FIG. 4.—*Triangular bandages, showing how they are folded broad and narrow.*

If you have not got a triangular bandage at hand, you may improvise one by tearing or folding any piece of material such as your own singlet or large handkerchief. To serve the same purpose as the folded bandage you can use your belt, braces or socks or you

must send someone nearby to find some suitable material from the mess decks or cabins. Remember to fold whatever you use into broad bands rather than rounded cords like rope, as these would cut into the flesh.

Rolls of bandages are not quite so suitable for first aid, but should you have them and nothing else, then you can use lengths of them in double or triple thicknesses, according to their strength, to secure splints.

The ends of all bandages should always be tied by a **reef knot.** Knots should always be tied over the splints. This is safer and more comfortable than allowing the knots to dig into the flesh.

As soon as you have finished bandaging, ask the patient if he is comfortable. By the time that you have secured the last bandage the first may be too tight or too loose and you may have to make a few adjustments.

There will have been some swelling with the fracture right from the beginning. This swelling may increase. If you have padded your splints well they are unlikely to be secured so firmly that the swelling makes the bandages too tight. But if the end of a limb gets numb, blue or cold, then the bandages must be loosened. The casualty himself would be able to see whether his fingers are becoming either swollen or bluish in colour, and he would feel his feet becoming numb. If you are unable to stay beside him you should tell the injured man that he may loosen these bandages himself or, if he cannot, that he should call for help.

Slings.

These are used to support the arm, in all cases of fracture of the collar bone, shoulder blade, arm and forearm bones and the hand. They are made with triangular bandages or other material such as you can find and put on as shown in the photographs. (See figures 5, 7, 8, 9 and 16.)

6. FIRST AID FOR FRACTURES OF THE SEPARATE BONES.

You must now read the details of how to splint various bones when they are fractured ; but this will not teach it to you perfectly. To understand it well you must study the photographs and practise on yourself and on your messmates the methods which are described. You should remember that in action you may often have to do these things **in the dark** or by the light of torches or lamps, so that you need to know them very thoroughly.

For example, in a destroyer, badly damaged at Dunkirk in 1940, a Medical Officer was groping his way in complete darkness through smashed bulkheads with water pouring down from overhead. He found a casualty and **felt** a fractured shin bone. He gave

FIG. 5.—*A large arm sling.* FIG. 6.—*The jacket used as a sling.*
Note —Minor casualties carry on after first aid.

first aid by using the sound leg as a splint. If you train yourself well and practise the methods which are described, you should also be capable of giving first aid under similar circumstances.

Upper Arm Bone (Humerus).

When this bone is broken **near the shoulder joint,** you do not require a splint.

1. Support the forearm across the chest with a sling.
2. Place the middle of a broad bandage across the upper end of the arm with its upper border level with the tip of the shoulder ; pass the bandage round the body and secure it with a reef knot under the opposite armpit. (See figure 7.)

When this bone is broken **across its middle,** you should use small splints.

1. Support the forearm across the chest with a sling.
2. Place two, or if possible, three, small padded splints on the front, back and outer side of the arm, extending from the shoulder to the elbow ; secure these with bandages. (See figure 8.)

FIG. 7. FIG. 8.

Fractures of the upper arm bone.

Near upper end. *Near middle.*

If you cannot find any suitable splints, you should bandage the injured arm to the side of the chest.

You will have noticed that the splints you should use for this fracture do not fix the joint above and below the fracture as you have been told they always should ; but this has been done by means of the sling that you put on first.

When this bone is broken **near the elbow,** you do not require a splint.

Gently bend the elbow as much as you can and support the forearm in a sling, raised so that the hand rests on the opposite shoulder. (See figure 9.)

There is often great swelling of the arm with this fracture and, with the bending of the elbow which has been described, the circulation of the blood to the hand may be held up. Therefore, warn the injured man to look at his fingers at intervals after you have put on the sling. Tell him that if his fingers get a little more swollen or blue as time goes on he must call for help to have the sling lowered.

Forearm bones (Radius and Ulna).

First aid is the same whether one or both bones are broken.

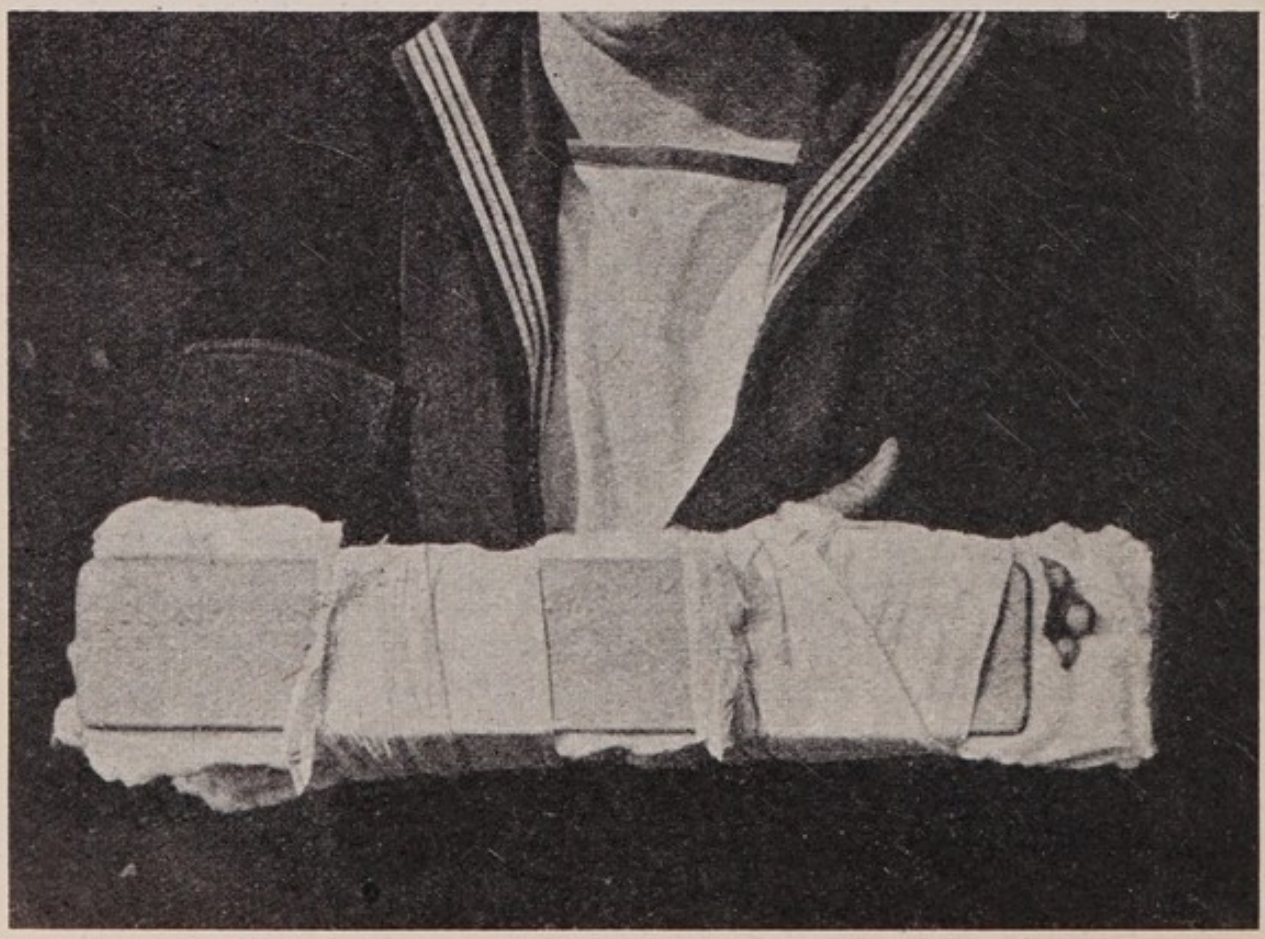
1. Gently bend the man's elbow to a right angle, with the thumb uppermost and palm of the hand towards the body, and support it across the chest.

2. Place one, or, if possible, two, padded splints, one on each side of the forearm, extending from the elbow to the fingers; secure these with bandages. (See figure 10.)

3. Put on a sling.

FIG. 9.—*Fracture of the upper arm bone near lower end.*

FIG. 10.—*Fracture of the forearm bones, before sling put on.*



Hand Bones.

1. Put a good firm wad of cotton waste, about the size of a cricket ball, into the palm of the injured hand, and fold the fingers as if to hold it.

2. Bandage the clenched hand. (See figure 11.)

3. Put on a sling.

Thigh Bone (Femur).

The assistance of another man is a great help in carrying out the first aid for this very serious injury.

1. Support the foot firmly in your hands.

2. Tie both feet and ankles together. (See figure 13.)

3 Place a long splint, extending from under the armpit down to the foot, on the outside of the injured leg Secure this with bandages which pass right round the man's chest and both his legs. (See figure 12.)

FIG. 11.—*Fracture of hand bones. Putting on a bandage, and the finished bandage.*

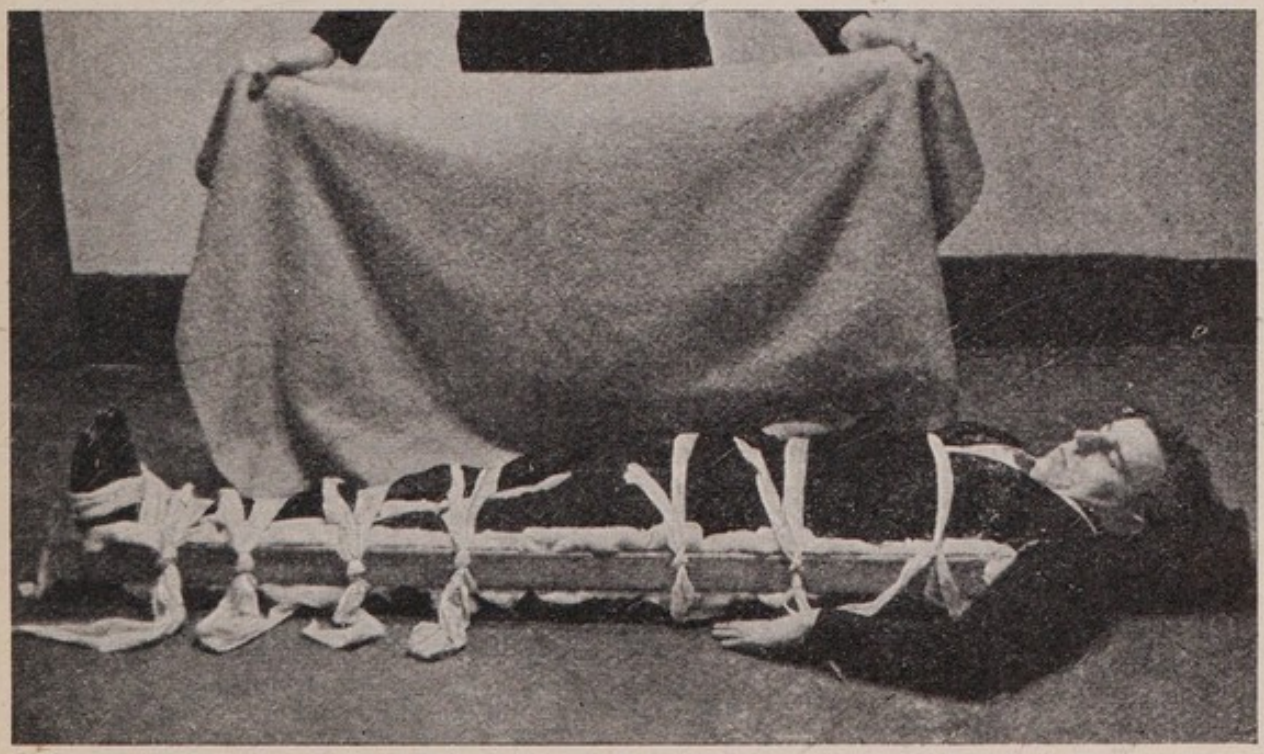


FIG. 12.—*Fracture of thigh bone.*

FIG. 13.—*How the feet are secured together in Fig.* 12.

The bandages should be tied in this order : first at each end of the long splint, then above and below the fracture, and lastly in the other positions shown in figure 12.

The long splint must be well padded, particularly where it touches the injured man's hip, knee and ankle.

When no splint can be found, the feet, ankles, knees and lastly the thighs of the injured man should be bandaged together.

Knee Cap (Patella).

1. Gently straighten the knee joint, if it is bent.

2. Place a splint (well padded under the knee) extending from the middle of the thigh to the heel, on the back of the injured leg ; secure this with bandages above and below the knee joint.

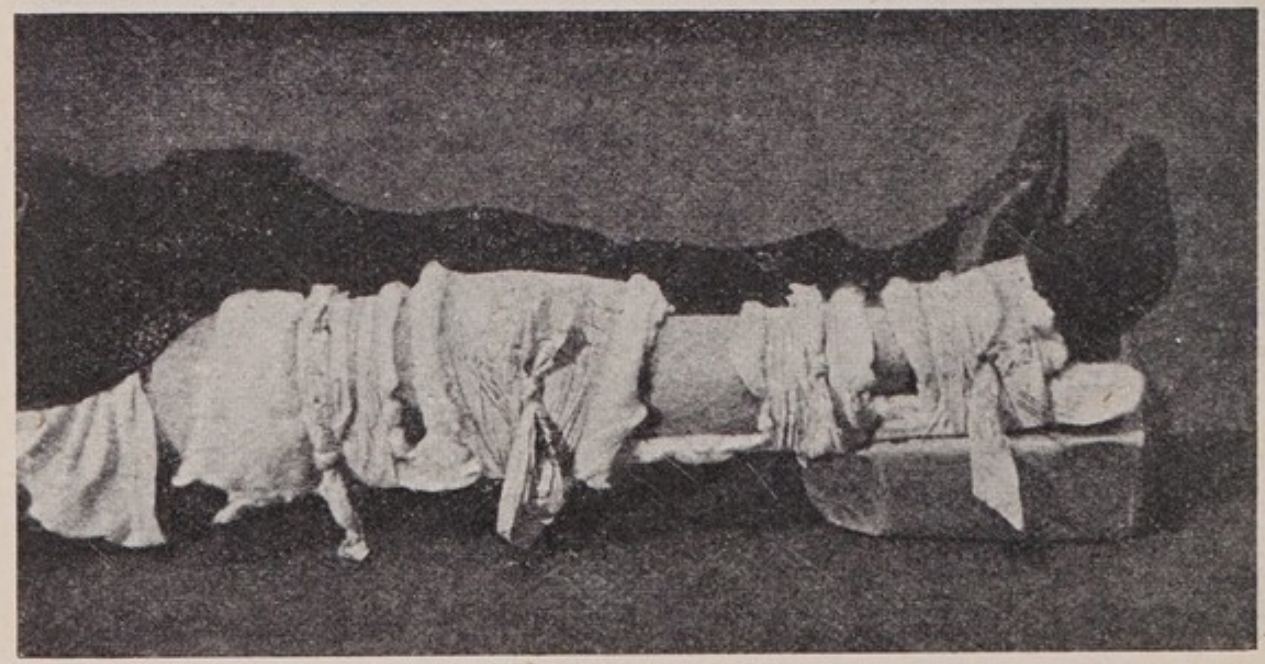


FIG. 14.—*Fracture of knee cap.*

3. Place some padding over the injured knee cap and firmly secure this with a broad bandage, leaving the knee as nearly straight as possible. (See figure 14.)

Leg Bones (Tibia and Fibula).

First aid is the same whether one or both bones are broken, but there are two methods according to how much the leg is out of shape.

If the leg is in an almost normal position :—

1. Support the foot in your hands.
2. Secure both feet together. (See figure 13.)
3. Place a padded splint, extending from the middle of the thigh to the heel, on the outside of the leg; secure it with bandages right round both legs.

When no splint is available, the feet, ankles, thighs and knees should be bandaged together.

If the leg is in a very unnatural position, splint it as it is without securing both feet together. Place a broad splint behind and several small very well padded splints at the sides. Bandage all together firmly over plenty of padding.

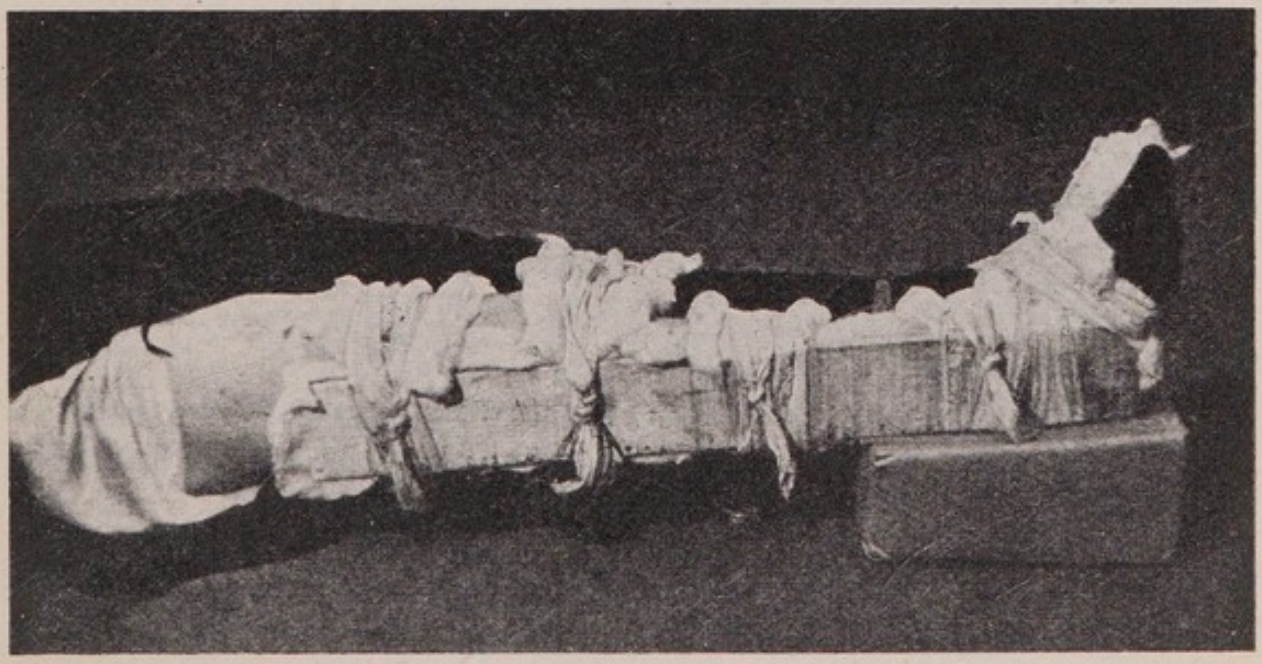


FIG. 15.—*Fracture of leg bones.*

Foot Bones.

If a heavy object has fallen on a man's foot and he has considerable pain, you should strongly suspect a fracture.

1. Do not remove his boot or shoe ; only loosen the lacing.
2. Put a firm bandage round the foot and ankle to prevent the foot moving.

FIG. 16.
Fracture of collar bone.

Collar Bone (Clavicle).

1. Where braces are worn, you should unfasten them.

2. Place a firm wad of cotton waste or rolled up handkerchiefs into the arm-pit.

3. Put on a sling, to take all the weight of the elbow, with the hand raised to rest on the opposite shoulder.

4. Place the middle of a broad triangular bandage at the lower end of the arm with its lower border at the tip of the elbow; pass the ends round the body and secure firmly. (See figure 16.)

As described under the first aid for a fracture near the elbow joint, warn the man to tell you if his hand becomes numb, extra cold or blue, so that the bandage or sling can be loosened.

Notice that the shoulder on the injured side is supported and well raised.

Ribs and Shoulder Blades.

When these bones are broken, the injured man will be unable to breathe normally without severe pain at the place of the fracture. If you suspect a fractured rib and he has not already told you this, ask him to take a deep breath in; he will suddenly cut short his deep breath when it hurts him. If this does not hurt him, he has not got a fractured rib. When there is a fracture the first aid is as follows:—

1. Place a piece of cloth, the size of a small towel, round the lower part of the man's chest and hold the ends near each other like the front of an unbuttoned waistcoat.

2. Tell the man to breathe out as much as he can and then to "hold his breath **out**" for a moment.

3. Pin the ends of the towel tightly together down the front of his chest, at moments when he is holding his breath out. (See figure 18.)

4. If the shoulder blade is broken, place the arm on **that** side in a sling.

If no safety pins are available, another method of keeping the ribs still is to secure several broad bandages tightly round the chest. First, one round the lowest part of the chest, then another above, just overlapping this, and so on. Each bandage is tied at a moment when the man is holding his breath **out.** (*See* figure 17.)

Provided that the man is not badly shocked, you should give first aid for fractured ribs while he is sitting down, not lying down; he will be more comfortable in this way. When you have finished and made it difficult for him to use his ribs to breathe normally, he will be most comfortable if you leave him still sitting. (He will continue to breathe with his diaphragm, moving his belly, when you have stopped him moving his ribs.)

FIG. 17.

Use of broad triangular bandages.

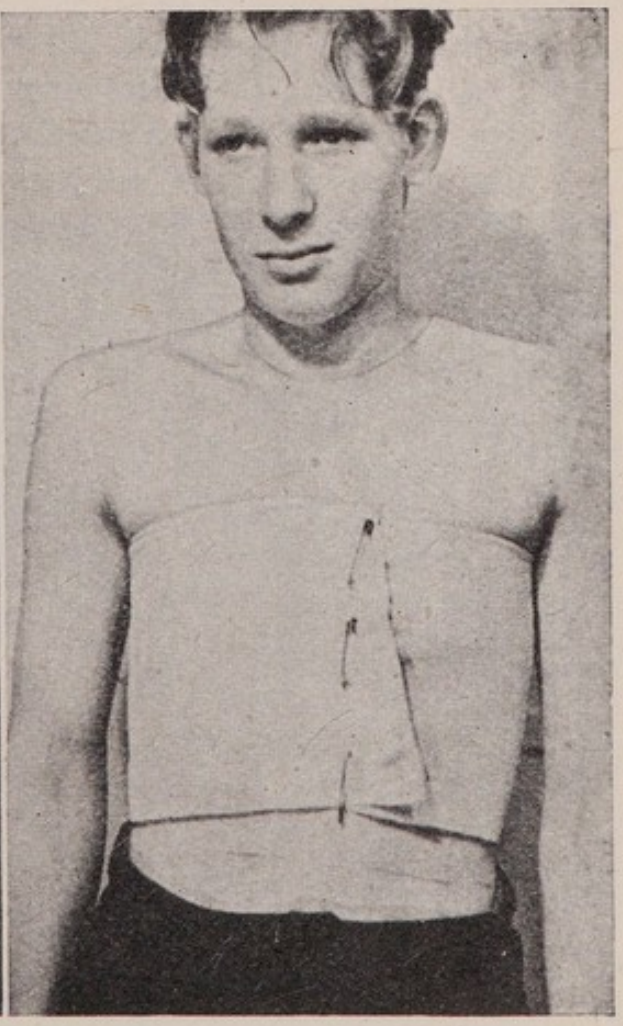


FIG. 18.

Use of towel and pins.

Fracture of ribs.

Backbone.

When you suspect a fracture of one or more of the small bones which make up the backbone you must do everything possible to prevent the injured man moving at all.

1. Warn the man to lie still—do not alter the position in which you find him.
2. Send a message to the Medical Officer.

This is the only fracture which it is essential for you to leave alone, because the very slightest movement may result in the man being paralysed for life, if you move him clumsily.

When the man must be moved out of the way of those who are continuing to fight the ship, try to keep the backbone straight by moving him on a flat board.

Hip Bones.

If, after a severe injury near the hip bones there is no sign of damage to the legs, but the injured man is unable to stand or move the legs without great pain, you should suspect that the hip bones are fractured.

1. Lay the man in whatever position is most comfortable for him.
2. Put a towel or broad bandage round his hips. (See figure 19.)
3. Bandage his thighs and legs together.

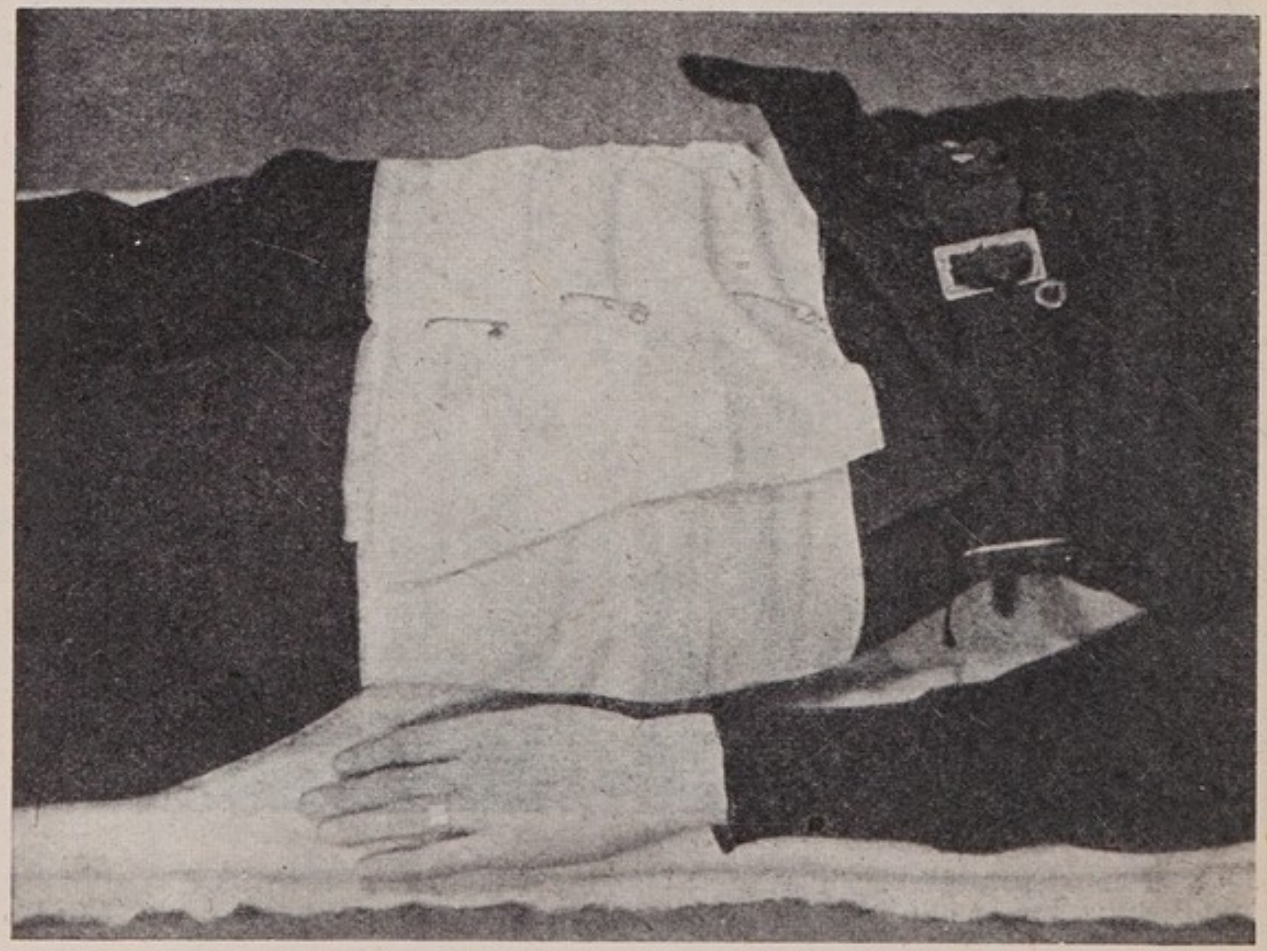


FIG. 19.—*Fracture of hip bones.*

Skull. *See* Concussion (page 101).

Nose. *See* Bleeding from the Nose (page 44).

Jaw.

A broken jaw is the only fracture for which a roller bandage is almost a necessity.

1. Support the jaw with the palm of the hand, pressing it gently upwards so that the teeth of the lower jaw make contact with those of the upper jaw.

2. Place the centre of a narrow bandage, about five feet long, under, and as far back towards the angle of, the jaw as is comfortable for the injured man. Include plenty of padding as shown in figure 22.

3. Carry the ends of the bandage upwards in front of the ears on to the top of the head ; tie the first loop of a reef knot. (*See* figure 20.)

4. While holding the loose ends in your hands, open out the knot on the top of the head so as to form two loops, one passing forwards, the other backwards. (*See* figure 21.)

5. Guide the forward loop on to the forehead so that it lies just above the eyebrows ; guide the backward loop on to the back of the head.

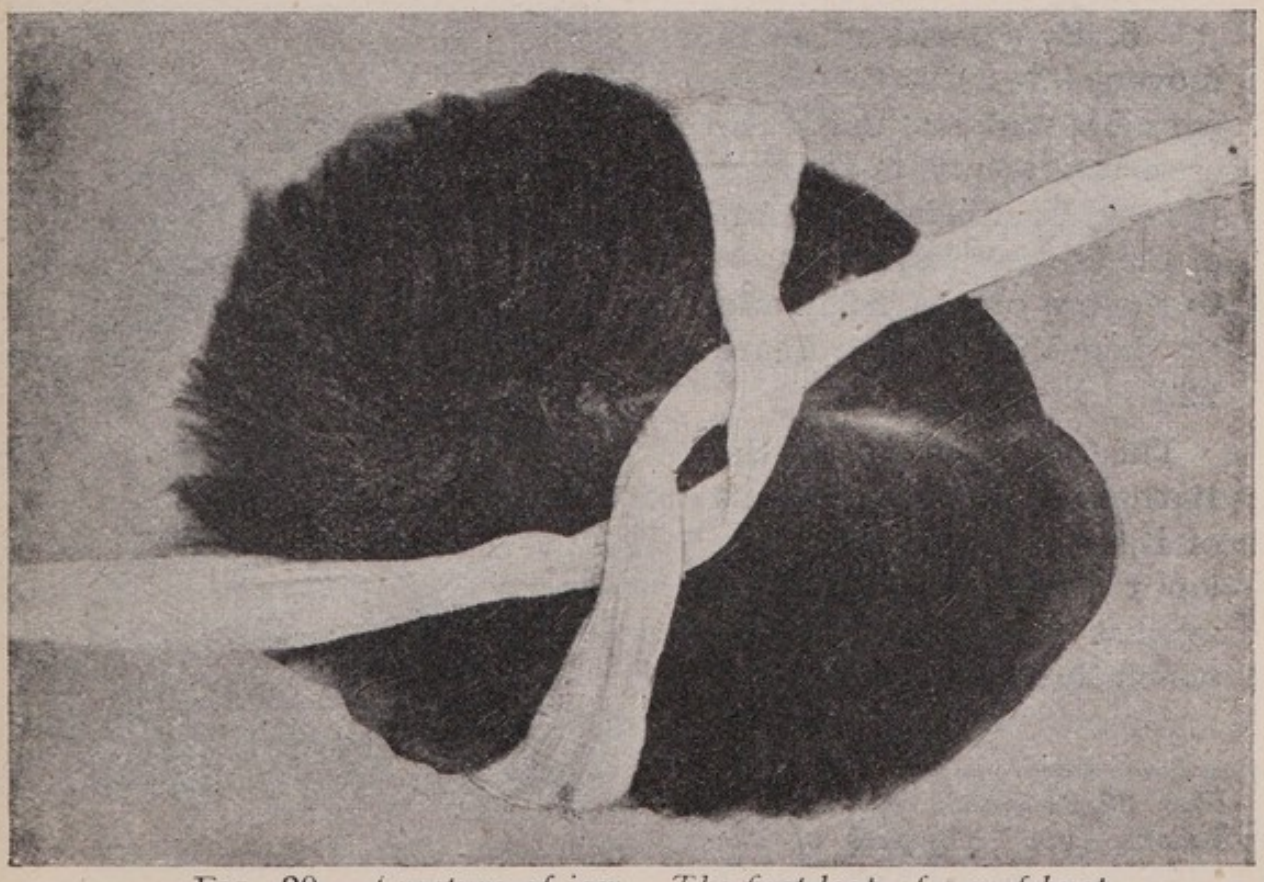


FIG. 20.—*Fracture of jaw. The first loop of a reef knot.*

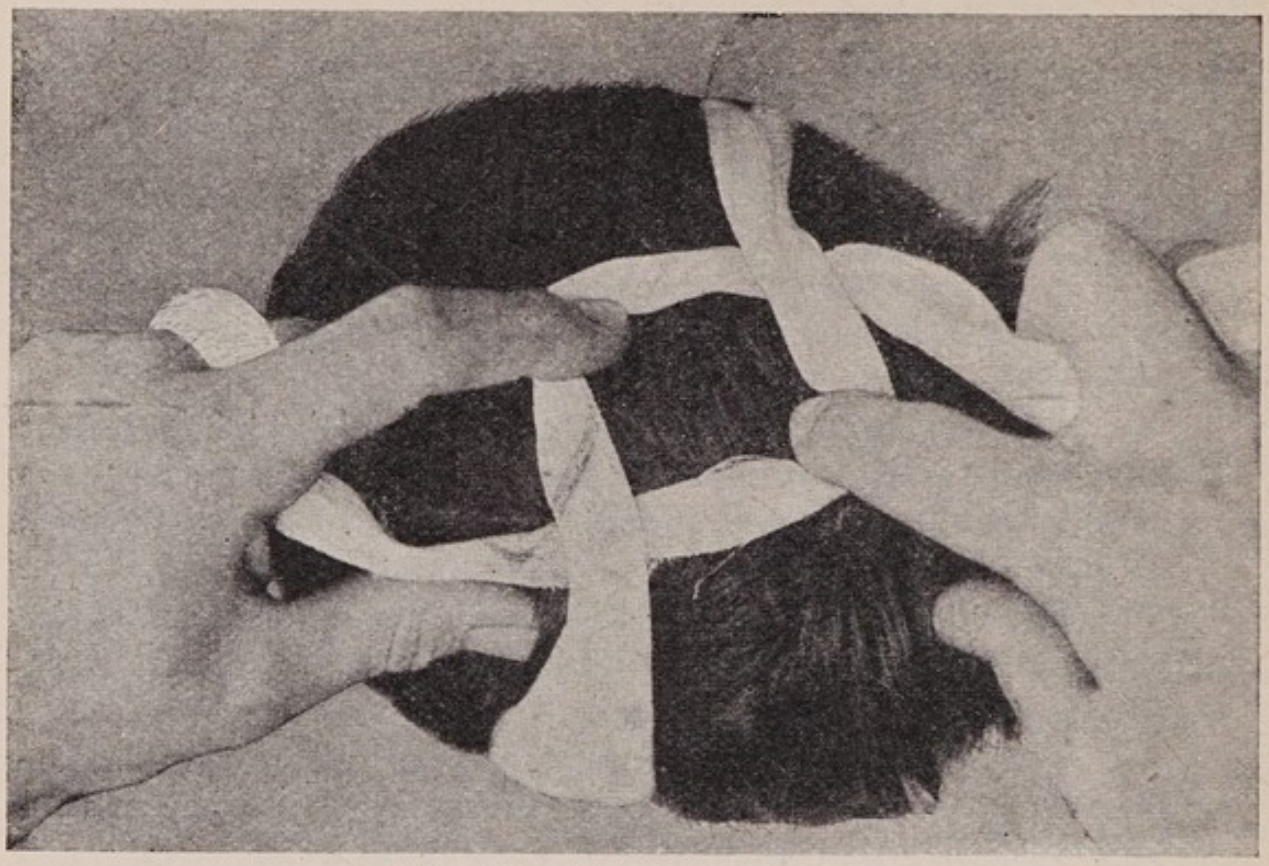


FIG. 21.—*Fracture of jaw.*
The loop being opened out.

6. By a series of small movements, make the bandage slide round so that each crossover is just in front of the ear, then bring the ends of the bandage upwards on to the top of the head and tie them there. (*See* figure 22.)

This is known as the Barrell bandage. By means of it, the teeth of a broken lower jaw are held firmly against the upper teeth, which then act as a splint.

FIG. 22.—*Fracture of jaw.*
The finished Barrell bandage.

Figs. 20, 21 and 22 reprinted, by permission, from "Injuries of the Jaw and Face" by Warwick James and Fickling.

NOTE.—The reason why you should place the lower part of the bandage as far back towards the angle of the jaw as is comfortable, is that the jaw is then supported with a slightly forward, as well as upward, pull, and is thus not allowed to slip backwards.

7. DISLOCATIONS.

A dislocation is present when the rounded end of a bone has slipped out of its socket; or at a hinge joint, when the ends of the bones which form it have been displaced from their usual position. Dislocations often occur when a ship is mined.

An injured man with a dislocation will be shocked and will have considerable pain about a joint that he cannot move. However, it is sometimes very difficult even for the Medical Officer to recognize at once the difference between a dislocation and a fracture and you should not waste time trying to do so; the first aid is very similar for both these injuries.

1. Give first aid for shock.

2. Fix the injured joint just as you would a fracture in that part of the body. **Do this with the limb either in the position in which you find it or in the position which is least painful.**

Do NOT attempt to replace the bones.

When you have done all the first aid that you can for a fracture or a dislocation, and the injured man has recovered from his shock, he is in a fit state to be moved away from the place where he was injured. But remember that you should not move him until either a lull in the action or until the action has ended.

The methods of carrying a casualty are described in Chapter 5.

First aid for fractures and dislocations is easy only when you know what you are trying to do and exactly how to go about it. So that you may not only become skilful, but also confident, in securing splints and slings, you must practise with your messmates the various methods which have been described, no matter how simple or how difficult you may think they are. Practise them until you know that you could do anything necessary, even in the dark.

Your own, and your pals', limbs and lives may one day depend on your being able to do this.

SUMMARY.

A Fracture is a broken bone.

A " closed " fracture is a broken bone with no wound in the skin.

A casualty with a closed fracture may have—

1. Shock.
2. Pain.
3. Loss of use of part of the body.
4. Tenderness over the broken bone.
5. Irregularity of the bone.
6. Swelling and bruising over the broken bone.
7. Unusual position of broken part.
8. Unnatural movement where the bone is broken.

First Aid for a closed fracture—

1. Treat for shock.
   (Rest, warmth, drink, cheer.)
2. Fix the broken bone.

An " open " fracture is a broken bone with a wound in the skin near or over it.

The bone is " open " to the air through the wound. A casualty with an open fracture usually has the same eight points listed above. In addition, he has a wound in the skin.

First Aid for an open fracture :—

1. Treat for shock, including stopping all bleeding.
2. Cover the wound completely.
3. Fix the broken bone.

The object of the first aid for both kinds of fracture is to fix the broken bone in the position in which you find it so that it cannot move.

CHAPTER 3.

CIRCULATION OF THE BLOOD. FIRST AID FOR BLEEDING.

1. CIRCULATION OF THE BLOOD.

You must learn how the blood circulates throughout the body before you can understand the various kinds of bleeding for which you may have to give first aid.

The **heart,** which lies behind the breast bone and the ribs of the left side of the chest, is a strong automatic muscular pump. The **blood** is forced by this pump into tubes, called **blood vessels,** which carry it to every internal organ and to every piece of flesh and bone in order to nourish and give heat to the whole body. The blood therefore is circulated in blood vessels just as steam is distributed throughout a ship in pipes. After having given up its nourishment, the blood returns to the heart to be refreshed just as steam uses up its force in the turbines and then returns to the boiler to be reheated.

The main tubes, or blood vessels, which carry the blood from the heart to the body are known as **arteries.**

As you see in figure 23 there are two main arteries running up to the head and one running from the heart to the end of each arm. There is also a very large artery running down just in front of the backbone which, after giving off branches to the contents of the belly, divides into two main arteries which travel down the legs. These main arteries give off many branches of all sizes which divide again and again into smaller vessels; these smaller vessels finally divide into millions of vessels which are so small that they cannot be seen with the naked eye. These tiny tubes, known as **capillaries,** are found in every part of the body; it is through their very thin walls that nourishment is given out from the blood to all parts while at the same time waste products are taken from these parts and drawn into the blood. These exchanges alter the colour of blood from bright red to dark red.

The capillaries join one another to form small vessels which run from all parts of the body back towards the heart. These are called **veins.** Small veins join to form bigger veins which finally join together to form two very big veins (about an inch in diameter) which enter the heart.

In general, every artery carrying blood from the heart has beside it a vein carrying blood in the opposite direction back to the heart.

The heart at once pumps the impure blood which has been brought back to it away to the lungs, where the job of purifying

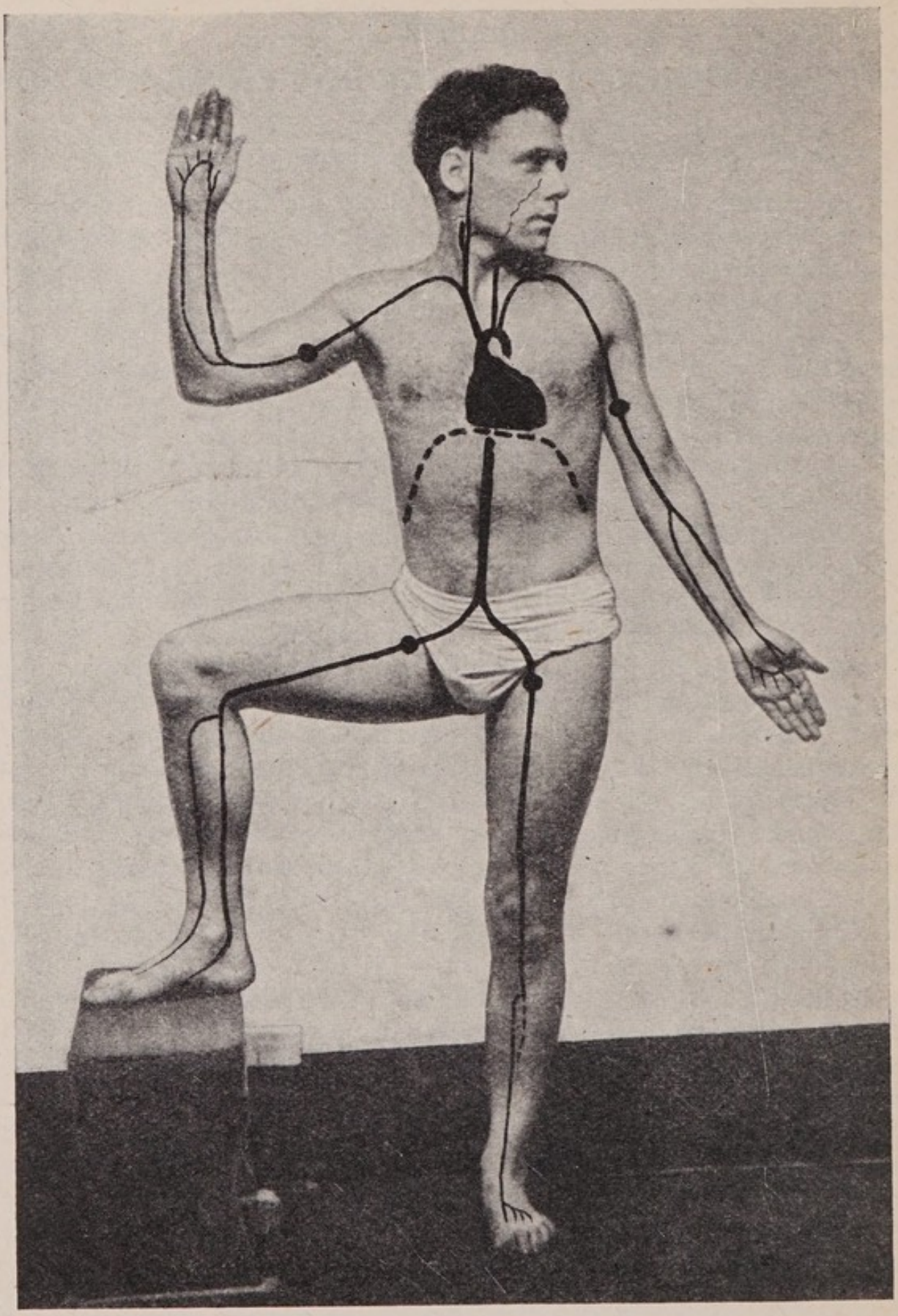


FIG. 23.—*The main arteries of the body.*

it is carried out. Then the blood comes back to the heart again which pumps this newly purified fluid away to the body through the arteries. Thus you can see that the heart really consists of two pumps; one to drive pure blood round the body and the other to drive impure blood through the lungs.

Normally the heart beats about seventy times a minute and thereby a constant circulation of the blood is maintained.

We have mentioned three kinds of blood vessels and you should remember in what ways they are different.

An artery takes pure bright red blood from the heart to all parts of the body. It is a thick-walled tube rather like a wirebound hosepipe. The blood in it is still under the high pressure given to it by the force of the heart.

A capillary is a minute tube which connects the smallest arteries with the smallest veins; it cannot be seen with the naked eye.

A vein takes impure dark red blood from all parts of the body to the heart. It is a thin-walled flabby tube; when empty it collapses like a canvas firehose. The blood in it is under very little pressure, because the tiny capillaries have cushioned off the heart's force.

2. KINDS OF BLEEDING.

Bleeding occurs when any of the blood vessels described above are either punctured, torn or cut.

A small scratch or graze such as you may cause while shaving only bleeds very slightly; this kind of very slow **oozing** of blood comes from the **capillaries,** many thousands of which will have been cut by the length of your razor blade as it damaged the skin surface. It is of no importance in such cases because it soon stops by the formation of a scab consisting of congealed blood.

All cuts or wounds which are deeper than mere scratches bleed according to how much flesh is damaged. This kind of bleeding, where you will see blood **welling up** to the surface and running over the edges of the wound in a **slow steady stream,** comes from the **small vessels,** both small arteries and veins, as well as from the countless capillaries which must also have been cut. This is usually called venous bleeding, but it should more correctly be named "small vessel" bleeding as it comes from more vessels than the veins alone. This is the **commonest kind,** and, although it may appear alarming, it has been the experience of the war that by itself it very seldom endangers the life of an injured man, provided that the correct first aid is given.

The only urgently serious kind of bleeding is that which occurs when a **main artery** (such as one of those shown in figure 23) is cut. Then blood is forced out in **spurts** with each beat of the heart and in less than two or three minutes a man may die. He will die because so much of his blood is lost (about two or three pints) that there is not enough left to circulate in his body. Fortunately, this kind of bleeding is **rare.**

We have mentioned three kinds of bleeding according to the kind of blood vessel which is cut :—

1. **Capillary bleeding.**—Blood oozes away very slowly.

2. **Small vessel bleeding.**—Blood wells up into the wound and runs over its edges in a slow steady stream. It is dark red in colour.

3. **Main artery bleeding.**—Blood spurts out in jets from the wound and runs away in rapid and copious streams. It is bright red in colour.

NOTE 1.—When a cut artery is at the bottom of a large wound then you may not see actual jets of blood ; in such cases, however, the wound will be seen to be brimming with blood which is rapidly pouring away.

NOTE 2.—The fact that blood from an artery is bright red in colour is a helpful guide when you are in good daylight. Between decks, however, you may not be able to see the colour and you must decide what kind of bleeding is taking place by the speed with which it flows.

3. THE GENERAL EFFECTS OF BLEEDING.

The immediate effects of bleeding are those of shock (*see* Chapter 1). If the bleeding continues and a large amount of blood is lost, SHOCK BECOMES WORSE. Thus the paleness, the coldness, the sweating and the thirst of the man all become more obvious ; but on a man with serious bleeding the effects of shock are altered in two ways :—

1. The breathing becomes hurried and laboured, with sighing, as a result of the effort ; the man may even " gasp for breath " because he is hungry for air. This is because there is too little blood to carry the vital oxygen round his body.

2. He is restless and may move his arms and legs aimlessly.

The gasping for breath and the restlessness—with paleness, coldness and thirst—are all apparent in a minute or two if there is a sudden loss of a large quantity of blood such as happens when a main artery is cut. These effects may take ten or fifteen minutes to develop with bleeding from small vessels.

4. FIRST AID FOR BLEEDING.

Bleeding from small vessels (the common kind of bleeding which occurs with all wounds).

1. LAY THE MAN DOWN. The heart pumps with less strength, and therefore the blood escapes with less force and less quickly, when a man is lying down than when he is standing.

2. RAISE THE BLEEDING PART OF THE BODY. This makes it more difficult for blood to escape as it now has to be pumped " uphill " from the heart. The only parts of the body which can be raised are the arms and legs. Should a fracture also be present, the affected limb must not be raised until after the broken bone has been fixed.

3. EXPOSE THE BLEEDING PLACE. Open up, or cut, clothing to do this. Remove no more clothing than is necessary.

4. COMPLETELY COVER THE BLEEDING PLACE WITH A THICK PAD ; BANDAGE THE PAD FIRMLY IN POSITION. A folded triangular bandage or handkerchief are good pads. When you have neither of these, you should make a pad by folding the cleanest piece of material that you can find.

FIG. 24.
A first field dressing covering a wound.

In action, you should use a first field dressing or a shell dressing as " pad and bandage," because these are immediately available with first aid gear at action stations.

Whatever you use as a pad must be large enough to cover the whole bleeding area completely.

5. CONTINUE THE FIRST AID FOR SHOCK, which you have already begun by laying the man down. *See* Chapter 1. Remember: loosen tight clothing, get the man warm, give him a drink and cheer him up.

The pad and bandage may fairly quickly become soaked with blood, but none should now run away from the wound. If the pad does become very wet, it means that it is not pressing hard enough in the right places to squash the bleeding vessels flat. Do NOT remove the first pad, but put on another pad (of cotton wool if you can find it, or waste or any other similar material) to cover the first one completely, and fix this with another bandage which is tighter.

Do not think that a spreading stain on a dressing must mean that you have failed to stop the bleeding. A small cupful of blood will soak a long way through pads, and a big wound usually contains at least as much blood as that. But if the pads become so soaked that blood drips or trickles from them, bleeding is still going on. The most likely reason is that the pads are not completely covering the bleeding places and pressing on them.

If the bleeding continues despite all that you have already done, and it is obvious that you cannot stop it with pads, then you should, **AS A LAST RESORT,** put on a tourniquet as shown in the next section. This may very occasionally be necessary with large wounds in which a great number of small vessels have been cut; it may also be necessary if, in fact, a main artery has been cut, although you had not recognized this at first.

Bleeding from the Main Vessels of the Arm or Leg.

The great loss of blood which occurs when the main artery of the arm or leg is cut will kill a man in a minute or two. Blood will be pouring or spurting out of the wound and you must **take immediate action.** You must act more quickly in giving first aid for this kind of bleeding than for any other injury. It is an occasion in first aid on which **a man's life is entirely in your hands ;** it is a time when, if you neglect instant action, death is certain to follow.

All you have to know is the " pressure point " in the arm and in the leg, and how to put on a " tourniquet." (These are described in separate sections later in this Chapter.)

1. PRESS ON THE PRESSURE POINT. You will know when you are doing this properly as the bleeding will then stop.

2. GET A TOURNIQUET PUT ON. Shout for help. Another man must put on the tourniquet while you keep your grip on the pressure point.

Thus the bleeding is stopped. The man's life is saved. Now you should cover the wound and give first aid for shock.

Pressure Points.

A " pressure point " is a spot where you can press with your fingers against a bone so that you flatten out a main artery which lies between that bone and your fingers ; thus blood cannot run along the artery and it ceases to escape into the wound further down the limb. This is somewhat similar to the emergency way of stopping loss of water from a lead pipe by beating it flat with a hammer a little distance away from the actual break in it.

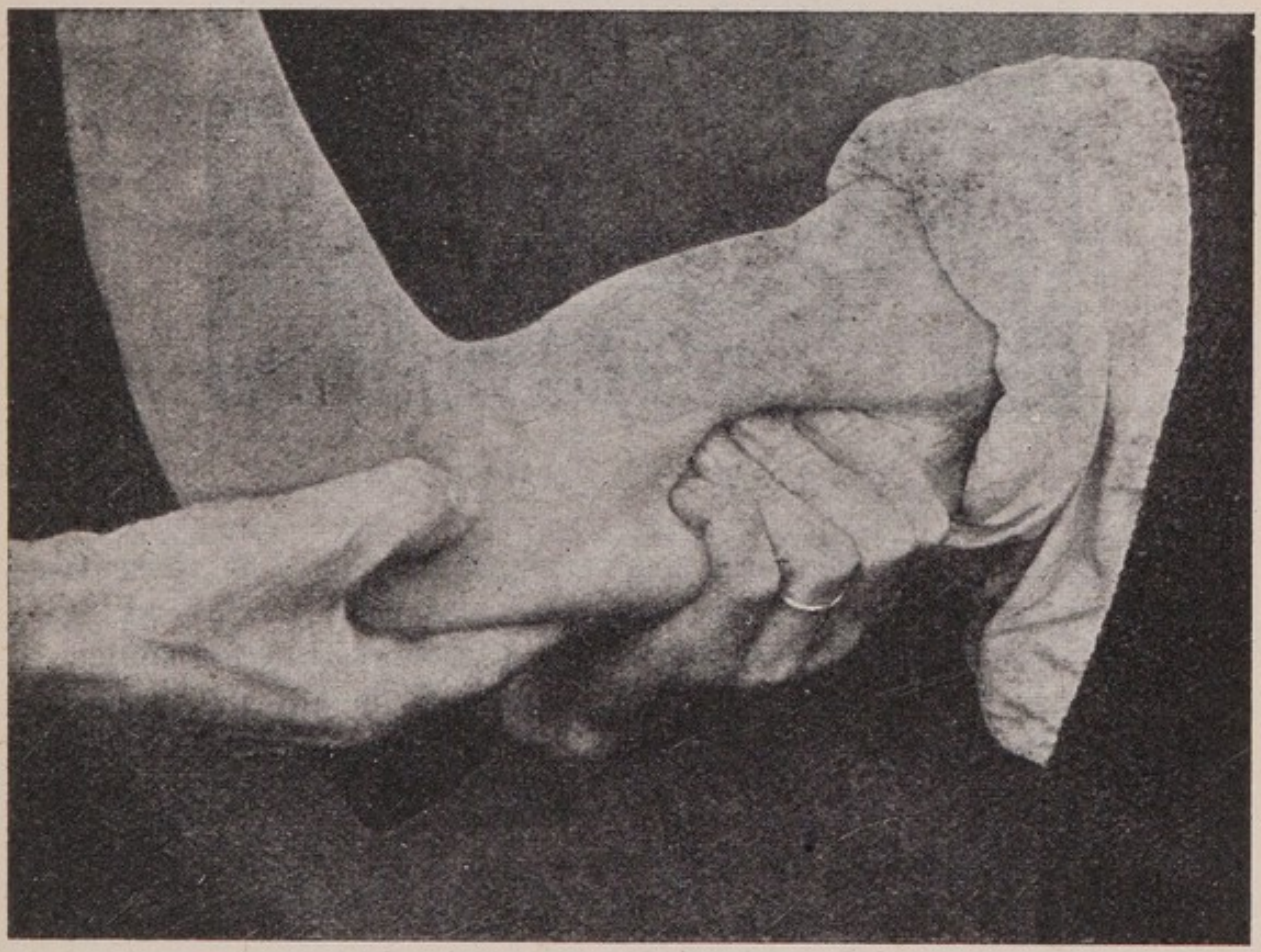


FIG. 25.—*The pressure point in the arm.*

The pressure point in the arm lies in the groove on the inner side of the biceps muscle. This is the muscle which you can so easily make stand out on your own arm when you want to show your strength. Figure 25 shows exactly where it is and how to place your fingers on it. Try to stop the blood running down a man's arm by pressing the spot indicated. You will know if you are correctly squashing the artery flat by a feeling of numbness which will develop in his hand almost at once.

The pressure point in the leg is right in the middle of the groin. Figure 26 shows how to find the spot and how to press your thumbs on it. Practise using this pressure point on yourself and on a messmate.

When pressing on the pressure points do not bend the end joints of either your fingers or thumb, but keep them straight. This is shown in the photographs.

FIG. 26.—*The pressure point in the thigh.*

It is difficult to keep up the necessary pressure at these two points for more than a few minutes because your fingers will get tired very quickly. However, this is a sufficient time for someone else to get a tourniquet in position, and this is all that pressure points are used for.

Tourniquets.

Any long piece of narrow and strong material which can be secured round either an arm or a leg in order to stop bleeding is known as a tourniquet. It presses all round the upper part of a limb with such force that every single blood vessel is squashed flat. Provided that it is tight enough and applied on the upper arm or thigh, a tourniquet never fails and the bleeding is absolutely certain to stop.

But there are two facts which it is essential to know about tourniquets. Every part of the body needs blood to live, and a limb can only live for about half an hour without fresh blood. If you leave an effective tourniquet on for an hour or two, the arm or leg will die : it will go rotten and gangrenous and will have to be amputated. Many limbs have had to be cut off because a tourniquet has been left on too long. The first fact, then, is that a tourniquet must not be used for a moment longer than necessary. When it must stay on for a long time, **it must always be loosened every half an hour to allow blood to flow into the limbs for**

about half a minute. Some blood may escape when this is done, but other fresh blood will circulate in the limb and keep it alive.

The other fact is that the soft veins are squashed far more easily than the strong arteries. A tourniquet which is too loose will trap the blood flowing out of the limb by the veins and yet will not block the blood from being forced into the limb by the arteries. So there will be more blood in the limb and the wound will bleed worse than with no tourniquet at all. The second fact, then, is that until the tourniquet stops the bleeding, it is doing harm and must be tightened; **if you cannot make it stop the bleeding, take it off.**

As a "tourniquet" you may use any of the following:

1. Triangular bandage folded narrow.
2. Strong handkerchief folded narrow like 1.
3. Any other strong strip of clothing such as a necktie, belt or pair of braces.
4. A length of rope or cord.
5. A piece of rubber tubing

How to use a tourniquet.

Place the "tourniquet" round the upper part of either the arm or the leg, higher than the wound, and secure it with a knot through which a stick or closed jack-knife has been placed, as shown in figure 27.

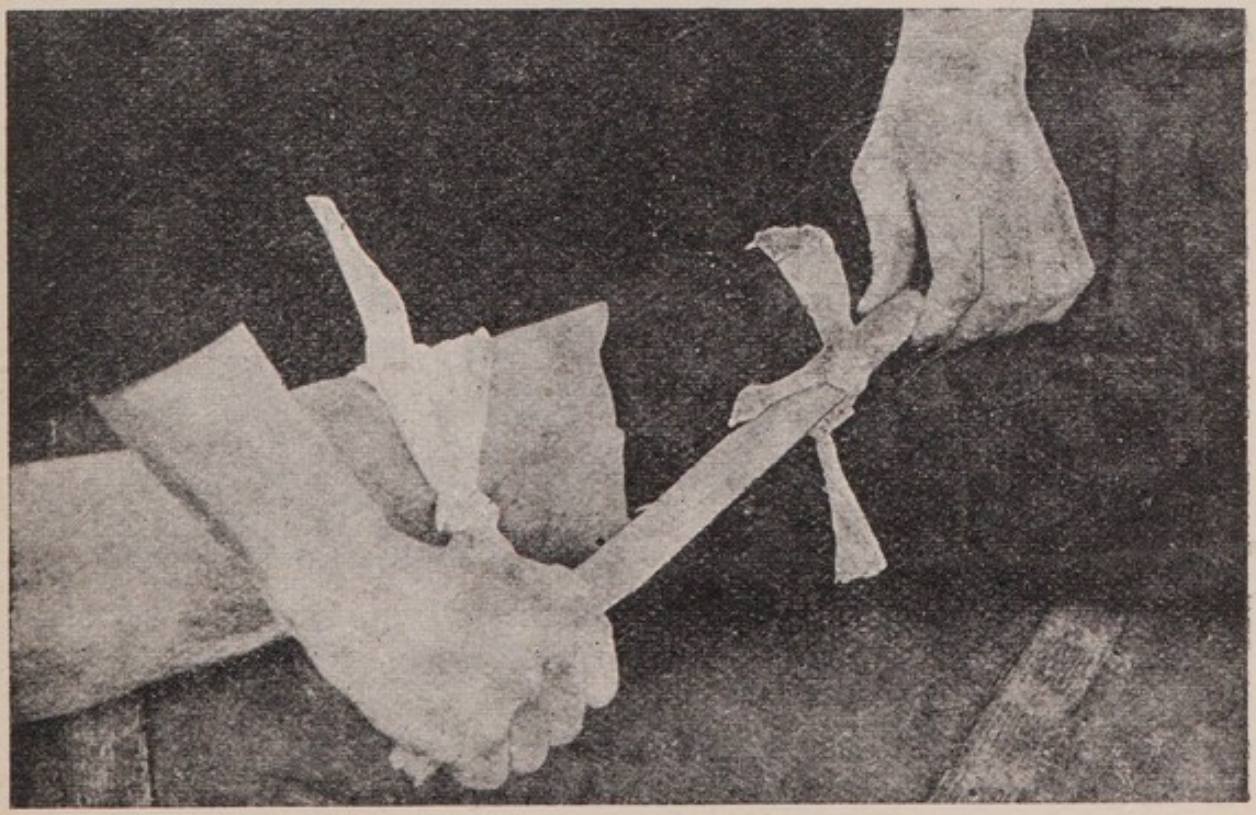


FIG. 27.—*Twisting a tourniquet tight.*

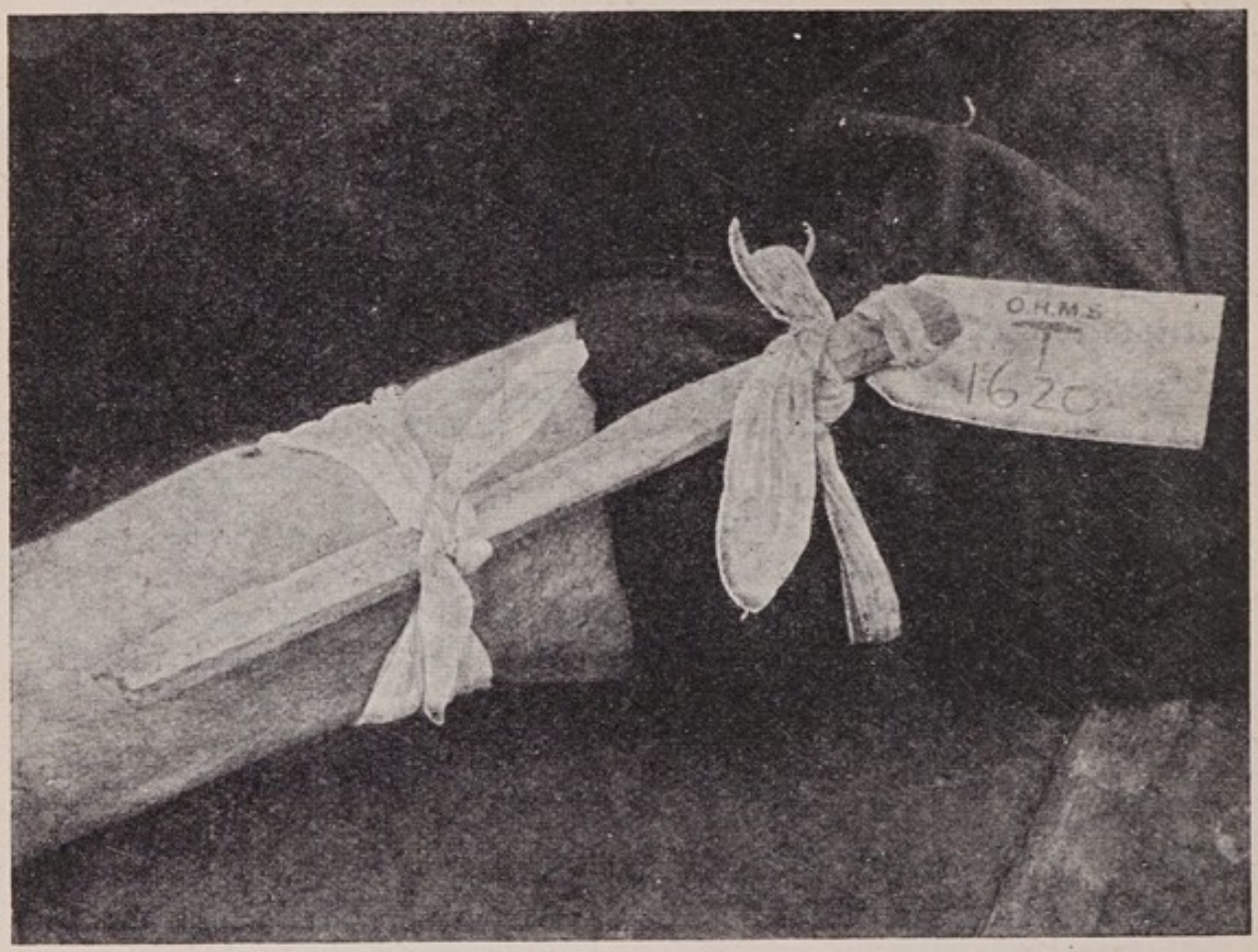


FIG. 28.—*A tourniquet secured tight.*

Note.—The stick is prevented from untwisting by its end being held in another bandage.

Now, using the stick as a lever " screw up " the knot to tighten the tourniquet; you should twist the stick until the bleeding stops and then no more. It is a rule that a tourniquet should be tight enough to stop bleeding, but no tighter. You can fix it in its tightened position by securing a second bandage round the limb and holding one end of the stick in this to prevent it untwisting.

You should put a tourniquet on over a man's clothes or over padding so that it does not pinch the skin.

After the tourniquet has been fixed in position, and the bleeding has stopped, you should cover the wound and treat for shock. When you have completed this, remember the rule: A TOURNIQUET MUST BE LOOSENED EVERY HALF AN HOUR. You may not be able to stay beside the man on whom you have put a tourniquet, so ATTACH A LABEL TO HIS CLOTHING SHOWING THE TIME IT WAS PUT ON. This will draw the attention of other men and also allow the fact that a casualty has a tourniquet on to be quickly seen by medical personnel later.

After half an hour, the tourniquet is loosened to see whether, the bleeding has now stopped by means of the pad alone. If it has

leave the tourniquet round the limb, completely loose, but in readiness to tighten again if bleeding should begin again.

If it has not been stopped, tighten the tourniquet once more and leave it for another half-hour. Then test again to see whether the bleeding has stopped.

When to use a tourniquet.

Although you have learnt that tourniquets are very seldom necessary, you should remember the occasions (that have already been mentioned) on which you must make use of them. These are

1. Bleeding from a main vessel of either the arm or leg.
2. When bleeding which you have tried to stop with a pad and bandage continues to be bad.

In addition there is a third occasion on which you must use a tourniquet.

3. When an arm or leg is totally torn off.

In such a case the tourniquet must be put on and left on without being loosened at any time. It must be put on as near the stump as possible.

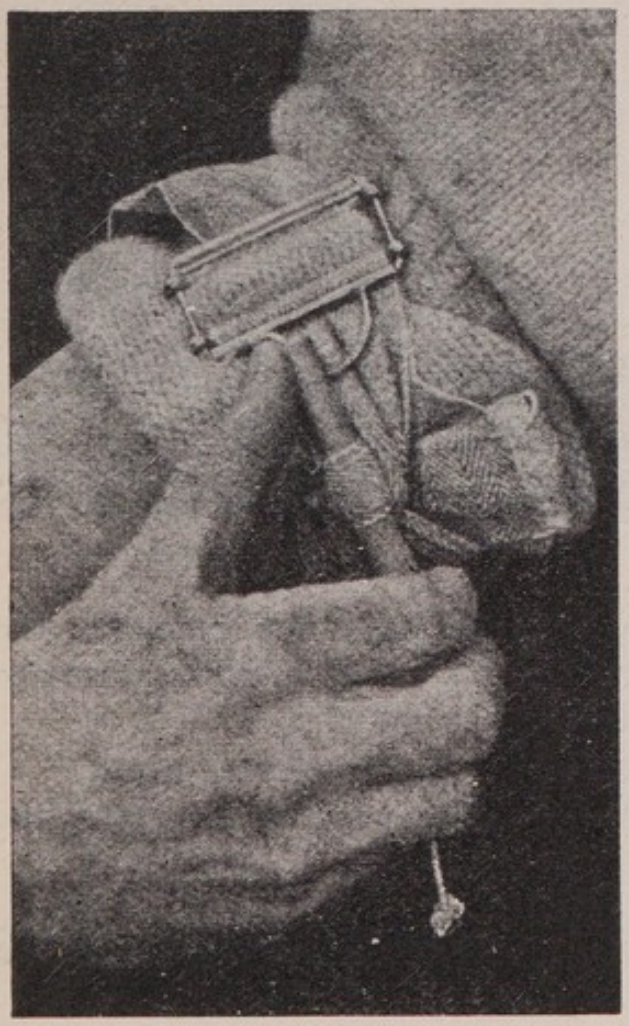


FIG. 29.
The St. John tourniquet.

First-aid gear in many ships still includes a St. John tourniquet. This is just a canvas strap which includes a stick for twisting. It also has a pad which should be put over the pressure point, but this is not at all necessary. It is no more effective than a handkerchief and jack-knife. Only use it if the medical officer in your ship has given you detailed instructions and if you have had some practice.

Bleeding from a main vessel in the Head or Neck.

In either case :

1. Hold a pad very firmly on the bleeding spot at once.
2. Secure this pad with a bandage, when it is possible.

Obviously, you must not tie a tight bandage round the neck. The pad, in this case, must continue to be held in place.

In addition, in the case of the scalp, if the bleeding does not stop with a pad and bandage, put a "tourniquet" round the head as shown in figure 30.

FIG. 30.—*A tight bandage round the head to stop bleeding from the scalp.*

In many cases this will stop the bleeding; but remember the rules for a tourniquet and use them here: if the bleeding does not stop, take it off; and test it after half an hour.

Bleeding from a main vessel in the palm of the hand.

1. Place a big firm pad, in the shape of a ball, into the hand.
2. Tell the man to hold it.
3. Bandage the hand very firmly so that it looks like a small boxing glove.
4. Raise the hand and arm in a sling.

Bleeding from a main vessel of the belly or chest.

This is one of the causes of almost instant death.

It is impossible to stop severe bleeding coming from the very large and hidden arteries of these parts of the body. You cannot press them flat and the injured man will be dead almost as soon as you begin to give him first aid.

5. INTERNAL BLEEDING.

"Internal bleeding" is said to be taking place when bleeding occurs within the body with scarcely any, or no blood at all, being visible externally. This kind of bleeding comes from the vessels of the chest and belly which may be damaged by accidents in which the body is crushed. These same internal vessels may be damaged in wartime by bullets and small pieces of flying metal which penetrate deeply into the body while only causing a slight wound in the skin; also as a result of explosions in the water (as by depth charges) near men swimming in it. (See page 53.)

You can recognize that a man has internal bleeding by seeing that he has the general effects of serious bleeding (see page 34) without your being able to discover any blood.

First Aid for this is as follows:

1. Treat for shock but do not put any hot water bottles near his chest or belly.

2. Do not give any fluids to drink.

If this kind of bleeding does not cease by natural means then it can only be stopped by a surgeon performing a very difficult operation, and this will not be possible during the action. You should, however, get an officer to give your man morphia, as this always helps to stop bleeding.

6. FIRST AID IN VOMITING BLOOD.

The blood which is vomited may have been swallowed from an injury to the throat or mouth or it may come from some form of damage to the stomach. Except when it is the result of a serious wound of the belly it is not usually dangerous to life.

1. Treat it as a case of internal bleeding.

2. Give some small pieces of ice to suck, but nothing else.

As part of your treatment for shock remember to reassure the man that this kind of bleeding is not dangerous and that it will soon stop.

7. FIRST AID IN COUGHING BLOOD.

The blood which is coughed up may have trickled down the windpipe from an injury of the throat or it may come from some form of damage to the lungs. Except when it is the result of a serious wound of the chest it is not usually dangerous to life.

You should give the same first aid as for any other case of internal bleeding.

8. FIRST AID IN BLEEDING FROM THE NOSE.

If this is due to a blow on the nose the small bones of the nose may or may not be fractured. First aid is the same in either case.

1. Sit the man on a bench or the deck, do not let him lie down.

2. Tell him to breathe through his mouth, and not to blow his nose.

3. Put a pad soaked in cold water over his nose and also on the back of his neck.

A fractured nose will bleed badly as a rule.

If the bleeding is not due to a blow but starts suddenly without obvious cause it can be controlled and may be stopped by the man pinching his nostrils and breathing through his mouth.

SUMMARY.

1. The common kind of bleeding :—

This always occurs with all wounds. Blood wells up into the wound and flows over its edges in a steady stream.

First Aid :—

1. **Lay the man flat.**
2. **Expose the bleeding place.**
3. **Completely cover the bleeding place with a thick clean dry pad. Firmly bandage this pad into position.**
4. **Treat for shock (rest, warmth, drink, cheer).**

If the bleeding does not stop, firmly secure a second pad on top of the first pad and bandage.

If the bleeding still does not stop, put on a tourniquet.

2. The rare kind of bleeding.

This occurs only when a main artery is cut. Blood sometimes spurts out of the wound in jets. Blood always pours over its edges in rapid and copious streams.

First Aid :—

1. **AT ONCE press on the pressure point.**
2. **Get a tourniquet put on.**
3. **Cover the wound with a thick clean dry pad. Very firmly bandage this pad into position.**
4. **Treat for shock (rest, warmth, drink, cheer, morphia).**

Loosen the tourniquet every half-an-hour.

Leave it off altogether as soon as possible.

CHAPTER 4.

WOUNDS. BLAST INJURIES. BURNS.

1. KINDS OF WOUNDS.

There are four different kinds of wounds which may occur at any time.

Cut (Incised).

This is a cut or clean split of the skin and the flesh beneath. It is often caused by broken glass or a slash with a knife. Its importance lies in the large amount of bleeding which may take place. In addition, incised wounds of deep flesh, for example the thigh or buttock, tend to gape widely open.

Torn (Lacerated).

This kind of wound has raggedly torn edges. It may be caused by moving machinery or flying metal splinters which tear the flesh. Lacerated wounds bleed less freely than incised wounds because when blood vessels are torn their lining curls inwards and lessens the escape of blood. Shock is usually severe even in the absence of bad bleeding, because much flesh may be damaged or completely torn away.

Bruised (Contused).

This is a wound with bruising of the flesh around it. It may be caused by a direct blow with something blunt, by sudden pressure, or by crushing. This kind of wound is usually not dangerous in itself, but when you see it on the head, chest or belly you should suspect serious injury of the brain or internal organs.

If shock is severe at first and continues to be so although you have given first aid, internal injury is probable.

A contused wound due to crushing (such as may be caused when a limb is pinned down under wreckage) does not usually cause severe shock at first, but some hours after the limb has been released shock often gets worse.

Stab (Punctured).

This kind of wound has only a small opening, but it may be very deep. It is often caused by a fall on a spike or a thrust with a bayonet or knife. It usually bleeds very little, but the internal organs may be badly damaged.

Bearing in mind these four general kinds of wounds you can now consider **what you should expect to see in wartime.**

Bomb and shell bursts (both direct hits and near misses) result in decks and compartments being sprayed with flying metal fragments. These are pieces of the missile itself and also splinters torn from the deck, bulkheads, etc. They may be of any size, and they all have very sharp irregular, jagged edges.

When they hit the body the larger fragments burst open the flesh just as deep mud is " exploded " when a large stone is hurled into it. Thus big lacerated wounds are caused which may be very severe, a whole limb being completely torn off or a large amount of flesh torn right away. Smaller fragments cause less damage to the skin, but they may penetrate deeply into the body causing internal injuries.

Bomb bursts nearly always result in just as many burns as wounds. This is because of the flash of the explosions. (See page 54).

Bullets, in contrast to the jagged pieces of metal described above, are smooth. They cause much less damage to the flesh than bomb splinters. They drill a neat hole in the body and the wounds they cause, which bleed very little (unless, as rarely happens, a main artery is cut), are usually no larger than a stab with a pencil. They may easily be overlooked.

Larger wounds (which are lacerated) are caused by dum-dum and explosive bullets and also by bullets fired from a close range (a few hundred yards), but such injuries are uncommon. Tracer bullets, see page 57.

Metal fragments and bullets may remain embedded in wounds, or they may pass right through the thickness of the body or a limb ; that is, having made an opening in the skin (called the entry wound), they travel through the body and make another opening (called the exit wound) in the skin on the opposite side where they leave the body. Exit wounds are always larger than entry wounds.

Bullets usually cause an exit wound no larger than half-a-crown, but if a bullet strikes a bone, breaking it into many pieces, some of these pieces may be driven out of the body with the bullet, causing a larger wound. Therefore, an exit bullet wound which is larger than half-a-crown, usually means that a bone has been broken.

It is important to remember that the point of entrance of bullets and splinters may be marked only by a very small tear in the clothing which gives no clue to the damage done to bones or internal organs. For example, during the operations in Norway in 1940 an officer was wounded by a bullet which entered his right ankle. It struck his shin bone, was deflected upwards, and then travelled up in the muscles of the back of his leg to reach his right thigh. Then it crossed to the other thigh and stopped near his left buttock. In another case a metal splinter entered the buttock and, by reason of its direction and the position of the man when hit, penetrated to the belly causing internal bleeding. Other splinters, as they travel through the body, may shatter bones, cut nerves or blood vessels and damage the internal organs. As you give first aid for a wound, try to decide

whether the injured man has any evidence of internal damage. If he has, it may be even more important for you to give first aid for that than for the wound itself. A small puncture wound of the belly or chest is often more dangerous than a big laceration of a limb.

The violence of the explosion of shells and bombs—and also of mines and torpedoes—throws men and fittings into a heap together, with the result that bruised wounds are frequently seen after such experiences. Also, men may be crushed or pinned in damaged compartments. It is a rule that men who have had bruised wounds from such causes should be looked at most carefully to exclude other injuries, such as fractures.

Another rule with war casualties is **you must never take it for granted that the wound you first see is the only one present.** For example, do not overlook the small entry wound of a bullet or splinter, and give first aid only to the larger exit wound. Also you should try to discover whether there are other injuries in other parts of the body. **It is common, particularly with bomb explosions, for casualties to have several wounds.** In such cases, as always with first aid, you must use your common sense, combined with the extra knowledge that this book gives you, to decide what to do. But always remember this : Stop the worst bleeding before all else and then stop all other bleeding. Then give first aid for shock. Sometimes casualties have even more than two wounds ; one example of this is provided by the list of injuries inflicted by a bomb explosion on a lookout on the bridge of a destroyer in 1941 : splinter wounds of the head (2), thigh (2), belly (3), with internal bleeding ; open fractures of the right hand, left arm and left knee cap. First aid was given to all these injuries and the rating recovered.

2. WHY WOUNDS ARE DANGEROUS.

The immediate dangers from wounds are :

1. Bleeding.

2. Shock.

You have already read about these in separate chapters and you should remember that each may be slight or extremely severe. If you are not absolutely certain of the first aid for shock, look again at the photograph on page 7.

The third danger which always exists with all wounds is :

3. Poisoning (Sepsis).

By this is meant the entry of germs into a wound. Germs (sometimes called microbes or bacteria) are always present in the air and in water. They exist on every object, they lie on the skin and hair of your body, they swarm in your clothes and are to be

found in thousands on the fingers of everyone. Thus, however small and unimportant a wound may appear to be, germs are nearby and ready to enter it all the time. A small number of germs do actually enter every wound. They are pushed in from the skin and clothes by the object causing the wound. You cannot stop this. But you can and must prevent other germs getting into a wound after it has been inflicted. You can do this by keeping everything away from the wound (above all, keeping your own fingers away) until it is covered by a dressing. Fortunately, poisoning does not always take place because many germs are harmless to man; also because the blood contains little living bodies (white cells) which attack germs and often destroy them before they can do any harm. However, if the army of invading germs is stronger than the defending white cells, then poisoning does take place.

A wound that has been poisoned has an unhealthy appearance and is painful, swollen, red and hot (like a boil). Later, pus is formed and discharged as "matter." In addition, the poison may spread from the wound into the blood which is circulating in the body, giving rise to what is called "blood poisoning." This spread of poison all over the body is very dangerous and may kill a man.

Mark the difference between the progress of a healthy or clean wound and an unhealthy or a dirty one. The former is almost painless. It heals quickly with very little scarring and the injured man soon returns to duty, perfectly fit. The latter is very painful and makes the man feel seedy and miserable. For weeks he remains on the Sick List with the wound discharging matter. Even when the wound does heal, a large scar remains, which is not only unsightly but also may cause stiffness of joints.

Poisoning of wounds is therefore serious. This is the reason why one of the most important objects in giving first aid for a wound is to prevent germs entering it.

3. FIRST AID FOR WOUNDS IN ACTION.

The objects are:—

To stop bleeding

To lessen effects of shock

To prevent germs entering the wound

by immediate first aid on the spot, at the place where the casualty falls.

In order to stop bleeding, you have already read in Chapter 3 that you should always cover a wound with a firm pad and bandage. In order to lessen the effects of shock you should also cover the wound with a pad and bandage because it is then less painful. In

order to prevent germs entering a wound you also need to cover it with a pad and bandage. Therefore,

1. COVER THE WOUND WITH A CLEAN DRY PAD. SECURE THE PAD WITH A BANDAGE.

   In this way you will have done all you should for the three objects of first aid for a wound. Next :

2. TREAT FOR SHOCK. See Chapter 1.

   Remember : Lay the man down, get him warm, give him a drink and cheer him up.

In action, wounds will be dealt with by a Medical Officer within a short time of their occurrence. It is then his duty, in a dressing station, to clean the wound, to put antiseptics on it and perhaps to stitch it. **None of these things can be called FIRST aid, which is limited to covering the wound with a CLEAN DRY dressing and giving treatment for shock.** Therefore :—

NEVER attempt to wash a wound with ordinary water.
NEVER put wet antiseptics on a wound in first aid.
NEVER touch a wound with your fingers or anything else.
NEVER leave a wound exposed to the air.

If you do any of these things, you will introduce more germs and upset Nature's own attack on those that are already there.

To find out how bad a wound is, and to see that you cover it completely with a pad, you should enlarge the hole in the clothing through which it has been caused. Do this by tearing or cutting clothing, going along the seams when this is possible. You may also have to remove clothing altogether, but in doing this remember that the greatest gentleness is necessary and that you must keep the man warm with blankets or coats. Any "first aid" which makes a man colder does not aid at all.

If you see a large piece of glass, a large metal splinter, or other debris, LOOSE in a wound you should lift this out before putting on a pad. To do this use a piece of material as though it were a face flannel to keep your fingers from touching the wound. **But never pull at anything which is fixed in a wound,** and never waste time looking for things which you only think may be there.

Small wounds should be covered with a first field dressing—bigger wounds should be covered with two or more first field dressings. When they are supplied with the first-aid gear available to you, shell dressings, which are merely big first field dressings, should be used for the bigger wounds.

When you cannot obtain these dressings, then the CLEANEST DRY piece of material that you can find should be used. Lint (with the smooth side towards the skin), a triangular bandage folded into a square, a clean handkerchief are all suitable. It is urgent to

cover a wound with the cleanest piece of material available, whatever it may be, rather than to leave the wound exposed to the air.

The rules laid down for the first aid of wounds in action are also to be followed when accidents occur in harbour and during peacetime routine. **It is beyond the scope of FIRST aid to do anything more at any time.**

4. ADDITIONAL FIRST AID FOR CERTAIN WOUNDS.

Wounds of the Belly.

When the internal organs (the intestines) protrude through the wound.

1. Place the man on his back, raise the knees on a pillow and support the head and shoulders so that he is almost sitting up. This slackens the belly wall and prevents the organs being nipped. (See figure 31.)

2. Cover the wound and organs with a big dressing; bandage loosely to retain dressing in position.

3. Treat for Shock, but do NOT give anything to drink,

FIG. 31.—*The position to lay down a man with a belly wound through which intestines protrude*

no matter how thirsty the injured man may be. You may moisten his dry lips.

Note.—Make no attempt to replace the organs. Avoid tight bandaging.

When there are no organs to be seen in the wound the position of the injured man should be adjusted to prevent gaping of the wound.

1. If the wound is vertical, keep the man flat on his back with his legs straight, but if the wound runs more across the belly than up and down then place the man in the position described above as being necessary when internal organs may be seen.

2. Cover the wound in the same way as any other.

3. Treat for shock, but do NOT give anything to drink.

Wounds of the Chest.

Penetrating wounds of the chest require sealing up at once to prevent air being sucked into the chest.

FIG. 32.

First aid for a penetrating wound of the chest.

1. Apply a dressing which overlaps the edges of the wound ; bandage it in position firmly.

(A first field or a shell dressing is usually big enough for this purpose.)

If it is at hand, fix the dressing with adhesive plaster or elastoplast.

2. Over the dressing apply a broad bandage round the chest.

Remember that as well as the danger of sucking air into the chest there are also the dangers of fractured ribs and internal bleeding with this kind of wound. Blood may also be coughed up. The first aid for all these things has already been described.

Wounds of the belly and of the chest require urgent surgical attention. It is important to tell the Medical Officer what lies under

any dressings you may have put on these parts of the body—attach a label to the injured man.

Wounds of the Head.

All kinds of wounds may occur on the head, and you should give the same first aid for them as you would for wounds in other parts of the body; but because the brain, inside its bony box, may be shaken up by whatever caused the head wound, the casualty may also be concussed. There is a description of concussion on page 101; you will read there that the first aid for it is similar to the first aid for shock.

5. BLAST INJURIES.

When a bomb explodes there is a sudden and violent disturbance of the air; first a powerful wave, or blast, of air radiates outwards; then there is a rushing-in of air back towards where the bomb burst.

You have already read that the blast of air may hurl men down and result in their being hit by tumbling wreckage. In addition to producing casualties in these ways, the blast of air itself may strike against the body with so great a force that severe and even fatal injuries are caused. These injuries, due entirely to the violent movements of the air near to explosions, are called "blast" injuries. The effects of blast are usually more severe in enclosed spaces (for example, between decks) than in the open.

It is rare for a man to have a blast injury alone—in many cases there will be external wounds and injuries as well, just as you would expect to find in men who have been near an explosion.

1. Blast injury of the lungs.

The lungs are damaged in this way: the blast of air coming from a bomb burst strikes the chest, putting pressure on it, and at the same time drives air down the throat into the lungs. Immediately following this the pressure is suddenly taken off the chest wall and air is sucked out of the lungs again by the wave of air rushing back towards where the bomb burst. As a result of these changes of pressure inside and outside the chest, the capillaries of the lungs are torn so that bleeding takes place inside the lungs.

A man affected by "blast" is very shocked, but because the damage to his lungs interferes with his breathing and also the purification of his blood, he usually has—

1. Quick shallow breathing, with difficulty in getting his breath.
2. A feeling of tightness, or pain, in his chest.
3. Blueness of the face.

In more serious cases men will be found unconscious with absent or only very feeble breathing; they may have some frothy blood-stained saliva on their lips. Other men will be found dead—the blast of air alone will have killed them without their necessarily having been wounded in any way.

First aid.

1. Take the man into the fresh air, if this is possible.
2. Lay him down with his head and shoulders raised.
3. Keep him warm.
4. Loosen tight clothing.
5. When it is possible, send a message to the medical officer.

By giving **complete rest** you will have done all that you can to help stop the capillaries bleeding inside the lungs. Should his breathing become more difficult or stop, there is nothing more that you can do; only the Medical Officer can give further life saving treatment.

2. Blast injuries due to explosions in the water.

Blast injuries may also occur as a result of explosions in the water. Depth charges are used against submarines in order to cause damage by the force of their explosions, and obviously these same explosions damage human bodies. Men are killed and others may feel as though they are "kicked in the back" and have the wind knocked out of them—they may lose the power of their limbs for a minute or two causing them to drown. Also the contents of their bellies may be damaged, causing internal bleeding.

When rescuing survivors who have been in the water in which either depth charges or bombs have exploded, you should be prepared to give them even more help than you would normally expect because they may have lost the power of their legs; also they may have internal bleeding or blast injuries of their lungs.

3. The effects of explosions on the brain.

The soft substance of the brain may be very shaken within its bony box as a result of the violent air movements following explosions, so that some damage may be done to it; there may also be mental shock.

As a result of these disturbances to the brain, men may be found sitting about, incapable of moving and not caring what is going on. These men, although often to all outward appearances uninjured and not unconscious, are in a dazed condition; they have no energy or will to move. They are "knocked silly" for the moment and may behave very foolishly—for example, although there may be an easy way of escape from a sinking ship, they may be too dazed to

take it. Or, if one of them should fall, he might drown in a few inches of oil or water because he has not got the sense to get up.

This dangerous condition in which men will not help themselves may occur after under-water explosions (mines or torpedoes) and with near misses as well as with direct bomb hits.

First aid.

When you see such men, you should help them by telling them what to do, even leading them by the hand to safety. They will accept help dumbly like children, they need to be led.

By knowing that this dazed condition may occur and by giving the first aid for it you may save many lives—for example, you may prevent men going down with their ship when they have not got the sense to abandon her.

6. BURNS AND SCALDS.

In action, there are many causes of burns. For example, ready-use cordite may be ignited by splinters; fires may break out between decks, etc. Then the bursting of bombs—the weapon used more than any other against the Royal Navy in this war—always causes a large number of men to be burnt. (The flash of bomb explosions results in many more burns than shell bursts). Burns, and also scalds, are further caused by bombs exploding alongside ships and breaking steam pipes or throwing men against them. In many ships which have had direct hits with bombs in this war at least half of the casualties have had burns.

"Electric" burns are caused by contact with cables carrying electric currents. They may be very deep. They should be given the same first aid as any other burns. (See page 81.)

For the practical purposes of first aid, burns and scalds may be looked upon as the same, so that all that follows applies equally to both conditions.

Burns are divided into three groups as follows:

1st Degree	Reddening of the skin.
2nd Degree	Reddening of the skin with formation of blisters.
3rd Degree	Charring and destruction of the skin and also of the flesh and bone beneath.

There is always severe shock with all burns. It may be so severe that it kills a man. The amount of shock depends much more on the size than on the depth of a burn. For example, it is much more serious when a third of the total surface of the skin is red and blistered than it is when a hand is charred by burning cordite.

Protection from Burns in Action.

The flash of a bomb burst (which causes most burns in action) is of great heat but it is past in a moment. Any clothes that you are wearing protect the skin beneath them. Only those parts of the body which are exposed, such as the face, neck, hands and ankles are burnt. This is the reason why you are issued with anti-flash gear (a helmet, mask, eyeshield and gauntlets) made of non-inflammable materials. This gear protects those parts of the body which are usually uncovered and where bad burns are most disfiguring and crippling. In addition to wearing this gear, you should always tuck your trouser legs inside your socks in order to prevent the flash of flame getting underneath.

FIG. 33.
Anti-flash gear in action.

These precautions have saved a very large number of casualties during the war.

7. FIRST AID FOR BURNS AND SCALDS.

1. TREAT FOR SHOCK. See Chapter 1.

   Remember: Lay the man down, get him warm and cheer him up. In particular, give him plenty of hot sweet drinks. This is very important because burns exude a lot of colourless fluid (they "weep"), and you should put fluid back into the body again to prevent shock becoming worse.

   All men with bad burns need morphia. Send a message to one of the officers who is carrying this drug so that he may give it.

2. COVER THE BURN WITH A DRESSING.

   This will relieve pain and prevent poisoning because a dressing stops air reaching the burnt area. Also, the loss of fluid by "weeping" is lessened.

In most ships an anti-burn preparation is in every first-aid haversack or tin. For example, a tube of an anti-burn jelly (labelled tannafax, triple-dye jelly or triofax) is distributed in many ships.

For burns of the face and hands you should squeeze the tube so that the jelly falls directly on the burn; then you should lightly smear it over evenly with a piece of lint and NOT put anything over it. **The jelly will form a crust which acts as a dressing.**

For larger burns, and for burns on parts of the body where a jelly crust would be rubbed off by the clothing or other covering that you will put over the casualty to keep him warm, you should squeeze some jelly on a piece of clean material. Then you should smooth it over and place this directly on the burn so as to cover it completely. This jelly dressing should be secured with a bandage.

In other ships a paste or a powder may be distributed as an anti-burn dressing; you will receive instructions from your Medical Officer on how to use it.

If, in your ship, no anti-burn preparation has been distributed with first-aid gear, or if you have used up all that there was, you should simply cover the burn with a clean dry dressing, using the cleanest piece of material that you can find. A shell or first field dressing is quite suitable to cover a burn; one or more of these should be used according to the size of the burnt area.

This method—simply covering the burn with a dry dressing—is very easy and quick. It is the same first aid as you would give a wound and it is equally satisfactory.

The only difference between the first aid for a wound and a burn is that for a burn you should, when it is available, use the "anti-burn" preparation.

Note 1. Clothing is often tightly stuck to a burn. NEVER attempt to pull this off but cut the clothing around so that those pieces which are stuck to the burned skin remain attached there.

Note 2. NEVER touch the surface of a burn—do NOT attempt to wash or brush off dirt or debris.

Note 3. NEVER break blisters.

Note. 4. NEVER put on an oily or greasy dressing.

The reason why you must never do these things is that they are NOT part of FIRST aid. Those that are necessary will be done later by a Medical Officer.

8. FIRST AID FOR A MAN ON FIRE.

1. Make him lie down.

When a man's clothing is on fire, the flames ascend and burn his head. By laying him down, the head and neck are protected. You must also prevent him from running about in the open air as this only fans the flames to greater activity.

2. Smother the flames.

This is best done by rolling the man in a wet blanket; instead you may have to use your own jacket or something similar such as you can find at once.

In covering the burning man with a blanket, stand at his head, hold down with your foot one edge of the blanket and throw it away from yourself and towards the man's feet. The flames are thus swept away from the rescuer and from the face of the burning person. A man who has caught fire may be panic-stricken; he needs all your help.

If your own clothes should catch fire when you are alone, roll on the floor and smother the flames with the nearest available bits of clothing or bedding. Call for assistance and do NOT run out into the open air.

9. PHOSPHORUS BURNS.

Phosphorus is used in tracer bullets, certain incendiary bombs and in smoke shells. When wounds are caused by these weapons (for example, during machine gun tracer-bullet attacks from the air and during the bombing of shore establishments when phosphorus incendiary bombs may be used) particles of phosphorus may lodge in the flesh and continue to burn there. Such wounds have been very rare during the first three years of the war. They may become more common.

First aid consists of wetting the wound—either by putting it in water or placing on it pads soaked in water. Then the phosphorus ceases to burn and the particles may be later removed by a Medical Officer. Keep the pads wet as phosphorus automatically sets fire to itself when dried out.

10. FIRST AID FOR BURNS DUE TO ACIDS AND ALKALIS.

Strong acids and alkalis eat into the parts of the skin with which they come in contact. The effect is the same as that of a burn.

1. AT ONCE THOROUGHLY FLOOD THE BURNT PART WITH WATER. Use warm water if it is at hand.

In this way, the powerful acid or alkaline liquid is diluted so that it stops burning the skin.

2. In addition, if you know the nature of the burning fluid and if you can obtain the material quickly :

FOR ACID BURNS. Bathe the part with large quantities of an alkaline solution made of baking soda or bicarbonate of soda.

FOR ALKALINE BURNS. Bathe the part with large quantities of an acid solution such as vinegar or lime juice.

In these ways, the strong acids or alkalis are neutralised so that they cease to burn the skin—

3. GIVE FIRST AID AS IF THE INJURY WERE A BURN DUE TO FIRE OR STEAM.

SUMMARY.

WOUNDS are dangerous because of bleeding, shock and poisoning. Immediately on the spot :—

1. **COVER THE WOUND WITH A CLEAN DRY PAD.**
   Secure the pad with a bandage.
2. **GIVE FIRST AID FOR SHOCK.**
   Rest, warmth, drinks, cheer, morphia.

BURNS are dangerous because of shock and poisoning. Immediately on the spot :—

1. **GIVE FIRST AID FOR SHOCK.**
   Morphia, drinks, cheer, warmth, rest.
2. **COVER THE BURN.**
   Use an " anti-burn " preparation if it is available. Otherwise cover the burn with a clean dry dressing.

Note.—**Wounds—Cover wound first ; then treat for shock.**

Burns—Treat shock first ; then cover burn.

BOMBS.

To avoid wounds and blast injuries, when not on duty for which you must stand up, LIE DOWN FLAT, WITH HEAD INBOARD.

To avoid burns, WEAR ANTI-FLASH GEAR ; and, even in Tropics, wear a complete covering to the body (for example, boiler suit) with trousers tucked into socks.

CHAPTER 5.

MOVEMENT AND STOWAGE OF CASUALTIES.

It is always easy enough to shift men somehow, like sacks of potatoes, and to dump them on the deck elsewhere ; but the moving of casualties is a very different matter. **They should be lifted gently and carried smoothly.** Every jolt is a stab of pain.

There are only a few correct ways in which you can move casualties comfortably. Like all drills done perfectly, they may seem easy to an untrained onlooker ; but when you try for yourself you find that they are not nearly as simple or obvious as they appear. They need learning and it is only by **practice** that you can be among those who really know how to do them.

If you carry a man in the correct way, you will cause him the least possible discomfort and yourself the least amount of exertion. At the same time, you will move him quickly and safely.

The exact method that you should use for each separate casualty depends on the sorts of places from and to which he has to be moved, how many men there are to help you, how badly he is hurt, and what part of the body is wounded. It is not possible to lay down any rules as to what you should do in each case, but, bearing in mind the points just mentioned and the various ways described below, your own **common sense** must decide. There is one other point which you should always remember : try to gain the confidence of any man you are carrying. For example, when strapped in a stretcher, he is quite helpless ; you must try to avoid giving him anxiety by showing that you know what you are doing and cheering him up.

1. MANHANDLING.

This is always a quick way of moving lightly wounded men and it may be used everywhere. In particular, it may be the only way in small ships, where narrow passages, difficult turns, and lack of space, make it impossible to use a stretcher.

Fireman's lift.

This is especially useful when you have to move a man by yourself and need the use of your right hand for holding on to a ladder.

Roll the wounded man on his face. Stand at his head and lift him into the position shown in figure 34. Stoop down and put your head under his LEFT arm. Then put your LEFT arm between his legs and grasp his LEFT hand, letting his body fall over your LEFT shoulder (*see* figure 35). Steady yourself and then stand upright, at the same time shifting his weight so that he lies well balanced across the back of your shoulders (*see* figure 36).

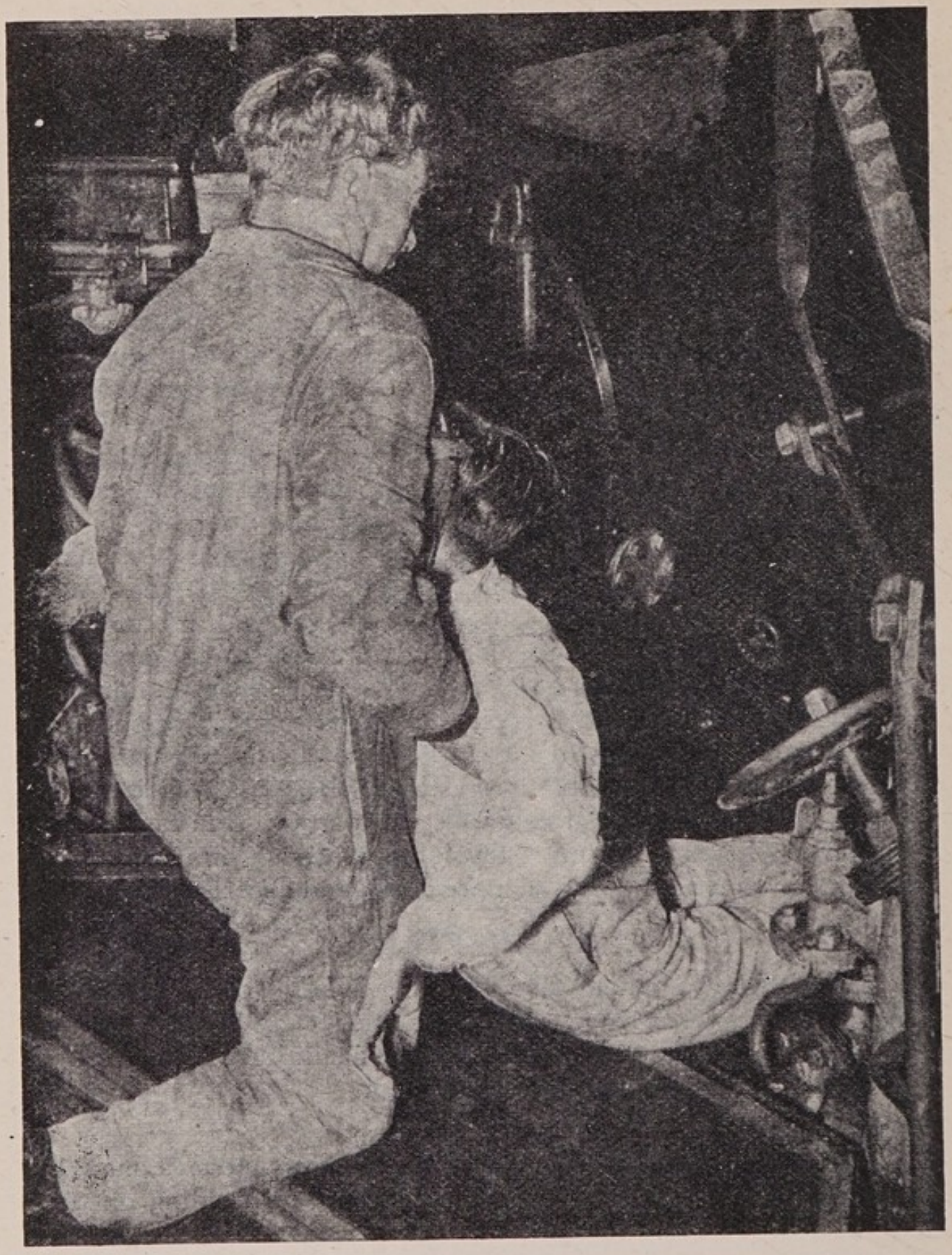


FIG. 34.—*Fireman's lift. First stage of lifting casualty.*

Pick-a-back.

The simple pick-a-back method of carrying a man is only useful when he is conscious and able to hold on to you with at least one arm.

FIG. 35.—*Fireman's lift. Second stage of lifting casualty.*

FIG. 36.
Fireman's lift.
Casualty being carried up a ladder.

FIG. 37.

The fore-and-aft carry.

Fore-and-aft carry.

Figure 37 shows how this is done. One man is supporting the casualty under his arms and the other under his knees.

FIG. 38.

How the wrists are held.

FIG. 39.

The three-handed seat.

A casualty being carried.

Three-handed seat.

Figure 38 shows how two men should hold each others' wrists to form a three-handed seat for the casualty, with one arm as a back-rest. Figure 39 shows a man actually being carried.

Four-handed seat.

Figure 40 shows how two men should hold each others' wrists to form a four-handed seat, and figure 41 shows a casualty actually being carried. He is supporting himself with his arms round the shoulders of his helpers.

Ordinary manhandling.

A casualty may be carried by two men without a " seat " being formed by their hands. One arm of each carrier supports his back and shoulders, and their hands hold his thighs as shown in figure 42.

FIG. 40.

How the wrists are held.

FIG. 41.

The four-handed seat.

A casualty being carried.

If conscious, the casualty may help to support himself with his hands on the shoulders of the carriers.

Manhandling down a gangway.

Figure 43 shows the way in which a casualty should be manhandled down a gangway. This is different to the ordinary manhandling described above in that the weight of the casualty's thighs is taken by a third helper.

Drag-carry.

In narrow spaces, particularly where there is wreckage following explosions, it may be possible for only one man to reach a trapped casualty and to rescue him. This is how he should be dragged to safety.

Tie the wounded man's wrists together and then, kneeling astride the man, put your head through the loop made by the tied wrists. Then crawl along, dragging his body with your neck as shown in figure 44.

FIG. 42.—*Carrying a casualty.*

FIG. 43.—*Manhandling down a gangway.*

When a casualty has been rescued by means of the drag-carry, he may be further moved through any narrow spaces by two men, as shown in figure 45.

This method of moving casualties is of-course rather rough. However, there are occasions in damaged ships and also ashore (for instance, when rescuing men who are trapped in the debris of bombed buildings and air raid shelters) when the immediate need is to get a man to a safe place, sometimes even before you can begin to give first aid for his wounds or loss of consciousness. It is only in such emergencies as these that you should use it.

Apart from the exceptions mentioned above, remember that **the rule is that you should never move any casualty until after you have given him first aid on the spot for whatever injuries or wounds he may have and until AFTER his shock is better.** (*See* page 9.)

FIG. 44.—*The drag-carry.*

FIG. 45.—*Manhandling in a confined space, after rescue by the drag-carry.*

2. STRETCHERS.

The Neil Robertson stretcher is a simple apparatus for moving casualties safely from difficult places, where the ordinary stretcher with stiff poles would be useless. The wounded man is enveloped in a protecting but flexible case so that he takes up as little room as possible. He is wrapped up like a mummy so that he can be hoisted vertically or carried horizontally. The stretcher can be bent slightly in turning sharp corners in narrow passages. It is used for moving men up ladderways from boiler-rooms or engine rooms and out of turrets; also for lowering men from bridges and masts, and from all other places where an injured man has to be got out of an awkward position.

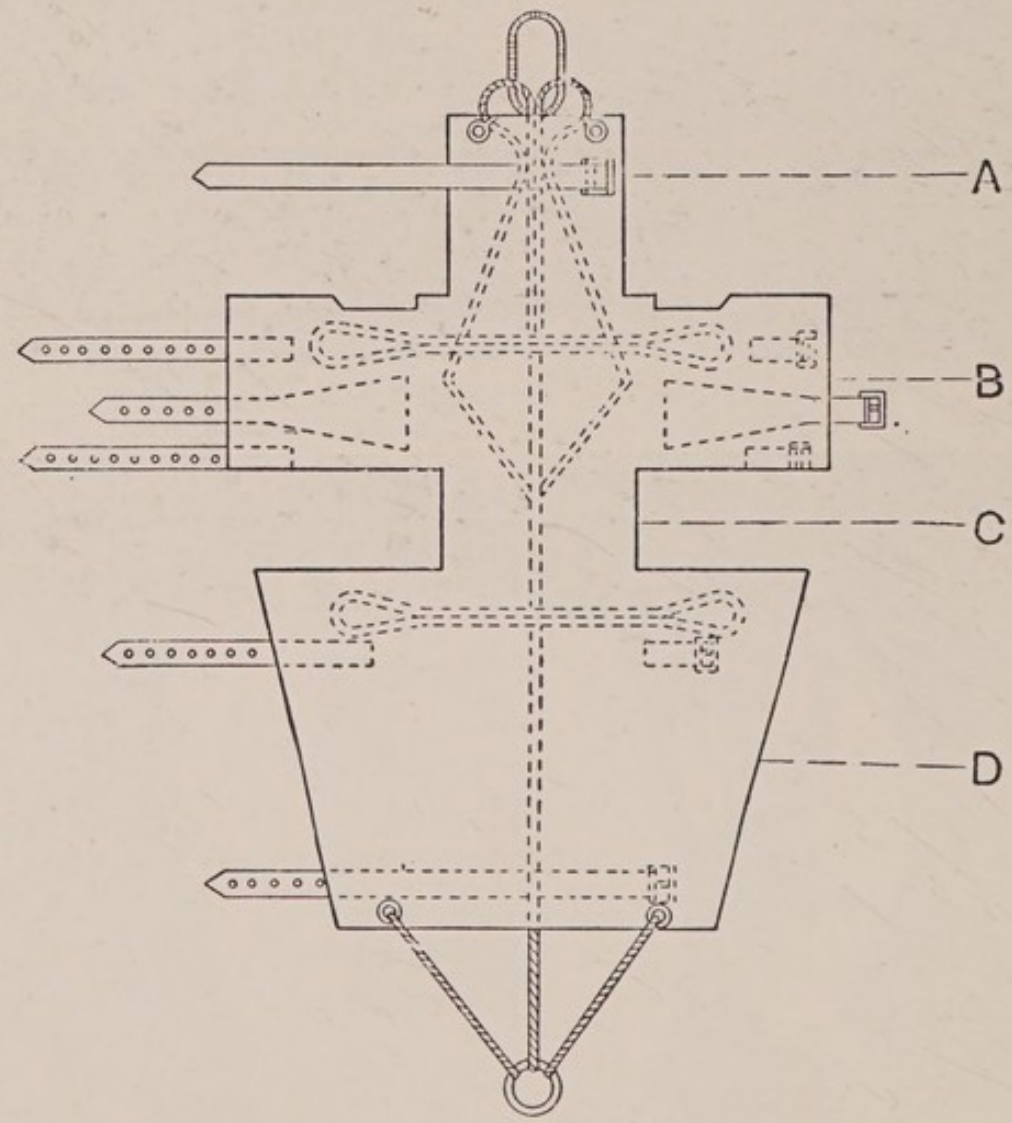


FIG. 46.—*Neil Robertson stretcher.*

The Neil Robertson stretcher is well known in the Service and very little description is necessary. In figure 46, the portion A takes the head and neck, which may be steadied by a canvas strap passing over the forehead. The portion B is wrapped round the chest,

notches being cut on which the arm-pits rest. This part has three canvas straps. The portion D folds round the hips and legs down to the ankles. It is secured by two canvas straps

FIG. 47. FIG. 48.

Neil Robertson stretcher being hoisted through a hatchway.

The whole stretcher is stiffened by bamboo slats which are sewn to the canvas. Figure 46 and the photographs (figures 47-50) illustrate the general construction and uses of this stretcher.

The only practical difficulty lies in mistaking the inside for the outside, and the head for the foot end. When you find you have begun to put it on the wrong way round you must begin again, causing much unnecessary movement for the casualty. This will be avoided if you open the stretcher completely and lay it alongside the man, head to head, foot to feet. You can then place him in it, using the proper Army stretcher drill when you have two or three men to help you. (*See* page 70.)

When it is being used to move an unconscious man, the head strap must be secured to prevent the head dropping forward, and

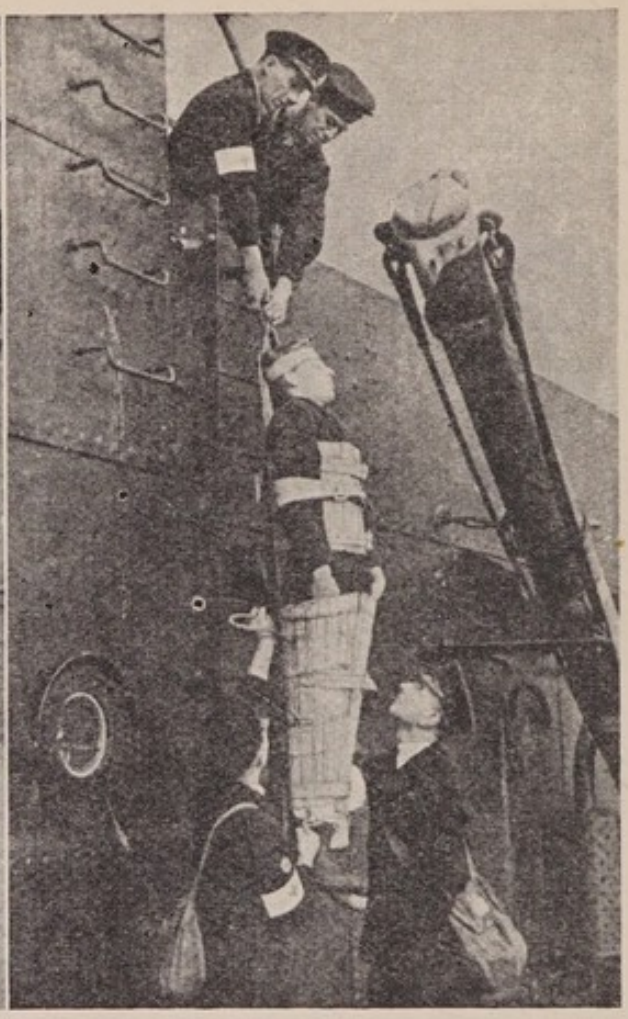


FIG. 49. FIG. 50.

Neil Robertson stretcher.

On deck. *Being lowered over side.*

the arms should be secured inside the chest piece B, as shown in the photographs. With a conscious man, the head strap need not be secured and the arms may be left free.

When a respirator is being worn, it must be placed outside the flap and not compressed but held by the middle chest strap, as shown in figure 51.

The Army pattern of stretcher consists of three parts: the stretcher itself (which folds up conveniently for carriage or stowage), a pair of carrying slings and a pillow. It is used in H.M. Ships for all occasions except those where limitation of space make the Neil Robertson essential. When Naval forces are landed during combined operations you may have to use your ingenuity in finding the best way to handle it. One method is shown in figures 52 and 53.

No further description is necessary of this well-known stretcher, but the drill for loading a casualty on to it, already mentioned above, will now be described.

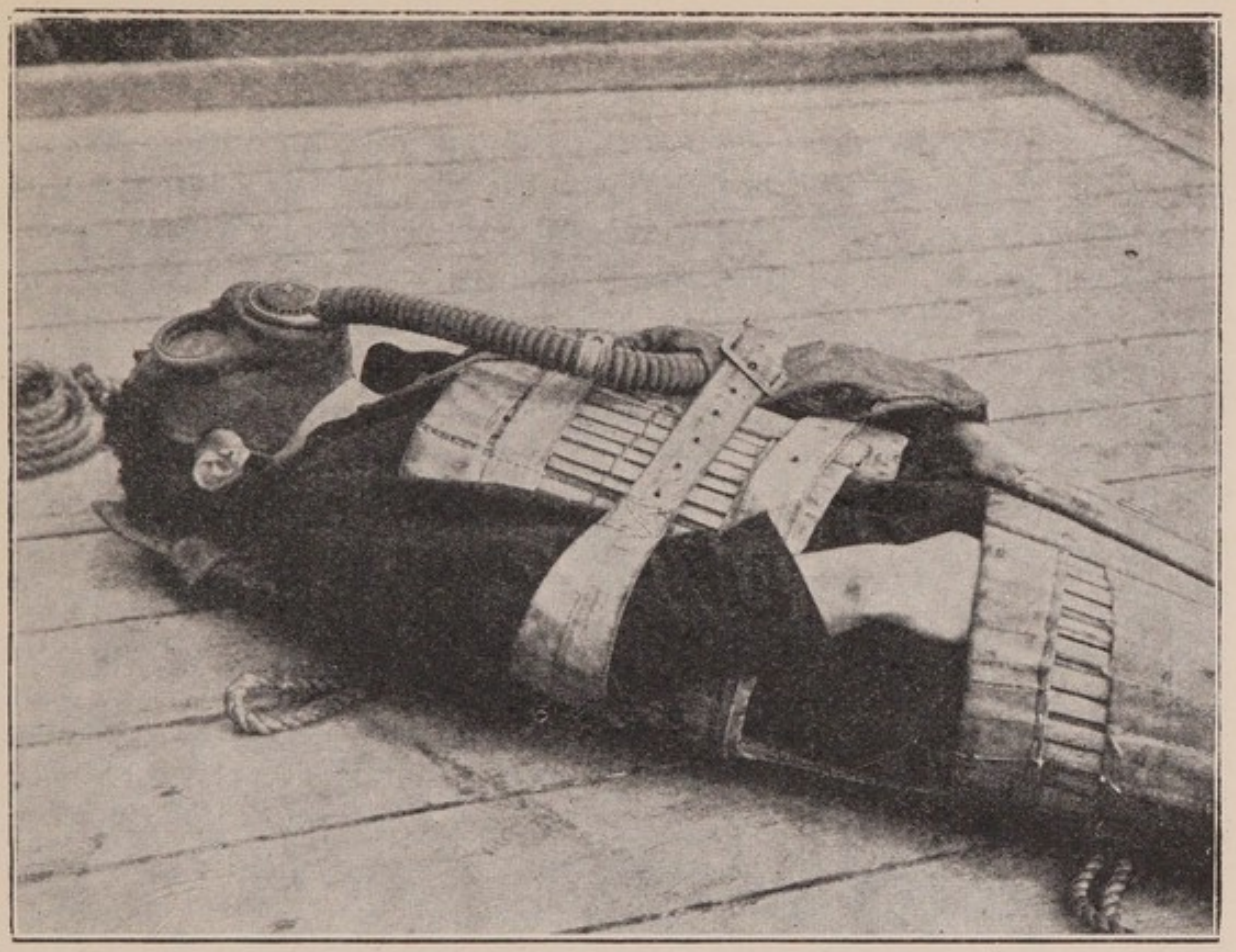


FIG. 51.—*The Neil Robertson stretcher and casualty wearing gas mask.*

FIG. 52. *Army type stretcher.* FIG. 53.
Use of stretcher in landing operations.

Figs. 52 and 53 reprinted, by permission, from the Journal of the Royal Army Medical Corps, Vol. 79.

How to put a casualty on a stretcher.

Three men stand on one side of the casualty and a fourth man stands on the opposite side facing the middle of the first three men. All kneel on their left knees. Hands are then placed under the casualty's body, the men opposite each other joining hands under his buttocks. On the word "Lift" the casualty is gently raised from the deck and placed on the ledge formed by the knees of the three men who are kneeling side by side. Great care should be taken to support the part of the body which has been injured. When the casualty is safely on the ledge, the single man leaves the others and fetches the stretcher which he places on the spot where the casualty was originally lying. He then joins hands again with the middle man opposite him and, on the word "Lower," the casualty is lowered on to the stretcher.

This is the Army drill and it provides the only safe and comfortable method of placing a man on a stretcher. You should always use it when there are sufficient men to help you. Three men instead of four as described above, can carry out this drill.

3. STOWAGE OF WOUNDED.

After an action is over and wounded have been moved to places chosen as most suitable for them, it may be necessary for you to assist in rigging the Army type stretchers in tiers as shown in figure 54. To do this, ropes are secured to hammock hooks and loops are taken round the stretcher handles. The bottom stretcher in each tier of three is resting on the deck so that it does not shift with the ship's movements.

By this arrangement, many men can be stowed in comfort on a mess deck without overcrowding, and room is left between stretchers for further treatment to be given.

4. FURTHER TREATMENT OF WOUNDED.

At this time, when action is over, the medical staff may be working hard with operations, setting fractures and carefully treating the wounds for which you have already quickly given first aid. As well as rigging stretchers, if off duty, you can continue to be very useful acting as auxiliary sick berth attendants. You can carry on treating shock—keeping men comfortable, warm and quiet, filling hot water bottles, tucking in blankets and giving hot drinks. You can also help by giving the wounded men bottles into which to pass urine. By being cheerful and telling them what is going on, you can make casualties much happier, and by watching and informing the Medical Staff if any man gets worse you can help them when they are most busy.

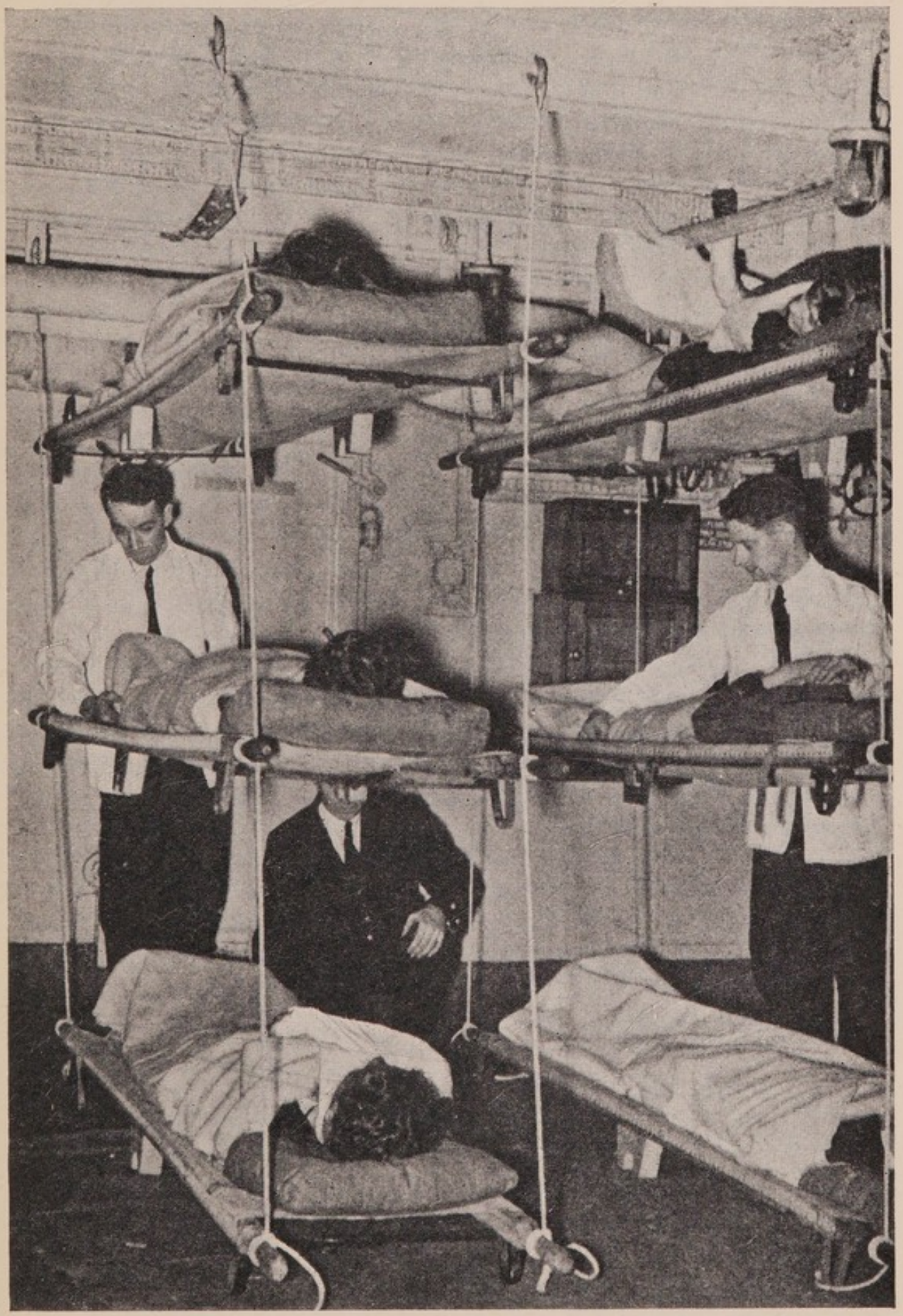


FIG. 54.—*Stowage of casualties on stretchers slung from hammock hooks.*

In certain circumstances when there are many wounded aboard, such as happened in the destroyers which evacuated the B.E.F. from the Continent, you may be asked to do other things under the Medical Officer's directions. For example, in one of the destroyers returning from a beach near Dunkirk, there were many Army casualties who urgently required second dressings for wounds which they had received some time before. This is how the Medical Officer was able to see that everything necessary was done. A volunteer was appointed " nurse " to each group of six wounded men and was directed to get them comfortable and warm, to give them food and drink, and to make sanitary arrangements for them ; in fact, to do all the first aid that was needed for their shock. Then the Sick Berth Attendant went round the cases in an order determined by the Medical Officer, accompanied by two other volunteers who acted as his assistants. One of them carried bowls of sterile water, antiseptics, clean dressings, etc., and the other carried buckets into which dirty dressings were put. They removed dressings and left wounds temporarily covered and splints held in position with triangular bandages. The Medical Officer followed about two cases behind, also with two volunteer assistants, one carrying clean gear and the other dirty. He cleaned the wounds, gave morphia as required and re-applied dressings.

Thus every casualty received treatment far more quickly than would have been possible by means of the unaided efforts of the medical personnel alone. The " nurses " and assistants were extremely valuable, working as they did with interest and energy even after they had already been fighting their ship throughout several days and nights.

Acting as a nurse may not seem a very exciting job, but you have probably at some time in your own life been grateful for good nursing, and you therefore know how much it helped you towards getting well. Try to remember what she did. She never fussed, yet you always knew she was there ; she cheered you up, and kept you comfortable. She made you feel safe.

These then are the jobs you may be called on to do **after action.** They are often something more than FIRST aid, but they have been done by volunteers in many ships already making the Medical Staff and the wounded equally grateful.

CHAPTER 6.

SUFFOCATION. ARTIFICIAL RESPIRATION.

When the lungs do not get a sufficient quantity of fresh air, they cannot carry on their job of purifying the blood ; as a result, impure blood circulates in the body. This is known as asphyxia or suffocation. It leads to the stopping of breathing, loss of consciousness, and, if first aid is not given, to death.

These are the causes of suffocation :—

1. No air to breathe.
   - (*a*) Drowning (*see* page 81).
   - (*b*) Breathing poisonous gases and fumes (*see* Chapter 8).
   - (*c*) Breathing in a space where there is very little or no oxygen (*see* page 96).
2. Inability to breathe.
   - (*a*) Electric shock (*see* page 81).
   - (*b*) Pressure on the chest and belly preventing normal movements, as when pinned down by wreckage.
   - (*c*) Smothering, throttling, or the lodging in the windpipe of something which prevents the entry of air into the lungs (*see* page 82).

When a man has been completely suffocated in any of these ways (they are described in other parts of this book), you will find him unconscious, his breathing will be stopped and he will be apparently lifeless.

But the fact that his breathing has stopped does NOT always mean that he is dead—his heart may still be beating, and if his breathing can be made to begin again he will recover consciousness. In order to restore his natural breathing you must at once begin " artificial respiration."

HIS LIFE IS IN YOUR HANDS. MAKE HIM BREATHE AND HE WILL LIVE.

If you do not know how to do this, you can only stand by and watch him die.

In order to understand artificial respiration you should know the two ways by which air is made to flow in and out of the chest during normal breathing.

The first way is by the raising and lowering of the ribs. When they rise, the chest expands so that the space inside is increased and air is sucked into the lungs. When they fall, air is pushed out. The second way is by the movement of the diaphragm, which is the partition between the chest and the belly. It is marked on figure 23 (page 32). It is a large domed sheet of thin muscle. When it

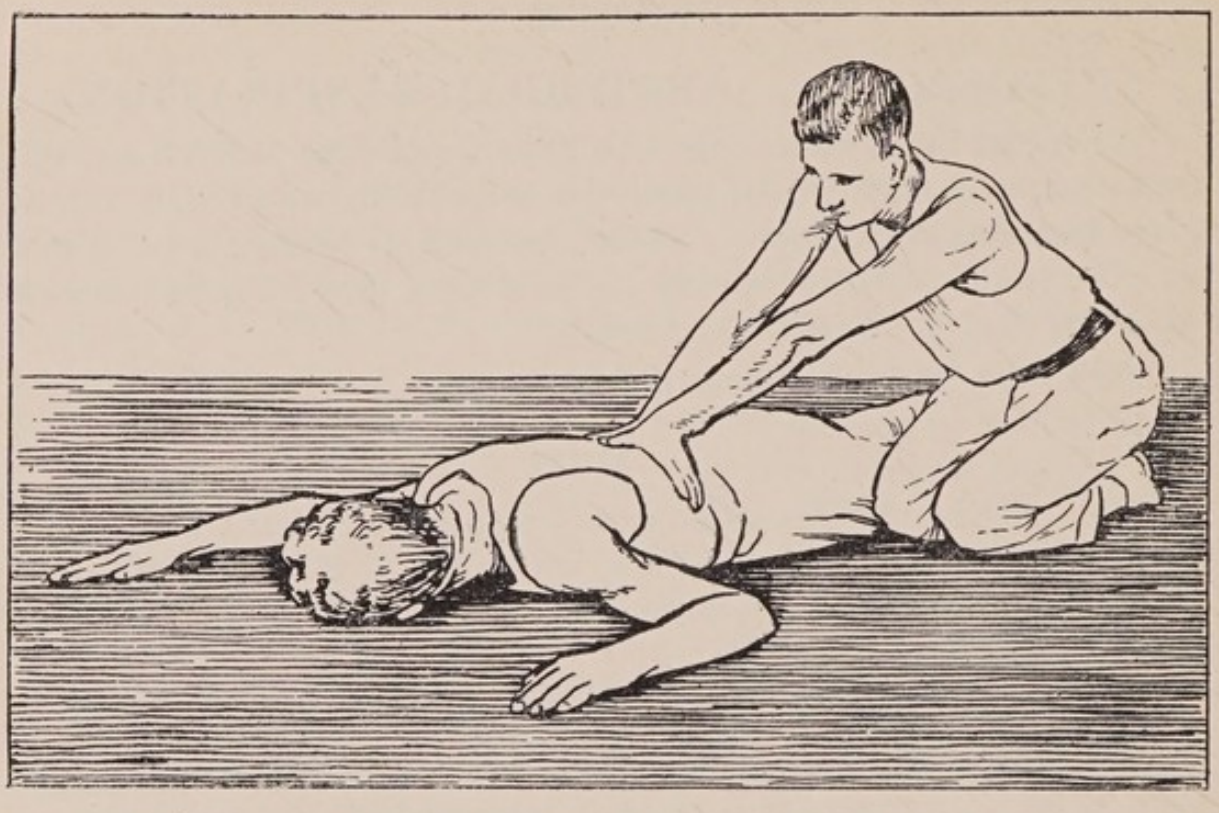


FIG. 55.—*Schafer's method. Note operator sitting on his heels, with arms straight out, no pressure on patient.*

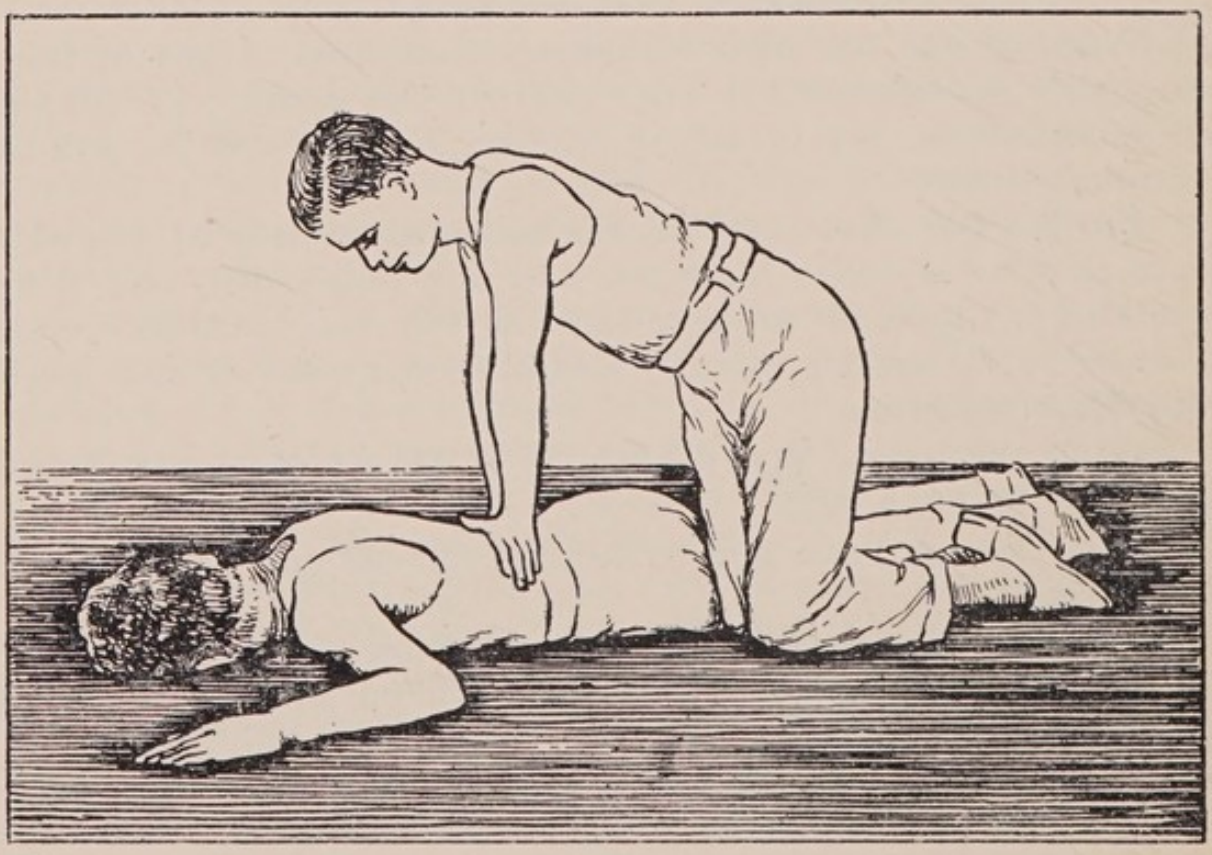


FIG. 56.—*Schafer's method. Note operator with the weight of his body pressing on the patient through his straight arms.*

Figs. 55, 56 and 57 drawn from photographs lent by the Royal Life Saving Society.

contracts, the dome is pulled down, the space inside the chest increases and air is sucked into the lungs. When it relaxes, it rises up and air is pushed out of the lungs.

These movements of the ribs and diaphragm are automatic—you do not usually realise they are happening until you breathe deeply after hard exercise. When they stop because of suffocation, you must make air flow in and out of the lungs in the following ways.

1. SCHAFER'S METHOD OF ARTIFICIAL RESPIRATION.

The man needing artificial respiration must be at once placed, belly down, on the nearest flat surface, the head turned to one side and the arms laid forwards. (*See* figures 55, 56 and 57.)

Loosen any tight clothing round his neck, chest and belly, and sweep your fingers round the back of his throat to remove any obstruction that there may be in his gullet. For example, false teeth may have fallen in or his tongue may have slipped to the back of his throat. You should only take a few seconds to do this.

Now begin artificial respiration and keep it up until normal breathing begins; in some cases life has been restored after three hours of unceasing work. The following description is in accordance with the official recommendations of the Royal Life Saving Society.

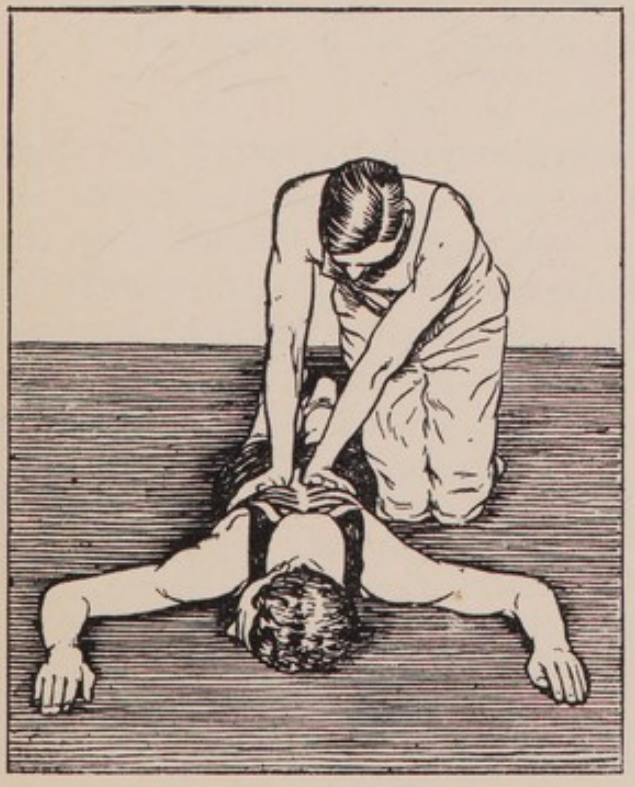


FIG. 57.—*Schafer's method. The same position as Fig.* 56.

Position of operator.

To perform artificial respiration place yourself on one side of the patient facing the head, in a full kneeling position, with knees and hips bent (*see* figure 55). Put your hands on the small of the patient's back, the wrists nearly touching, the thumbs as near each other as possible without strain and the fingers passing over the loins on either side, but not spread out.

Expiration (pushing air out of the lungs).

Swing slowly forwards from the knees so that your weight bears down on the patient (*see* figure 56). No exertion is

required: the necessary pressure is imparted by the weight of your body. In this way the patient's belly is pressed against the ground; the contents of the belly are forced against the diaphragm; the diaphragm rises and air is driven out of the lungs along with water or mucus which may be present in the air-passages and mouth.

Inspiration (sucking air into the lungs).

Next swing your body slowly backwards to its first position, thus removing its weight from the hands (which are left in place) and relaxing the pressure on the belly (*see* figure 55). The contents of the belly now resume their former position, the diaphragm descends, the chest is enlarged and air passes into the lungs. Repeat the movements regularly, about twelve times a minute, swinging your body alternately forwards and backwards from the knees.

Timing.

Every such double movement will occupy about five seconds—two of which may be taken up by pressure (expiration) and three by relaxation (inspiration). To ensure regularity you may count five slowly. As you say 1, swing forwards increasing your pressure; 2, keep up steady pressure; 3, begin to relax pressure; 4, go on relaxing pressure, so that the patient is quite free from pressure (although your hands are left in place) as you say 5. Your arms should be kept straight the whole time; not bent at the elbows. Continue this procedure until there are signs of recovery, shown by the reappearance of natural breathing. If this is ineffective or tends again to cease, artificial respiration must be resumed.

Use of helpers.

While the operator is performing artificial respiration, others may, if opportunity offers, endeavour to help restore the circulation by applying warmth by means of hot bottles and flannels to the legs and feet. But nothing must be allowed to interfere with the performance of artificial respiration, nor must the patient be turned on his back or receive any restoratives by the mouth, until his natural breathing is completely re-established and he is fully conscious. Such change of position may easily block the air-passages and produce fatal suffocation.

Further First Aid.

When the patient is completely restored and his ability to swallow has been tested by a teaspoonful of warm water, a teaspoonful or two of warm brandy and water may be given. He may then lie on his side in a warm bed and be encouraged to sleep. But he must be carefully watched for some time to see that breathing does not again fail.

2. EVE'S METHOD OF ARTIFICIAL RESPIRATION.

This new method was originated by Dr. F. C. Eve of Hull It has now been tested by Naval Medical Officers and the following description shows how it can be used in H.M. Ships. It is more efficient than Schafer's method and much easier in the long run. This is how it works. If a man's body is tilted with his head downwards, the contents of his belly slide down towards his head and press on his diaphragm, forcing air out of his lungs. If he is then tilted feet down, the contents of the belly slide down towards the feet, pulling the diaphragm down and sucking air into the lungs. So if he is tilted to and fro, his breathing will be automatically done for him.

To carry out this method, you will require the help of one or two other men and if they do not know what to do, you must be prepared to tell them.

When a man requires artificial respiration :—

1. Begin Schafer's method at once.
2. Send someone else to fetch a stretcher with a blanket on it.
3. Quickly put the man face downwards on the stretcher. Take him to the nearest mess deck.
4. As soon as he is below decks, continue Schafer's method while the man is fixed to the stretcher to prevent his slipping during rocking. (*See* figure 58.)

   This is best done by bandaging his wrists and ankles to the handles of the stretcher, as shown, over plenty of padding.

   Ropes encircling his body and the stretcher just above and below his buttocks can be used instead.
5. Meanwhile a light rope is fetched and secured to a hammock hook. Deck space is cleared all round.
6. The stretcher is lifted to waist height and the rope is passed below and then made fast to the next hammock hook. You now have the stretcher resting with its middle on a loop of rope. (*See* figure 59.)
7. Begin tilting the stretcher to and fro. (*See* figure 60.)
8. Cover him with warm blankets.
9. Continue the seesaw rocking twelve times a minute until normal breathing returns. This has been known to occur after eight hours. The only certain sign of death that first aid personnel can rely on to

FIG. 58.—*Eve's method. Note: artificial respiration is being performed while the suffocated man is being fixed to the stretcher.*

let them cease trying to restore the man to life, is " rigor mortis "—that is, the stiffening of the muscles of the body that occurs after death. Rocking must therefore go on for eight hours, until rigor mortis is present or until a Medical Officer says that the man is dead.

In your ship, some stretchers may already be prepared with the wooden blocks attached, as shown in the photographs. If they are not, in order to prevent the stretcher slipping on the rope, a pair of nails should be hammered into the underside of the stretcher bars on each side. This must be done before the man is placed on the stretcher.

This method is easy. But do not expect to be able to do it without practice. Just as you must practise Schafer's method, so you must practise rigging the stretcher and rhythmically carrying out the seesaw movements.

FIG. 59.

Slinging the stretcher from hammock hooks

FIG. 60.

Rocking the stretcher.

Eve's method.

Although you must not waste time in changing over to Eve's method of artificial respiration, you must not panic about it—it is far better to spend the short, but necessary, time in getting the man to a mess deck and then, with the help of others, performing Eve's method there, than to carry on Schafer's method on the first flat surface you can find.

There are many practical advantages of Eve's method. Any untrained man can assist after watching for only a few moments to pick up the rhythm. Thus it can be kept up for many hours without skilled help. Since recovery has taken place after eight hours of unconsciousness work must be continued for that time. With several casualties and using Schafer's method, this may be impossible, for it involves the wholetime efforts of many trained men and their reliefs. In contrast, any "gash hand" can rock a stretcher.

In cases of drowning, the head down position allows any water in the lungs to run out; also wet clothes can be cut off and warm blankets put on (when necessary first aid can be given to wounds and burns of the trunk) without disturbing the artificial respiration. Schafer's method would be much interferred with to do any of these

things. Also, Eve's method cannot do any harm such as may be caused by rough use of Schafer's method, for example, bruising the contents of the belly, or fracturing a rib by too great pressure.

Rigging the stretcher, by using a length of rope and a few nails, can always be done in a very short time when the need arises. No preparations are essential.

Another way of performing rocking does depend on preparation beforehand. Stretchers may have blocks attached and trestles may be made ; then rocking can be done as shown in figures 61 and 62. In place of a trestle, an iron bar resting on, for example, kit lockers or benches would provide an alternative pivot on which a stretcher could be rocked.

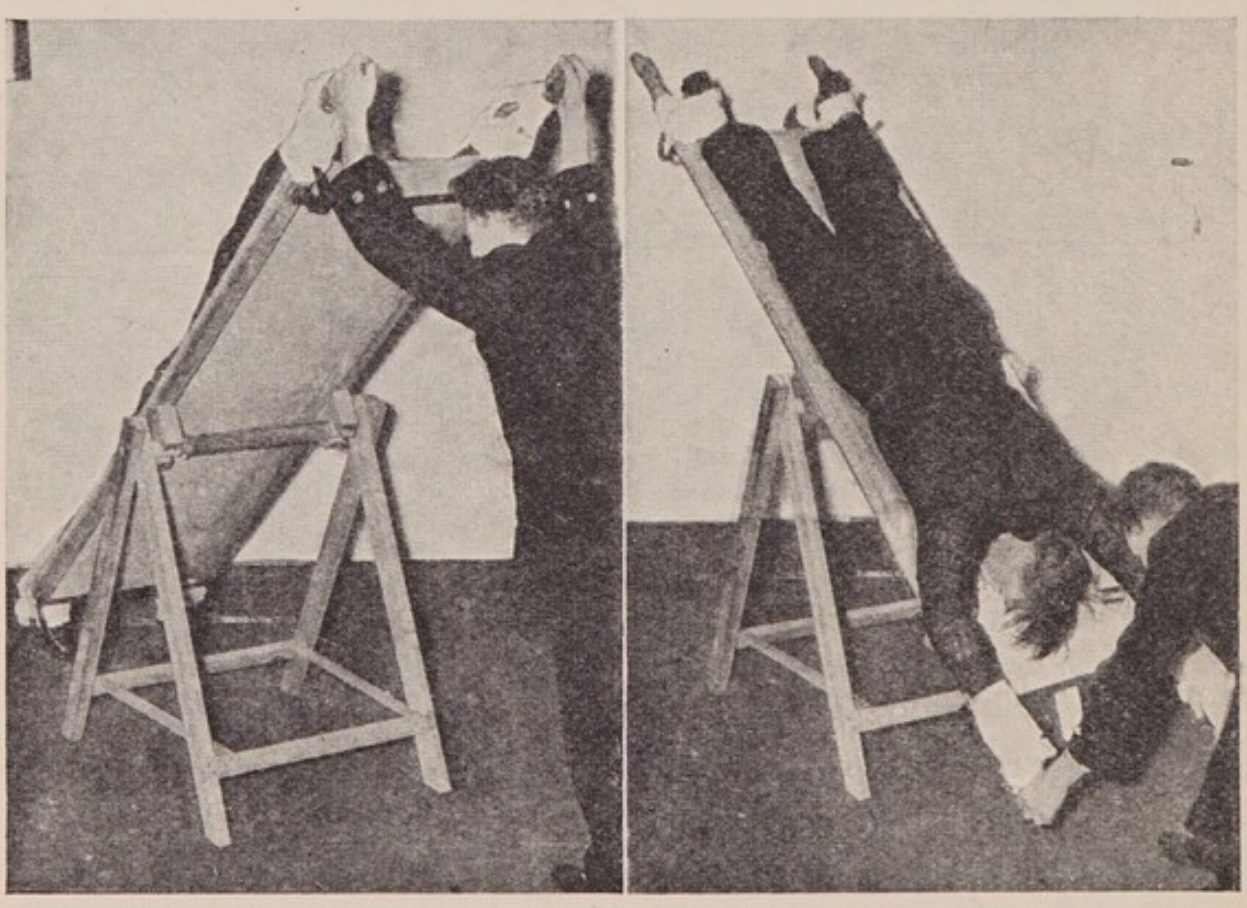


FIG. 61. *Eve's method.* FIG. 62.

Rocking with trestle as pivot.

The Novox oxygen giving apparatus may be used while either of these two methods of artificial respiration are being given. With Eve's method the box container should be placed on a table close to the middle of the stretcher ; then the tubing is long enough to follow the swing of the head.

Some of the causes of suffocation are described elsewhere in this book, but others are dealt with now.

Electric shock.

In action in H.M. Ships, where electrical equipment is widely used, and during the bombing of shore establishments, there is always a chance, in the dark, of broken electric cables being touched. " Live " wires may also be touched accidentally during repair work at any time. They are then short-circuited by the body with two results : first, an electric burn is caused on the part of the body that made contact with the current. From the point of view of first aid, this is no different from any other burn. Second, electric shock is caused. This may result in paralysis of the muscles used in breathing and loss of consciousness.

If the man is still in contact with a live wire, do not touch any part of him with your bare hands or you may also be electrocuted. Switch off the current if possible, or else drag the man clear, having covered your hands with some insulating material. Rubber or thick dry woollen gloves, a tobacco pouch, mackintosh or any thick bundle of dry clothing may be used for this purpose.

In all cases give first aid for shock (*see* Chapter 1) and if the man's breathing is very weak or has stopped, give artificial respiration at once. Nearly all men can be restored to life by means of artificial respiration if it is begun within a minute of electrocution, no matter how dead they may appear.

Drowning.

When a man is got inboard apparently dead from drowning, lay him face down on the nearest flat surface and then, by standing over him lift his belly off the ground. This allows water in his lungs or stomach to run out. Then perform Schafer's method of artificial respiration. The rule that you must clear the throat is most important, as seaweed, etc., may be lodged there. Meanwhile, steps must be taken to perform Eve's method as soon as possible. The particular values of this method are :—

1. In the head down position, water is drained from his lungs.
2. Wet clothing may be cut away and warmth given without interfering with the giving of artificial respiration.
3. It is much easier to work for the long time that may be needed.

Choking.

This is caused by food " going down the wrong way," and also by various objects, such as dental plates, either blocking or slipping right into the windpipe.

The first aid is as follows : Lay the man flat on his face with his head turned to one side. Pass your fingers over the back of his tongue to remove any object that you can feel lodged there and to pull his tongue well forward. If you can find nothing, get the man held upside down and thump his back between the shoulder blades. If, after you have removed the object, there are no signs of breathing, begin artificial respiration at once.

Throttling, hanging and smothering.

The normal flow of air in and out of the lungs may be stopped in any of these ways. The actual cause is always self-evident. First aid consists of freeing the throat or mouth from whatever may be constricting or blocking it and then giving artificial respiration if breathing is not seen.

The need for you to be able to perform artificial respiration is very great. It is urgently important, even as vitally important as it is that you should know how to put on a tourniquet to stop arterial bleeding, because, if you cannot do so, you can only stand by and watch a man die.

You should learn both the methods which have been described. Then, when single-handed, you can carry out Schafer's method, and when there are several men to help and the necessary gear is available (as it always is in H.M. Ships) you can use the better method of Eve.

Remember that you must not expect to be able to carry out artificial respiration successfully when an emergency arises unless you have trained yourself beforehand. Reading this chapter once is not enough—you must read it again to make sure you understand it and then prove your knowledge and become skilful by actually practising artificial respiration with your messmates.

CHAPTER 7.

ABANDON SHIP. FIRST AID FOR SURVIVORS.

When " Abandon Ship " stations are piped, you will follow a drill which you have often practised and nothing which is discussed here must interfere with your allotted duties; but these are the points you should remember to help towards the survival of yourself and others.

1. Gather up any extra clothing, blankets or duffel coats.

Experience has shown only too often that unnecessary suffering has been caused by lack of clothing when in a Carley float or boat. Even in the tropics it may feel bitterly cold at night. It is better to carry too much clothing than too little (if you are wearing it, keep your anti-flash gear), because it will protect you not only against the cold, but against the sun. Do not imagine that the weight of this extra clothing will be a danger to you. Modern lifebelts will support a person in the water fully dressed.

2. Going overboard.

If you do not get away in a boat or float, when possible, throw something, such as a table top or wooden bench, over the side before entering the water. It is surprising how small an amount of wreckage does in fact float and you may need something to which to hang on temporarily.

Go over the lower side if the ship has listed. If you go over the upper side you will be in danger of being badly hurt by barnacles and marine growths and of fracturing your ankles by hitting your heels against the bilge keel. Men have also disappeared into holes in ships' sides. When the lower side of the listed vessel happens also to be the weather side, take care to avoid being washed back on board, and in this case if possible take to the water from the bow or stern, whichever is the lower.

Do not mind going into the water if it is covered with fuel oil. It is not dangerous (*see* page 86), except, of course, when it is burning.

If you have to jump from the ship into burning oil you may, if you are a good swimmer, be able to avoid being burned if you adopt the following procedure, which has been tested and proved successful. Jump feet first through the flames. Swim as long as you can under water, then spring above the flames and breathe, taking a breast stroke to push the flames away, then sink and swim under water again. Men have been able to navigate up to 200 yards of burning oil in this way. To be able to do this, however, you will have to remove your lifebelt and other cumbersome clothing.

3. Have confidence in your lifebelt.

Many people have been saved by having their lifebelts inflated early in an action as they have been temporarily concussed at the time when their ship sank and have come to a few minutes later to find themselves kept afloat by it. For this reason, and also because it is not easy to inflate a belt when you are in the water, make sure that it is fully inflated from the beginning of an alarm. Also make sure that you are wearing it in the correct place and not flapping somewhere around the belly. Always take great care of the tapes of your lifebelt and, if they are wearing thin, sew on new ones. They may have to take a considerable strain.

4. In the water.

As soon as you are in the water, swim away from the ship. Underwater explosions (for example, depth charges from your own ship) are dangerous if you are close to them (*see* page 53). Also, as you have gone overboard from the lower side if there was a list, the ship may " turn turtle " and superstructure roll over on to you.

Many men have lost their lives through losing their heads and thrashing about in the water. Look for some floating object, swim slowly towards it and get on board or support yourself with it. Do not exhaust your strength by swimming about uselessly, once you are clear of the sinking ship.

5. Rescue.

When rescue boats arrive, do not try to swim from any supporting wreckage you may be holding, but wait until they come to you. Men have sometimes done this and failed to reach the boat, losing their lives quite unnecessarily.

Once you have safely got on board a rescue-craft, whether it be a ship's boat or only a Carley float, your chances of winning through have improved enormously. From now on the way you act will influence your physical comfort while adrift and your chances of survival.

Being adrift in a lifeboat is uncomfortable ; being on a raft or Carley float is a good deal worse. Do not exhaust yourself by getting excited. Do not sing nor shout ; for by doing so you use up your strength and lose a great deal of valuable water in your breath. The motion of the craft will jostle you against others, and you may be very tightly packed. Make the best of it and do not give way, for your survival depends on every one being cheerful and helping each other.

It is most important that each officer and man in a boat or float should be given a job to do, however small.

As soon as possible, squeeze out all your wet clothing, but do not take off all your clothes unless the weather is warm and dry and the wind moderate. Undress and dry your clothes layer by layer.

Pay special attention to the feet (*see* page 87) ; if you are wearing boots and socks, take these off, quickly dry them and the feet as well as you can, and then replace them. If you are wearing sea-boots, take them off, empty out any water which may have got inside, and then put them on again.

An invaluable possession in a boat is a jack knife ; do not throw yours away before entering the water.

FIRST AID FOR SURVIVORS.

When you are in a ship rescuing survivors who have been in the water for only a short time, it is warmth and dry clothing alone that is necessary for most of them. However, there may be some in a condition which is the same as that of men who have been wounded, that is, shocked. These men have lost their strength and are exhausted. You may have to give them every assistance to get them inboard. They cannot, for instance, clamber unaided up a rope or net hung down the ship's side. It is a general rule that such survivors should be treated as shocked men and you should give all the first aid that is described in Chapter 1. In particular, remember this told you to give rest and warmth, and to cheer men up. In those ships in which it is possible, an additional method of getting survivors warm is to give them a hot mustard bath (two table-spoonsful of mustard added to five gallons of water). A tot of rum and a cigarette will then be all that they want. Artificial respiration must be promptly given to those who need it. If any of the survivors have wounds you must also give the necessary first aid.

The difficulties of giving first aid to a large number of survivors can be overcome by volunteers. This was well shown by the work in one of H.M. Cruisers at the time of the Battle of Crete. Within twenty minutes, 266 survivors had been pulled out of the sea, with the help of flotanets. Meanwhile, large numbers of volunteers came forward with enthusiasm. These were men of the supply parties in the adjacent spaces and some survivors who were in a fit condition to assist. They were each asked to adopt and look after one survivor. They were given lint and bandages, and instructed to cover up all burnt areas. Scissors were distributed to them to be used in undressing those who were wounded. Blankets and duffel coats were obtained from stores or borrowed from the ship's company, and each volunteer was responsible for his adopted survivor being dry and warm. Feeding cups were also issued because many of the patients had burnt lips, and oranges were squeezed into their mouths. Indeed, the volunteers supplied every need and comfort to the men who had been rescued.

The duties of the Medical Officer thus became only concerned in directing the activities of the volunteers, in picking those in need of special attention, and administering morphia to the many men with severe burns.

Oil fuel.

In many cases you will find that survivors are covered with oil fuel. This does no particular harm. On the contrary, it may have prevented them from getting very cold (the coating of oil keeps in the heat of the body) ; it may also have kept sharks away (fish cannot swim in oil as it clogs their gills). However, men's eyes may be sore as much from the salt water as from the oil fuel, and they may vomit and cough as a result of water and oil in their stomachs and lungs. All these effects generally pass off quickly, but you should help these men by bathing their eyes with water, and smearing their eyelids with vaseline, if it is available. You should also get them plenty of warm drinks, cups of sweet tea, cocoa or soup.

Turkey red oil is officially supplied to clean the oil off the skin, and shale oil may often be obtained aboard for the same purpose. It is only important to remove the oil fuel for the sake of comfort. It will not harm the skin and there should be no undue haste in getting it off.

If oil is in a wound, do NOT attempt to wash it out. Simply give first aid as though the oil were not there. It won't do any harm as it acts like an antiseptic.

When men have been in the water or lifeboats for long periods, there are additional conditions for which you may have to give first aid. These conditions are seen mostly in Merchant Navy survivors.

1. **Frostbite.**

During exposure to severe cold, parts of the body, usually the fingers (particularly when they are used to touch cold metal), ears, nose and toes, lose sensation and become blue or purple in colour and later white. This is because the circulation of the blood to these "ends" of the body has become very slow and the moisture of the flesh may actually turn into ice. If freezing continues, the circulation may cease altogether and the part may die (become black or gangrenous). At sea, frostbite is very rare unless the sea water is freezing.

First aid consists of putting the fingers or toes in cold water, or very gently rubbing the affected part. Use your own hands either dry or smeared with a little grease or vaseline, for this very gentle

rubbing so that their slight warmth is given gradually to the frost-bitten area. Warming must be very slow. Never rub with snow or ice. On thawing, the skin softens and becomes pink. Do not let the man enter a warm compartment until this has taken place.

NOTE.—The frostbitten man feels very little or no pain at all. Therefore you may have some difficulty in persuading him to stay in the open until you have given first aid.

2. Immersion foot.

When the feet or legs are immersed for many hours in cold water the skin, nerves and blood vessels very gradually suffer damage. The colder the water and the longer the immersion the greater is the damage. Sea-water, cold enough to injure, is usual in the Atlantic (winter and summer) from latitude 50 degrees northwards.

Immersion in water cold enough to cause damage is distinctly painful, but this pain is not usually severe and soon lessens. Within a half-hour the immersed part is red and numb, and it becomes

FIG. 63.—*A case of "immersion foot." Note the swollen ankles and feet, the blisters and black patches.*

difficult to move the toes. This numbness and weakness gets worse, and within three hours the limb is a little swollen. The swelling increases with time, and especially if the limb is hanging down. All these early signs of damage quickly disappear if

immersion ends and the limb can be warmed. If, however, the immersion has lasted for several days the signs of damage are more serious and lasts longer ; in such cases blisters or dark patches may appear and the skin may become broken.

Prevention.

Make all efforts to avoid this condition which may lead to permanent disability. The damage comes from cold, and the chief source of cold in boats is cold water. Keep your feet out of water by keeping the bottom of the boat as dry as possible, or by raising the feet. Even if you are wearing sea-boots, the less that water touches these boots the better ; cold from the water will come through them. If your socks have become wet, empty your boots, wring out your socks, and put them on again quickly ; if you carry dry socks put these on instead of the wet ones.

Try frequently moving your feet and toes.

Unless it is fairly warm, do not bare your feet to rub them ; the exposure to the air will cool your feet more than the rubbing will warm them. Rubbing the skin when it has become swollen, numb or tender will do harm rather than good.

Keeping the upper parts of the body dry and warm is extremely important ; this also helps to keep the limbs warm. It is better to keep damp or wet clothes on the body under waterproof covering than to strip and wring out the clothes in a cold wind.

Do not wear tight garters, suspenders, tight boots, or any other tight clothing on the legs. If the feet begin to get swollen inside your boots or shoes take them off.

First aid.

When a survivor with immersion foot is rescued, correct first aid is very important as the vitality of the legs is low and the flesh very easily damaged.

1. Lift the survivor inboard, HANDLE FEET AND LEGS GENTLY.

2. CARRY HIM to a dry, fairly warm place.

3. Strip his body and wrap him in blankets. Place hot bottles near his body, but NOT near his feet.

4. If the Medical Officer has issued it, dust any cuts or sores on the legs with powder. (This is sulphonilamide or a similar drug.)

5. Leave feet uncovered, resting them on soft pillows. Place an electric fan nearby, to fan the feet.

6. Encourage the survivor to move his feet and toes. Thus you will have warmed the body, but NOT the legs.

Do NOT let him stand or walk.

Do NOT handle the feet or legs roughly.

Do NOT massage the legs.

Do NOT wash or swab the legs in warm water.

Do NOT place hot water bottle near the legs.

Do NOT put anything on the feet except the powder, if it is available.

Remember that frostbite is rare and that it will be unusual for you to see a case. On the other hand, immersion foot is common, and you will see it quite often when rescuing survivors who have been many days adrift in a float or boat.

Frostbite and immersion foot are both serious conditions. Try to remember the ways in which you can help to prevent their occurrence so that you yourself may avoid ever being affected by them.

When you do see either of these conditions on yourself or others, correct first aid is extremely important. It is easy to make them worse by doing the wrong thing, but equally easy to help save limbs by doing the very simple and correct things.

CHAPTER 8.

POISONOUS GASES.

1. POISON GASES USED IN CHEMICAL WARFARE.

The term "poison gas," as used in chemical warfare, includes not only gases, but also liquids and solids, which are used deliberately for their damaging effects on the body. They may be delivered by shells or bombs, and the liquid gases may also be sprayed from aircraft.

The effects of a gas attack would be less at sea than in any other place (one reason is that ships could soon steam through a dangerous area) and the menace of poison gas attacks has been in the past to some extent disregarded afloat. However, in these days such attacks are quite likely to be experienced by ships engaged inshore during combined operations and they may also be delivered from the air against shore establishments and dockyards. Thus there are several reasons why men in the Royal Navy should know the first aid for them.

The "poison gases" are named after their effects on the body.

1. "Tear" gases.

These chiefly affect the eyes, causing them to water and smart. They make it impossible to keep the eyes open so that men are temporarily blinded.

2. "Nose" gases.

These, after a brief period of delay, produce intense irritation of the nose and throat, and give rise to sneezing, coughing and pain in the nose, throat, gums and chest.

Neither the tear nor the nose gases cause any permanent harm; and almost as soon as the respirator is put on all discomfort to the eyes due to the tear gases disappears. However, the effects produced by the nose gases usually persist for some time—for example, your nose may continue to hurt (it may even hurt more) **after** you have put on your respirator. You should expect this. Do not think that your respirator should immediately make you comfortable and, finding that it does not, fear that you are not getting adequate protection.

First aid for tear and nose gases.

None is required except to make sure that the respirator is correctly adjusted. Even when it has been severe, the pain and discomfort will disappear after a few hours. Do NOT rub the eyes.

Men who have been exposed to these gases are very depressed and they should not be left alone; you should reassure them that

they will soon be all right. Do not let them lose confidence in their respirators and attempt to take them off. Individual fear (of permanent damage to the eyes, etc.) easily spreads to others, giving rise to panic. This, which is the most serious danger of a gas attack, can easily be avoided by immediate reassurance of casualties.

3. **" Choking " gases** (such as chlorine and phosgene).

These produce great irritation of the lungs, giving rise to a feeling of suffocation or choking. There is immediate coughing, catching of the breath and a tight pain across the chest. There is usually some smarting of the eyes and there may be some vomiting. In most cases the coughing and vomiting pass off very soon after a respirator has been put on, but if you vomit while you are wearing your respirator, you must do so without taking it off. Bend the head forward and over to one side; as you vomit, lift the edge of the face-piece away from the face. Let it fall back again at once, before you draw in another breath.

The coughing may suddenly return some hours later, even if there is no gas about. For example, a man breathes the gas, has a short spell of coughing and is then apparently well; but twelve hours later he begins to feel breathless and ill. He will cough violently producing a large quantity of frothy fluid which may be stained with blood. He may bring up as much as four pints of fluid in an hour. His face will be flushed and perhaps of a purple colour. This illness comes on more quickly and is worse if the man took exercise after he was gassed. The interval of time before it develops varies between two and twenty-four hours.

First aid for choking gases.

While there is gas about, make sure that the respirator is correctly adjusted and keep it on. In order to lessen the illness which may come on several hours later, and which is made worse by exertion of any kind, all men known to have been, or even suspected of having been, exposed to a choking gas should be made to rest from the beginning and not allowed to walk. You must insist on this even if, as often happens, the man concerned keeps on saying that there is nothing the matter. Make him lie down as the exertion of walking may kill him.

When a man gets the delayed illness some hours after exposure to the gas—

1. Do not allow him to walk. Keep him in a sitting position.
2. Remove any heavy equipment that he may be wearing.
3. Loosen tight clothing.
4. Keep him warm.

5. Encourage him to empty his lungs by coughing up all that he can.

6. Get the man seen by a Medical Officer as soon as possible.

(The reason that a man should be seen by the Medical Officer is that in certain cases artificial respiration may be necessary, but, for this illness, it may only be given on the instructions of a Medical Officer.)

Do NOT give stimulants.

4. **Blister gases.**

These are oily liquids which give off harmful vapours slowly and continuously. Therefore these gases may persist for a long time and they will be dangerous until all the liquid has evaporated and all the vapour has dispersed. Blister gases affect all parts of the body, including the eyes and lungs, and in many cases they cause irritation and burning of the skin with deep blisters.

Mustard gas.—This blister gas, in either liquid or vapour form, causes no immediate discomfort. There is a delay of some hours before its effects on the body are felt. (Splashes of liquid in the eyes are an exception to this rule ; they cause great irritation and smarting of the eyes at once.) After exposure to mustard gas vapour, within about six hours the eyes become sore and begin to water, and there is a general feeling as if a common cold in the head is coming on. The voice is husky, the throat burning, there is some headache, coughing and usually some vomiting. The skin may have become red by this time, but blisters will not usually form for about eighteen hours. Moist and greasy parts of the skin are affected most.

Lewisite.—This blister gas causes immediate tingling of the skin, pain in the eyes and irritation of the nose. It therefore lacks one of the dangers of mustard gas since it cannot be breathed without men being aware of it. It acts in the same way but more quickly than mustard gas ; thus the skin may become red and begin to itch in twenty minutes. Blisters may develop in twelve hours.

First aid for blister gases.

The respirator is a complete protection for the eyes and lungs and will prevent any damage being done to them. But both the liquid and the vapour penetrate all ordinary clothing and attack the skin.

The special protective clothing (oilskin and rubber boots) is an adequate protection against the liquid but only for a few hours. This outfit also provides protection against the vapour, but as the latter is sucked into the suit by the " bellows " action produced by

body movements, you should, if possible, leave the dangerous area and open up the suit to ventilate it every fifteen minutes.

1. Liquid gas in the eyes.

At ONCE wash each eye separately with plain water. The washing must be done with running water, with the eyelids held back so that the whole surface of each eye and the linings of the lids are completely washed. Pour the water into the side of each eye near the nose and let it run outwards—in this way you should avoid spilling the water from one eye to the other. This is particularly important if only one eye is affected.

Reassure the man that with this immediate washing of the eye, there is no danger to his sight, although the eye may appear very red and swollen.

Do not rub the eye.

Do not put a bandage over the eye. (Shade the eye, if there is much smarting, by something which does not touch it.)

2. Vapour in the eyes.

Whenever it is known that the eyes have been exposed to the vapour, wash them thoroughly as described above. If it is available, wash them with salt and water (made by placing a teaspoonful of salt in a pint of warm water).

3. Liquid on the skin.

Mop off any drops of the liquid gas. Do not spread it on the skin. Then use the ointment, anti-gas, with which you have been issued, over the parts of the skin which are affected.

In various ships and various climates you may be issued with different ointments. They are not all described here as you will have to use only the ointment with which you are issued. Instructions are written on its container. They are for immediate use **before** the skin has become red. NEVER use them once the skin is red.

Take care to prevent the ointment getting into the eyes.

If first aid can be given within five minutes of the liquid touching the skin, blisters will probably be prevented. In any case, the sooner it is done the quicker it will lessen the severity of later effects.

Another way of giving first aid is to dissolve the gas and then remove it from the skin. To do this, repeatedly swab the skin with petrol, methylated spirits, kerosene or fluid from a pyrene fire extinguisher. Finish off by washing with soap and water.

If, however, none of these ointments or other materials are available, a thorough washing of the contaminated areas with soap and water, with frequent changes of the water, should always be done.

4. Vapour on the skin.

If a man has only been exposed to the vapour, as from drops of the liquid on outer clothing, a complete wash all over (paying special attention to the armpits and crutch) with soap and water is all that need be done to prevent any later redness or blistering of the skin. Washing under a shower is the best method.

When the later effects of the gas on the body are present and a man has a burning throat, is coughing and vomiting, the first aid is as follows :—

1. Do not allow the man to walk.

2. Remove any heavy equipment he may be wearing and loosen tight clothing.

3. Keep him warm.

4. Cheer him up.

5. Get the man seen by a Medical Officer as soon as possible. Vomiting may be eased by giving him plenty of water to drink with soda bicarbonate powder added to it (one teaspoonful to a cup of water).

NOTE.—In all cases of contamination, all clothing should be removed as soon as possible. It is dangerous to handle or keep contaminated clothing in a closed space because vapour will continue to be given off from it. Similarly, all contaminated rags or pieces of cotton wool must be got rid of at once.

As a special protection for the eyes against surprise attack by blister gas spray from aircraft, transparent eye shields may be worn. They will safeguard the eyes without interfering with a man's duty, but they must be removed in favour of the respirator when an actual attack develops.

2. POISONOUS GASES, OTHER THAN THOSE USED IN CHEMICAL WARFARE.

As a result of explosions and accidents, various gases may be formed, which, when breathed, cause serious harm to the body. The circumstances under which you may meet these gases and the manner in which they may affect you are described below. But before you read that, it is important for you to realise two points : firstly, by knowing when they are likely to be set free, **you can nearly always avoid being overcome by these gases.** This is because there are steps you can take to protect yourself from them. Secondly, no matter which of the gases has been breathed, the first aid that you should give is always along the same lines.

1. **Nitrous fumes.**

These fumes are formed when cordite is ignited (for example, in a magazine fire) or as a result of the explosions when ships are torpedoed below the water line. They also occur in gun turrets firing into the wind and in the " blow back " from the muzzle gases of big guns.

If the fumes escape into the open air, they quickly become dilute and cause no harmful effects ; but when they accumulate in closed or poorly ventilated spaces, as they may in ships " closed down " for action, they are very dangerous.

Irritation of the nose and coughing are caused when you breathe nitrous fumes, but at the times when you may do so, you are probably also breathing the ordinary smoke and dust of an explosion, so that you think the coughing is due to the smoke and dust alone. Therefore **poisonous doses of nitrous fumes may be breathed without your knowledge.** On regaining the open air, the irritation and coughing soon pass off ; but after a period varying from three to twenty-four hours, breathing becomes difficult and a delayed illness quickly develops, which is similar to that produced by phosgene.

The Service respirator must be worn in the presence of burning cordite, and in other circumstances when nitrous fumes are formed. It gives complete protection in a moderate concentration for only five minutes, and after that, although it does not give complete protection, it lessens the effects of the fumes, and may well make the difference between breathing a fatal dose and one which causes only a passing illness.

2. **Carbon monoxide.**

This gas is given off in the exhaust of internal combustion engines ; it is also produced in varying amounts near all fires and explosions, and it may occur in Q.F. gun turrets.

In general, it will become dangerous only if it occurs in closed spaces, especially if for any reason the ventilation has been cut off. This may happen as a result of leaks from the engine exhaust pipes into the closed compartments of M.T.B.s and other small craft ; by the use of small stoves or fires in unventilated cabins ; or by the accidental starting up of a torpedo motor in a submarine. Because this gas is both colourless and odourless, **poisonous doses may be breathed without your knowledge.** Then, giddiness, headache, vomiting, inability to use the limbs and loss of consciousness may occur ; or if asleep, you may fail to wake.

The Service respirator does NOT protect you against carbon monoxide. When you suspect that it is present, you must get out of the compartment. Only a self-contained

oxygen breathing apparatus, as, for example, a D.S.E.A., is safe for rescue or repair work.

3. Methyl chloride.

This gas is used in the cooling systems of some refrigerators and it may be set free as a result of leaks caused by careless handling and by either distant or close explosions. It is almost odourless if pure and may be breathed repeatedly from a small leak without being noticed. The effects accumulate and eventually it causes headache and vomiting and possibly convulsions and death. In some cooling systems a distinctive substance such as " tear gas " is purposely introduced so that any leak may be quickly noticed.

The Service respirator does NOT protect you against methyl chloride.

When you suspect that it is present, you must move away or else wear a self-contained oxygen breathing apparatus for repair purposes.

There are two other gases (sulphur dioxide and ammonia) which are sometimes used in refrigerators, but these are both very irritating to the eyes and lungs and therefore easily detected. Thus, men are unlikely to stay in an atmosphere containing them, but if they have to the Service respirator is an adequate protection.

4. Lack of oxygen.

Complete lack of oxygen may occur in holds or store rooms containing vegetable foodstuffs or linseed oil plants (which absorb the oxygen) or in double bottoms and torpedo " blisters." Such an atmosphere will cause immediate loss of consciousness ; a man will fall as though felled with an axe. He will quickly die if he is not rescued.

Large spaces of this nature should be ventilated with air by a hose or a pump before they are entered, and the first man to enter should have a life-line attached to his body.

5. Fire fighting.

When fighting fires in enclosed spaces, men may be overcome by various gases. Carbon monoxide, and nitrous fumes if cordite is burning, will be expected from what has been written above. In addition, there may be lack of oxygen—perhaps not so extreme as to cause unconsciousness, but to a degree that will cause muscle weakness and impaired judgment, and stupidity.

There are certain dangers associated with the use of fire extinguishers. Among those in common use in the Service, the Foam, Phomene and Soda Acid models act by spurting a spray of carbon dioxide. This gas itself makes the chest feel as though it is bursting,

and in greater strength causes much weakness and finally unconsciousness.

Pyrene extinguishers contain a substance which, on contact with hot metal, gives rise to phosgene and chlorine and is itself poisonous.

The only complete protection from gases while fighting fires in enclosed spaces is a self-contained oxygen apparatus. However, the Service respirator which is more readily available to a larger number of men can be worn if combustion gases are anticipated in emergency fire fighting and rescue work. But it will NOT protect against carbon monoxide or methyl chloride, and it is obviously useless if there is a lack of oxygen. On all these occasions an oxygen apparatus should be used.

The respirator container may be put out of action and care must be taken to change it after it has been used in a heavy smoke or gas cloud for any length of time.

The Service respirator will keep out nitrous fumes, pyrene fluid, chlorine, phosgene, ammonia and sulphur dioxide for a sufficient time to give protection while rescue work is going on and at the time of immediate emergencies ; but not if prolonged repair work in a heavily contaminated atmosphere is to be carried out.

First aid.

With care and common sense it should be possible to avoid the effects of most of these gases, if you remember the points emphasised above.

If, however, cases of poisoning do occur, first aid treatment for each of them is very similar and may be summarised as follows :—

1. RESCUE THE MAN AND CARRY HIM AWAY FROM THE DANGEROUS AREA.

   If possible, take him into the open air.

2. LAY HIM DOWN.

3. LOOSEN TIGHT CLOTHING.

4. KEEP HIM WARM.

5. PERFORM ARTIFICIAL RESPIRATION, only if the breathing has stopped, and while doing this USE THE NOVOX APPARATUS. (*See* Chapter 6.)

6. When he is conscious, hot sweet tea or other warm drinks may be given.

All senior ratings should have a full knowledge of the practical use of the " Salvus " and " Proto " equipment and of the Naval Breathing Apparatus 230.

Rescuers should always wear life lines when entering doubtful spaces.

CHAPTER 9.

STOKER'S CRAMP, HEAT EXHAUSTION, HEAT-STROKE AND SUNSTROKE.

These conditions occur mainly in the tropics and are often confused. However, they are distinct from one another and first aid treatment is described for each. You should also remember that in some cases you can avoid being ill in any of these ways by taking the precautions which are included below.

1. STOKER'S CRAMP.

This condition occurs **quite often** in men who work hard in high temperatures, and particularly when the atmosphere is damp and they are sweating. An attack begins with very painful cramps, especially in the muscles of the arm, leg and belly; the pain may soon cause the man to collapse.

The cramps are caused by the washing out of salt from the body in excessive sweat and by drinking large quantities of water without added salt.

Stoker's cramp can be avoided by taking regularly half-a-teaspoonful of salt with each cup of water, when in the tropics.

First aid.

1. Lay the man down.
2. Rub the parts of the body which are cramped.
3. Put a hot-water bottle on his stomach if he has colic.
4. Give him plenty of water with half a teaspoonful of salt added to each cup.

2. HEAT EXHAUSTION.

This condition occurs quite **frequently** among men who work in compartments where the temperature is very high; particularly in the tropics when closed down for action, and when men are in poor physical condition.

When attacked with heat exhaustion, a man feels weak and giddy, and perhaps staggers and falls. There may be slight headache. He looks as though he is about to faint—that is, he is pale and **his skin is cold and damp.** His breathing is shallow and he may be partly, and very seldom quite, unconscious.

First aid.

1. Treat as for Shock.

   Do NOT allow the man to walk. Carry him on a stretcher with his head flat; lay him flat on his back. Loosen his clothing, but keep him warm with blankets, coats, etc.

2. In order to stimulate the circulation, dash a little cold water on his face and chest; rub his arms and legs.

Usually, after only a short time, he will recover, but he may have a bad headache and feel very weak for a few hours.

3. HEATSTROKE.

This is due to overheating of the body by working in an over-hot space, for example, the engine room in the tropics. Heatstroke occurs in the same circumstances as heat exhaustion, but it is **rare** and far more serious.

An attack usually begins with restlessness ; then there may be delirium before a man falls down unconscious. In other cases there may be some headache and vomiting before he faints. The temperature of the body is raised so that **the skin feels hot and dry.**

First aid.

1. **Cool the skin** by every possible means.
2. Give the man plenty of cold water to drink. (When he is conscious, not before.)
3. If breathing stops, perform artificial respiration. This is very seldom necessary.
4. If unconsciousness should return after he had once regained it, repeat cold water first aid.

NOTE.—To cool the skin, cold water may be poured slowly over the body or blocks of ice may be rubbed over the skin and laid beside the limbs. Playing an electric fan on the man wrapped in a wet sheet also cools him quickly. You should continue cold water first aid until the skin does not feel so hot to touch and, if he has lost it, until he has recovered consciousness

4. SUNSTROKE.

This is caused by too much exposure (particularly of the head and back) to the sun's rays in the tropics. It may occur on a cloudy day. It is much more common than heatstroke

An attack usually begins by a man having a very bad headache. Then he feels giddy and weak and he usually vomits. His eyes may be bloodshot. Drowsiness and loss of consciousness very rarely follow.

Men serving in the tropics for the first time may avoid sunstroke by exposing themselves to the sun very gradually and only for short periods at a time, until accustomed to it and well tanned. Dark glasses should be worn.

First aid.

1. Take the man to a shaded place.
2. Lay him down with head and shoulders raised.
3. Loosen tight clothing.
4. Sponge his head with cold water (if possible used iced water).

Remember that in heat exhaustion the man is cold ; therefore, you treat him as for shock, which includes warming him. In heatstroke, the man is very hot ; therefore you try to cool him.

CHAPTER 10.

UNCONSCIOUSNESS. POISONING. MINOR INJURIES.

In this chapter several conditions are collected together to complete what you should know so that you may carry out first aid for all emergencies.

1. UNCONSCIOUSNESS.

Loss of consciousness (or insensibility) may be divided into two kinds :—

(*a*) **Unconsciousness with very feeble or absent breathing.** (This is described in Chapter 6.)

(*b*) **Unconsciousness with breathing present.**

There are many reasons why a man may lose consciousness yet be breathing more or less normally. These are fainting, stunning (or concussion), drunkenness, and poisoning by acids and other drugs. Also sunstroke and serious illnesses such as heart or kidney disease, diabetes, epileptic convulsions or a stroke.

It is beyond the scope of first aid to distinguish between all these various conditions, most of which are extremely serious. **On board ship, whenever you find an unconscious man it is your duty, in accordance with K.R. and A.I., to report the fact to the Officer of the Watch, who in turn will inform the Medical Officer.** You are not required to assume any further responsibility.

Until the Medical Officer arrives, you should usefully employ yourself in using your senses in trying to decide what the cause is. Note the position in which the unconscious man is lying ; look for any evidence of foul play or violence which may have resulted in a blow on his head. Is there a wound of the head—is there any bleeding from the nose or ears—is there a weapon near the man or a bottle from which he may have taken poison—does his breath smell of alcohol ? In certain cases, you can guess the cause. For example, in the tropics, and in the absence of any other likely reasons, it may be sunstroke.

You are not always expected to be able to find the exact cause, but the Medical Officer will be grateful for sound facts which you may be able to give him as a result of what you have seen before he arrived.

While you are examining the man you must give the following simple first aid which applies to all cases :—

1. Lay him comfortably flat on his belly, turn his head on one side and then disturb him as little as possible.

2. Loosen any tight clothing so that he can breathe easily.

3. Keep him warmly but not heavily covered with blankets or coats. If the skin is cold, place hot bottles at his feet and sides.

4. Do not let a crowd collect near him. Keep them back to allow as much fresh air as possible.

5. Do NOT give anything by the mouth.

Some additional facts about the commoner causes of unconsciousness are given now. By knowing these, when you are in a ship not carrying a Medical Officer, or ashore in a place which a doctor cannot reach for some time, you will be able to give more adequate first aid than the general rules provide.

1. Fainting.

This is due to the heart working feebly so that not enough blood is pumped to the brain. It may be caused by shock (*see* Chapter 1), by fatigue, want of food, fright, sudden bad news or a stuffy crowded room. A man becomes pale and cold, feels giddy, and falls. First aid, in addition to the four general rules above, consists of lowering his head as far as possible—for example, sitting him with his head between his legs or laying him flat with no pillow under his head, and raising his legs.

2. Drunkenness.

A man who is dead-drunk has been poisoned (with alcohol). In certain parts of the world he may have had doped drink without realising it (for example, hashish). Do not leave him alone. He may die. He may be robbed. Get him to some safe shelter ashore or, better still, get him back to his ship. The first aid, in addition to the four general rules, consists in laying him face downwards and making him sick by tickling the back of his throat. (He is laid face downwards so that as he is sick the vomit does not run back into his windpipe.) Now lay him on his side and allow him to sleep off the effects of the poison.

Be very careful to keep him warm so that he does not get chilled, because a drunken man's cold may easily become worse and result in pneumonia.

3. Concussion.

Unconsciousness may be caused by a blow or fall on the head. You should suspect that this is the cause when you find a man unconscious who has a wound or bruise on his head.

As a result of the blow which caused the concussion, a fracture of the skull may be caused. When this has happened there may also be bleeding from the nose or ear. Also a piece of bone or a blood clot may press on the brain. Whether or not there was

initial concussion, when the brain is pressed on in either of these ways, unconsciousness usually follows. Small movements, or twitches, of the body may also occur when the brain is compressed. This is a very serious sign and you must not mistake it for returning consciousness.

First aid consists of covering the wound if there is one and then in applying the four general rules, but lay him on his back with his head comfortably raised on a pillow. If there is a fracture, there is nothing more which you can do especially for this as you can for fractures in other parts of the body.

4. Epilepsy.

This is an illness in which sudden and complete loss of consciousness occurs with a fit. Thus, a man falls to the ground and his limbs are moved in spasmodic convulsions—they are thrown about and may be injured by hitting surrounding objects. Often the teeth are ground together and the tongue may be bitten ; froth may appear at the mouth. First aid consists in applying the four general rules above. In addition, you should try to prevent the man hurting himself by gently guiding his limbs clear of nearby objects or moving him away from any source of danger, such as machinery. Do NOT forcibly restrain his movements. To prevent his tongue from being bitten and to ensure a free entry of air to his lungs you should wrap a pencil or other similar object in a handkerchief and, if possible, place it between his back teeth.

All cases of unconsciousness must always be considered as serious. Remember that on board ship you must inform the Officer of the Watch so that the Medical Officer arrives as soon as possible. When you are ashore or in a place where a doctor cannot arrive for some time, always carry out the four general rules and, when you are quite sure of what you are dealing with, the additional points. The man may then recover consciousness. If he does, so much the better, but you should stay with him for some time yet as he may suffer from loss of memory, or confusion. You should give him this warning : every man who has been unconscious even for only a short time must see a doctor as soon as possible and he should not resume normal activities until he has done so and received his permission.

2. POISONING.

A man who takes a large dose of poison by mouth, either accidentally or on purpose, is in immediate danger of death. Whether or not he dies usually depends directly on the speed and skill with which first aid is given.

Fortunately, the immediate effects of poisoning which endanger life are always the same, and therefore part of the first aid that you should give is also always the same, no matter what poison has been taken.

These immediate effects are :—

(*a*) **Shock.**—This may be due to pain, which is often very severe, or to a direct action of the poison on the heart and blood vessels. It is the same as the shock seen in wounded men.

(*b*) **Suffocation.**—This may be due to actual blockage of the air passages by vomited stomach contents, by mucus secreted by the violently irritated lining of the throat, or, if he is deeply unconscious, by the tongue being swallowed, that is, falling to the back of the throat and choking the man. Also he may swallow his dentures. Sometimes the victim suffocates because the poison has paralysed the muscles used in breathing.

First aid in all cases.

1. Treat for shock. (*See* Chapter 1.)

Lay the man flat face downwards. This ensures any vomited material running out of the mouth and it also helps to prevent him swallowing his tongue. Feel round the back of his throat to bring his tongue forward and to remove any dentures.

2. If he is not breathing well enough to keep him a nice pink colour, carry out artificial respiration by Schafer's method.

In particular, remember that it is useless to do this until you have made sure that the throat is not blocked.

The above first aid is all that you can give if the man who has taken poison is unconscious ; but when he is conscious and therefore able to swallow, you should also give him something to counteract or get rid of the poison. Before you can do this you must decide what kind of poison has been taken.

This will, of course, be obvious if there is a labelled bottle (for example, of disinfectant such as Lysol) beside the man or if he can tell you. However, you will often not have such evidence, and then you should proceed as follows :—

If there are stains around his mouth, the poison is probably a burning fluid, either an acid like vitriol or an alkali like caustic soda. If you do not know whether the burning fluid is acid or alkaline, give plenty of cold water, milk or the white of raw eggs.

If you know that the poison is acid, give cups of water in which half a tablespoonful of washing soda has been dissolved. On the

other hand, if you know that the poison is alkaline, give cups of equal parts of vinegar and water or of lime-juice and water.

By giving these antidotes the burning action of the poison will be stopped.

If there are NO stains around his mouth, you should make him vomit. This is best done by tickling the back of his throat with your fingers. If this fails, give an emetic : either one tablespoonful of mustard or two tablespoonsful of salt in a large cup of warm water. After he has been sick, give plenty of milk, raw eggs or over-brewed tea.

NOTES.—1. If the poisoned man is drowsy and wants to sleep, he is probably poisoned with opium or morphia. In such a case you should keep him awake by walking him about and by giving him over-brewed tea or coffee and talking to him.

2. If the poisoned man is violent or unco-operative, any of the first aid above may require the help of several people.

3. In the case of an attempted suicide, it is your duty to do everything possible to save his life.

4. Try to collect in a bowl anything that is vomited. The Medical Officer may later wish to have this examined by an analyst.

3. MINOR INJURIES.

1. Snake Bite.

This very rarely occurs in England but is less uncommon on foreign stations. The usual parts of the body to be bitten are the fingers and ankles.

When poisonous snakes bite, a powerful poison (or venom) is injected into the skin, causing pain, swelling and bruising. After a short interval, vomiting, difficulty in breathing and collapse may occur, showing that the venom is circulating in the system.

First aid is as follows :—

1. Put a tight band round the limb on the side of the wound nearest to the heart.

2. Break the skin over the bite so that blood already in the limb runs out. In this way, some of the venom is washed out of the bite. Contrary to the popular idea, sucking the wound is useless.

3. As soon as possible, crystals of potassium permanganate should be rubbed into the bite. This destroys the venom.

4. Treat for shock in the usual manner. (*See* Chapter 1.)

5. Inform the nearest doctor as soon as possible so that he can inject a specific antidote.

NOTE.—Remember to loosen the tight band for about a minute when it has been on for half an hour.

2. Insect Stings.

Stings caused by bees, wasps, mosquitoes and other insects are often painful and followed by swelling. Later they may become septic. Some men are very sensitive to certain insect stings.

The harmful effects of a sting are caused by an acid ; first aid, therefore, consists of bathing the sting with weak ammonia or a solution of ordinary washing soda. Certain insects, such as the bee, leave their stings in the wound, and when seen these should be removed. If there is much swelling, particularly on a dangerous place like the tongue, or if the man collapses, a doctor must be found as soon as possible. He can give an injection which usually causes immediate relief.

3. Fish Hook in the Skin.

The barb of a fish hook prevents it being removed without tearing of the skin and much pain. This is what you should do : push the point and barb of the hook out through the skin and then break off the barb. The hook can then be withdrawn without too much pain.

As there is great danger of infection, the wound should be seen by a Medical Officer as soon as possible.

4. Particles in the Eye.

Particles, such as sand, pieces of metal or insects, often enter the eye. Do not rub it, but put your face in a large basin of clean water and open the eye several times under water—or open your eye in a pool of water held in your cupped hands. In this way the particle is often washed out of the eye.

If this fails, let some gentle-fingered person hold your eyelids open and, when he can see it, remove the particle by laying a small piece of blotting-paper on it.

If even this fails (and it is often not easy to find the fragment), or if the irritation does not quickly become less, report to the Medical Officer.

The eyes of guns' crews are often inflamed with the smoke and fumes of their guns. In these cases the eyes should be washed out with clean water or a weak solution of boric acid.

5. Objects in the Ear.

Unless it can be seen lying free near the entrance, never try to clear the ear of anything which may be in it. Do NOT probe about with a matchstick or pencil—you will almost certainly cause far more harm than good. Report to the Medical Officer as soon as possible.

6. Games.

If a man is "**winded,**" for instance, at football or boxing, lay him flat on his back with his knees drawn up and gently rub

his belly. Do not try to make him stand up or attempt to hold him up. He will soon recover.

When a man is **kicked in the crutch** or is hit by a cricket ball on the testicles, the pain is extremely severe and he may be sick. Carry him off the field, supporting the injured testicles. This temporarily eases the pain. He should be seen by a doctor if any bruising or swelling occurs.

After a man has been **knocked out** at boxing, carry him to the dressing room and give first aid for concussion.

A **" black eye "** is caused by bruising of the lids. Usually swelling occurs very quickly. A pad soaked in cold or iced water and put on at once, helps to prevent much of the swelling.

Accidents to **knee joints** are very common. Whatever has happened, lay the man on his back with a rolled-up sweater behind his knee. Never try to pull his leg straight. Take him off the field and ask for a doctor.

Sprains are also common accidents. They are due to tearing of the muscle ligaments by sudden twists. A bad sprain may be very painful and be thought to be a fracture. First aid consists of resting the injured part. A firm bandage should be put on, no attempts should be made to move the part, and in the case of a sprained ankle or knee, the man should not walk until he has been seen by a Medical Officer.

When football or hockey are played on hard grounds, men may fall heavily and their knees or elbows are often " scored " by small, sharp pieces of stone—the so-called **"gravel rash."** Dirt, grit and germs from the soil get embedded in the flesh and may set up infection. There is the particular danger of infection with the germ of tetanus, or " lockjaw."

The first aid treatment for gravel rash is to paint the scored skin freely with iodine or some kind of disinfectant and then cover with a bandage. The injury should be seen by a doctor as it may be necessary for him to give an injection to prevent the occurrence of lockjaw.

" Cramp " occurs chiefly in the calf muscles of the leg, and sometimes in the muscles of the belly or thigh. The first aid treatment is to lay the man down and knead the affected muscles vigorously with the palms of your hands. The man should try to move his muscles gently meanwhile.

" Stitch " is a painful condition, usually felt on one side of the belly, seen, for instance, in cross-country runners who are out of training. Rub the painful side gently while the man is lying down. Sips of hot water very often give immediate relief for this trouble.

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