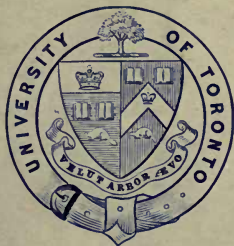




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- A. Principles of First Aid.
- B. A brief Description of the Human Skeleton and of the Muscles.
- C. Fractures—Causes, varieties, signs and symptoms.
- D. Treatment of Fractures—General Rules.
- E. The Triangular Bandage and its application.

SECOND LECTURE.

- A. Treatment of Fractures (continued). Details of treatment.
- B. Dislocations, Sprains, Strains—Signs, symptoms and treatment.
- C. The Heart and Blood Vessels. The Circulation of the Blood.
- D. Hæmorrhage and wounds. General rules for treatment.
- E. The Triangular Bandage and its application.

THIRD LECTURE.

A. Hæmorrhage and wounds (continued). Details of treatment.

B. Internal Hæmorrhage—Signs, symptoms and arrest.

C. Hæmorrhage from Special Regions.—Signs, symptoms and arrest.

D. Bruises, Burns and Scalds, Bites and Stings, Frost-bite.

E. Foreign bodies in the Eye, Nose and Ear.

F. The Triangular Bandage and its application.

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A. The Nervous System.

B. The Organs and Mechanism of Respiration—Artificial Respiration.

C. Insensibility

D. Poisoning.

FIFTH LECTURE (for Males only).

A. Improvised methods of lifting and carrying the sick or injured.

B. Methods of lifting and carrying the sick or injured on stretchers.

C. The conveyance of such by rail or in country carts.

FIFTH LECTURE (for Females only).

A. Preparation for reception of accident cases.

B. Means of lifting and carrying.

C. Preparation of bed.

D. Removing the clothes.

E. Preparations for surgeon.

NOTE I.—The subject of poisons should be treated in a general manner; the common poisons classified, and only their general symptoms, effects and treatment taught.

NOTE II.—The last half-hour of each lecture should be devoted to practical work, such as the application of bandages and splints, lifting and carrying wounded on stretchers.

NOTE III.—There should be an interval of a week between each lecture. A candidate for examination must attend *at least* four out of the five lectures.

NOTE IV.—Male classes must pass in that system of stretcher exercise most suitable for the locality.

NOTE V.—As little time as possible is to be spent on instruction in anatomical and physiological details. Lecturers and examiners are particularly requested to remember that it is "First Aid" that has to be taught and tested, and not anatomy and physiology.

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PREFACE.

AT the request of the Central Executive Committee I have revised the manual written by myself in 1901, as the official handbook of the St. John Ambulance Association.

Throughout the revision an endeavour has been made to simplify the study of First Aid to the Injured by drawing up a number of general rules for the treatment of accidents and sudden illness, and by the omission of all detail which is not absolutely necessary to enable the student to acquire an intelligent knowledge of the subject.

I wish to express my thanks to Professor E. A. Schäfer for furnishing instructions for performing a method of artificial respiration, to Dr. L. M. F. Christian for many valuable suggestions, and to the Medical Members of the Central Executive Committee, especially Surgeon-Major G. H. Darwin, M.D., and Dr. F. R. Cassidi, for perusing the proof sheets and for a number of useful additions to the work.

I cannot omit also to offer my best acknowledgments to Mr. W. R. Edwards, the Accountant and Storekeeper of the S.J.A.A., for his invaluable co-operation.

JAMES CANTLIE.

FIRST AID TO THE INJURED.

CHAPTER I.

The St. John Ambulance Association has now completed thirty years of its existence, and during that period hundreds of thousands of men and women have been taught at its classes, in all parts of the world, how to help their injured neighbours.

First Aid to the Injured is a special branch of practical medicine and surgery, by a knowledge of which trained persons are enabled to afford skilled assistance in cases of accident and sudden illness. The instruction begins and ends with First Aid, and the subject is taught simply but thoroughly and exhaustively. The duty of the ambulance pupils ends where the doctor's commences, and there ought to be no overlapping or clashing of duty or interests.

PRINCIPLES OF FIRST AID.

1. The First Aid student should be—

(a) **Observant**, that he may note the **causes** and **signs*** of injury.

(b) **Tactful**, that he may without thoughtless questions learn the **symptoms**† and **history**‡ of the case.

* Signs are what may be perceived.

† Symptoms are what the patient can tell you.

‡ History means the circumstances attending the accident or sudden illness.

- (c) **Resourceful**, that he may use to the best advantage whatever is at hand to prevent further damage and to assist Nature's efforts to repair the mischief already done.
- (d) **Explicit**, that he may give clear instructions to the patient or the bystanders how best to assist him.
- (e) **Discriminating**, that he may decide which of several injuries presses most for treatment by himself, and what can best be left for the patient or the bystanders to do.

2. **Remove the cause** of injury or danger whenever possible.

3. **Severe hæmorrhage** must receive the first attention, no matter what are the other injuries.

4. **Air**.—The patient must be in a position in which breathing is possible; the air passages must be free from obstruction; if breathing has ceased prompt measures must be taken to restore it.

5. **Rest**.—A restful position of the body will assist the vital functions; support of the injured part will help to prevent further damage, and is essential in the case of fractures of limbs.

6. **Warmth**.—After every accident keep the patient warm so as to prevent the fall of temperature below the normal point.

7. **When the skin is broken the wound**

should be promptly covered with a clean absorbent dressing. Should the wound be poisoned, it is most important immediately to prevent the poison permeating the system.

8. Poisons swallowed should be got rid of, or when that is inexpedient, neutralised.

9. The best means of transport must be studied, and provision made for proper care when the patient is brought to shelter.

10. Removal of Clothing.—Clothes should not be taken off unnecessarily, but when it is needful to remove them, the following rules will be found of service in serious cases:—

COAT: Remove from the sound side first, and, if necessary, slit up the seam of the sleeve on the injured side.

SHIRT AND VEST: Slit down the front and remove as the coat.

TROUSERS: Slit up the outer seam.

BOOT: Slit the back seam and undo the laces.

SOCK: Cut off.

11. Stimulants.—It is incorrect to suppose that alcohol is the only form of stimulant, and far too frequent use of spirits is made to restore a patient after an accident, often with serious results; the safest rule, therefore, is to defer the administration of alcohol until the arrival of a doctor. When the patient is able to swallow, strong tea or coffee, or milk, as hot as can

be drunk, or a small quantity of sal volatile in water may be given. Smelling salts may be held to the nose. Sprinkling the face with cold and hot water alternately, warmth applied to the pit of the stomach and over the heart, and vigorous friction of the limbs upwards have a stimulating effect.

12. Throughout his work the First Aid student must on no account take upon himself the duties and responsibilities of a Medical man. At times an apparently slight injury is accompanied by grave danger and may actually cause loss of life. When sending for a doctor, state the nature of the case, and remember that written particulars are safer than a verbal message.

It is necessary that something should be known of the structure of the body (elementary anatomy), and of the functions of some of the more important organs and systems (elementary physiology). A short description of the necessary anatomical and physiological points is therefore given as the several subjects are discussed. For purposes of description the human body is supposed to be erect, with the arms hanging by the side and the palms of the hands directed forwards. The "middle line" of the body runs vertically from the top of the head to a point between the feet.

QUESTIONS ON CHAPTER I.

*The numerals indicate the pages where the answers
may be found.*

| | PAGE |
|--|--------|
| What is First Aid to the injured? | 17 |
| What qualities should the First Aid student possess? | 17, 18 |
| What are signs? | 17 |
| What are symptoms? | 17 |
| What is the history of a case? | 17 |
| What is often the first thing to do in an accident? | 18 |
| What result of injury must receive the first attention? | 18 |
| What three things are absolutely necessary to an injured person? | 18 |
| What must be done when the skin is broken? | 18, 19 |
| How must poisoning be treated? | 19 |
| What steps must be taken beyond the actual treatment of injuries? | 19 |
| Should clothing always be removed? | 19 |
| How would you remove clothing when necessary? | 19 |
| Explain the use and abuse of stimulants | 19, 20 |
| What must the First Aid student not do? | 20 |
| What is elementary anatomy? | 20 |
| What is elementary physiology? | 20 |
| For purposes of description how is the human body supposed to be placed? | 20 |
| What is the middle line of the body? | 20 |

CHAPTER II.

FRACTURES, DISLOCATIONS, SPRAINS AND STRAINS.

THE SKELETON.

The human body is moulded upon a bony framework (the skeleton) which serves—

- 1.—To give shape and firmness to the body.
- 2.—To afford attachment to the muscles.
- 3.—To protect important organs, as in the skull, chest, and abdomen.

THE SKULL.

The Bones of the Skull are arranged in two groups, those of the brain case or cranium, and those of the face.

The Boundaries of the Cranium are the vault or dome, the rounded portion forming the top of the head; the front or brow; the back of the head, where the greatest extent of brain exists, and where therefore the cranium is widest and deepest; the sides or temples. The base of the cranium is hidden from view by the bones of the face and of the vertebral column; in it are numerous perforations for the passage of blood vessels and nerves; through the largest opening the brain and spinal cord are continuous.

The Bones of the Face with the exception of

the lower jaw are firmly jointed together, so that movement between them is impossible. The cavities of the nose and of the eye sockets (orbits) are formed by the bones of the cranium and of the face conjointly. The mouth cavity is formed between the upper and lower jaws, the palate being the bony roof of the mouth which separates it from the nasal cavity above.

The Lower Jaw consists of:—

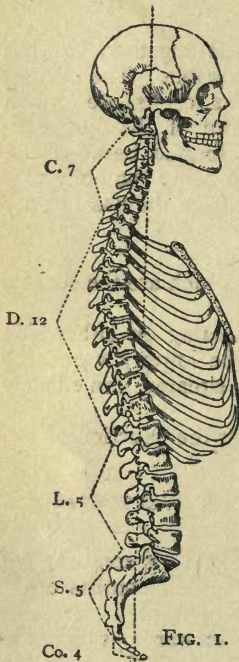
- (a) A horizontal portion in which are the sockets for the teeth.
- (b) Vertical portions terminating on either side at the joint between the lower jaw and the base of the cranium, situated immediately in front of the ear.

The angle of the jaw indicates the junction of the horizontal and the vertical portions.

THE BACK-BONE, SPINE, OR VERTEBRAL COLUMN.

The Vertebral Column (Fig. 1) is composed of bones called vertebræ, each of which consists of—

- 1.—A body or bony mass in front.
- 2.—Processes projecting backwards, which enclose a canal for the spinal cord—the spinal canal.
- 3.—Two transverse processes, twelve pairs of which support the ribs.



SKULL AND VERTEBRAL COLUMN.

Showing left ribs and portion of breast bone. The right ribs are removed.

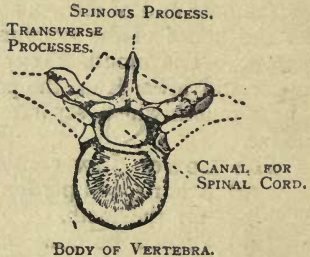


FIG. 2 A.



FIG. 2 B.

- 4.—A spinous process. The spinous processes of the vertebræ can be felt beneath the skin for the whole length of the back (Figs. 2A and 2B).

The Vertebræ, 33 in all, are grouped into regions, in each of which they are known by numbers, counting downwards :—

- 1.—In the neck 7 Cervical vertebræ. The first vertebra, *the atlas*, forms a joint with the base of the skull, at which the nodding movement of the head takes place; the second, *the axis*, by the joint between it and the atlas, allows of the side-to-side movements of the head.
- 2.—In the back 12 Dorsal vertebræ.
- 3.—In the loin 5 Lumbar vertebræ.
- 4.—The rump-bone, or Sacrum, consists of 5 Sacral vertebræ united in adults as a solid mass.
- 5.—The tail-bone, or Coccyx, consists of 4 vertebræ joined together to form a single group.

Between the bodies of the vertebræ, in the upper three regions, are interposed thick pieces of cartilage (gristle), which, while they bind the bones together, allow of free movement to the column as a whole, and help to break the shock of any sudden force applied to the spine (for example, when falling from

a height on the feet). The whole spine is strapped together by ligaments reaching its entire length.

THE RIBS AND BREAST-BONE.

The Ribs consist of twelve pairs of curved bones extending from the dorsal vertebræ to the front of the body, and are known by numbers—first, second, etc., commencing from above. The ribs are not bony throughout their entire length, but at a short distance from the front the bony material ends, and cartilage takes its place. The upper seven pairs, named the true ribs, are attached by their cartilages to the **Breast-bone** (*sternum*), a dagger-shaped bone with the point downwards, just over the pit of the stomach. The lower five pairs are termed the false ribs, as their cartilages fall short of the middle line. The eleventh and twelfth pairs are termed the floating ribs, as their ends are free in front. The ribs enclose the chest and serve to protect the lungs, heart, liver, stomach, spleen, etc.

THE UPPER LIMBS.

The Shoulder-bones are the Collar-bone (*clavicle*) and the Shoulder-blade (*scapula*).

The Collar-bone can be felt on either side beneath the skin at the lower and front part of the neck as a narrow curved rod about the thickness of a finger. Its inner end rests on the upper part of the

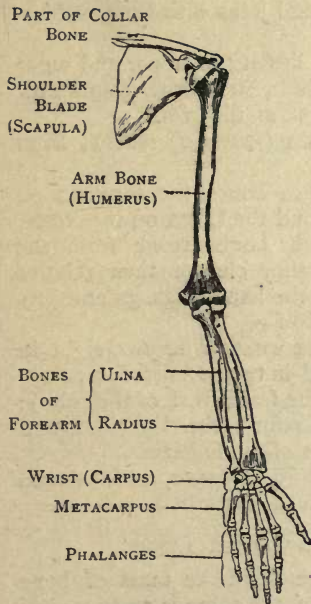


FIG. 3A.

BONES OF THE LEFT
UPPER LIMB.

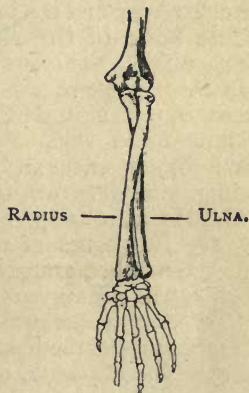


FIG. 3B.

SHOWING THE POSITION
OF THE RADIUS AND ULNA
WHEN THE THUMB IS
TURNED INWARDS

Compare Fig. 3A, in which
the thumb is turned out-
wards.

breast-bone, and its outer end joins with the shoulder-blade.

The Shoulder-blade lies at the upper and outer part of the back of the chest, and forms joints with the collar-bone and the bone of the arm.

The bone of the Arm (*humerus*) reaches from the shoulder to the elbow.

In the **Forearm** are two bones, the **Radius** on the outer, or thumb side, and the **Ulna** on the inner, or little finger side. Both bones reach from the elbow to the wrist, and they change their relative position with every turn of the hand (Figs. 3A and 3B).

The Hand is composed of—

- 1.—The bones of the wrist, or *carpus*, eight in number, arranged in two rows of four.
- 2.—The *metacarpus* (the framework of the palm); five bones which form the knuckles and support the bones of the fingers.
- 3.—The *phalanges*, or finger-bones, three in each finger, and two in the thumb

THE PELVIS AND LOWER LIMBS.

The Pelvis.—The large basin-like mass of bone attached to the lower part of the spine is composed of the two haunch-bones and the sacrum. The haunch-bones meet in front (at the *pubes*) in the middle line, only a small piece of cartilage intervening, but behind, the sacrum is placed between them. The pelvis

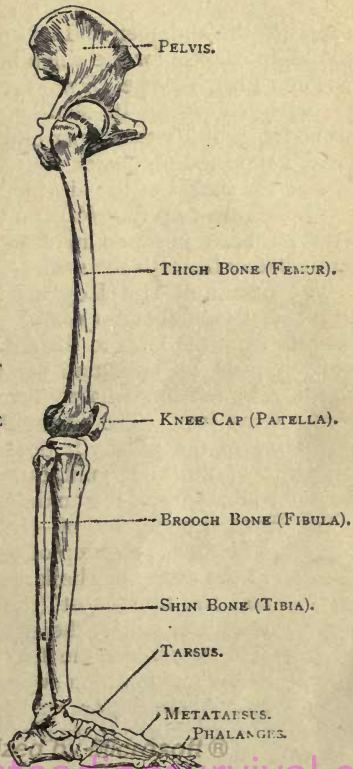


FIG. 4.

BONES OF THE RIGHT
LOWER LIMB, SHOW
ING JOINT WITH THE
PELVIS AT THE HIP.

supports the abdomen and its contents, and provides the deep sockets for the thigh-bones—the hip joints.

The **Thigh-bone** (*femur*) reaches from the hip to the knee joint. Its shaft is stout, rounded, and arched forwards; the upper end presents a rounded head, supported on a neck which projects inwards, to fit into the socket of the hip joint.

The **Knee-cap** (*patella*) is a triangular bone lying with its base upwards in front of the knee joint immediately beneath the skin.

The **bones of the Leg** are the Shin-bone (*tibia*) and the Brooch-bone (*fibula*). The **Shin-bone** extends from the knee to the ankle, in both of which joints it plays an important part; its sharp edge, *the shin*, can be felt immediately beneath the skin of the front of the leg. The **Brooch-bone** lies on the outer side of the tibia. It does not enter into the formation of the knee joint, but its lower end forms the outer boundary of the ankle joint.

The **Foot** is composed of—

- 1.—The *tarsus*, a group of seven irregular bones at the instep. The largest is the heel-bone, and the uppermost (the ankle-bone) forms the lower part of the ankle joint.
- 2.—The *metatarsus*, the five long bones in front of the tarsus which support the toes.
- 3.—The *phalanges*, or toe-bones, two in the big toe, and three in each of the other toes.

JOINTS.

A **Joint** is formed at the junction of two or more bones. In moveable joints such as the hip, knee, elbow, etc., the surfaces of the bones are covered by cartilage, which lessens friction and the shock of a

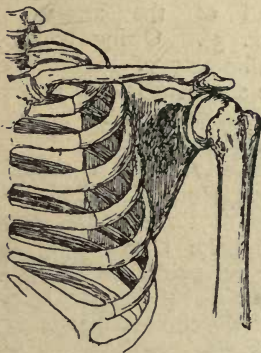


FIG. 5.



FIG. 6.

LEFT ANKLE.

Compare Fig. 4, Page 29.

fall. Lubricating the joint is a clear, rather sticky fluid, the "joint oil," or *synovia*, enclosed within a *capsule*. Tying the bones together, but allowing of movement, are a number of bands or *ligaments*.

To explain the formation of limb joints, the

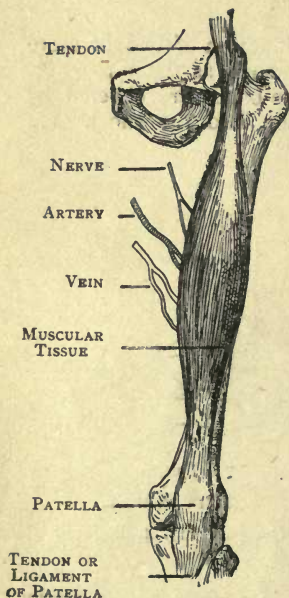


FIG. 7.

DIAGRAM SHOWING RECTUS
MUSCLE OF THIGH, WITH
ARTERY, VEIN AND NERVE.

following examples are given :—

The **Shoulder**, a ball-and-socket joint, consists of a shallow socket on the outer angle of the shoulder-blade, and of the head of the arm-bone (Fig. 5). Owing to the shallowness of the socket the arm-bone is very prone to escape from its socket (dislocate).

The **Ankle**, a hinge joint, is formed at the junction of three bones, the shin-bone above and on the inner side, the brooch-bone on the outer side, and the ankle-bone below (Fig. 6).

THE MUSCLES.

The **Muscles** of the body are classified into two groups—*voluntary* and *involuntary*.

The **Voluntary muscles** are met with in the limbs, the head and neck, and the surface of the trunk. Their ends are attached to different bones, and as they pass from one to another they cross a joint, and, being endowed with the power of contraction and relaxation, cause the movements of the body. As a muscle crosses a joint, it as a rule becomes a fibrous cord or tendon. Blood-vessels traverse and supply the muscles, and the nerves entering them bring them under the direct control of the brain and spinal cord.

The **Involuntary muscles** are met with in the walls of the stomach and intestines, in the air passages, and in most of the internal organs and blood-vessels, also, in a special form, in the heart. They are not under the influence of the will, but continue their work during the hours of sleep; their functions are regulated by a separate set of nerves (see Sympathetic System, page 118).

FRACTURES AND THEIR TREATMENT.

When a bone breaks a Fracture is said to occur.

CAUSES OF FRACTURE.

1. **Direct Violence.**—When from a severe blow, impact of a bullet, crush of a wheel, etc., a bone breaks at the spot where the force is applied the fracture is termed direct.

2. Indirect Violence.—When the bone breaks at some distance from the spot where the force is applied the fracture is termed indirect. Alighting on the feet and fracturing the thigh-bone or the bones of the leg, or falling on the hand and breaking the radius or the collar-bone, are examples.

3. Muscular Action.—The knee-cap and the arm-bone are occasionally broken by a violent contraction of the muscles attached to them.

VARIETIES OF FRACTURES.

Fractures are classified according to the condition of the tissues adjacent to the bone as follows:—

1. Simple.—The bone is broken with but slight injury to the surrounding parts.

2. Compound.—The bone is broken and the skin and tissues are punctured or torn, thus allowing disease-producing germs to obtain entrance to the seat of fracture. The fractured ends may protrude through the skin, or (for example, when a bone is broken by a bullet) the wound may lead down to the fracture.

3. Complicated.—The bone is broken and in addition there is an injury to some internal organ (for example, the brain, spinal cord, lung, etc.) or to some important blood-vessel or nerve.

A fracture may be compound or complicated as the immediate result of the injury; or a fracture,

originally simple, may be converted into a compound or complicated fracture—

(a) By careless movement on the part of the patient.

(b) By carelessness or ignorance on the part of one rendering first aid.

Special varieties of fractures may be classified according to the injury to the bone itself as follows :—

1. Comminuted.—The bone is broken into several pieces.

2. Green-stick.—In children, owing to the softer state of the bony tissues, a bone may bend and crack without breaking completely across.

3. Impacted.—The broken ends of the bone are driven one into the other.

GENERAL SIGNS AND SYMPTOMS WHICH MAY BE PRESENT.

(A fracture of the femur, humerus, or both bones of the forearm or leg, affords the most complete example.)

1. Pain at or near the seat of fracture.

2. Loss of power in the limb.

3. Swelling about the seat of fracture. Swelling frequently renders it difficult to perceive other signs of fracture, and care must therefore be taken not to mistake a fracture for a less serious injury.

4. Deformity of the limb.—The limb assumes an

unnatural position, and is mis-shapen at the seat of fracture. The contracting muscles may cause the broken ends of the bone to override, thereby producing shortening.

5. Irregularity of the bone.—If the bone is close to the skin the fracture may be felt, and if compound it may be seen.

6. Unnatural Mobility.—Movement may be made out at the seat of fracture.

7. Crepitus, or bony grating, may be felt or heard when the broken ends move one upon the other.

The last two signs should only be sought by a doctor.

Several of the above signs are absent in green-stick and impacted fractures.

In addition to the signs and symptoms the patient or the bystanders may be able to give the history of the injury, and marks on the clothing or skin should be noted, as they may serve to locate the fracture. The snap of the bone may have been heard or felt.

APPARATUS FOR TREATMENT OF FRACTURES.

Splints and bandages for First Aid frequently have to be improvised.

A Splint may be improvised from a walking stick, umbrella, billiard cue, broom or brush handle, police man's truncheon, rifle, folded coat, piece of wood, cardboard, paper firmly folded, a rolled-up map, or, in fact, *anything that is firm and long enough to keep*

the joints immediately above and below the fractured bone at rest. When the above appliances are not available, the upper limb, if fractured, may be tied to the trunk, and in all cases a fractured lower limb should be bandaged to its fellow.

Bandages may be improvised from handkerchiefs, belts, straps, braces, neckties, or any piece of linen, calico, string or cord that comes to hand.

Esmarch's Triangular Bandages (Fig. 8) are made by cutting a piece of linen or calico about forty inches square diagonally into two pieces.

The broad bandage is made by bringing the point down to the base (Fig. 9), and then folding into two (Fig. 10).

The narrow bandage is made by folding the broad bandage once (Fig. 11).

The medium bandage is made by bringing the point down to the base, and then folding into three. (Fig. 12). This bandage may be used instead of the broad or the narrow bandage when it is better suited to the proportions of the patient.

It is sometimes advisable to halve the size of the bandage by bringing the two ends together before folding it into the broad, narrow, or medium bandage.

When not in use, the triangular bandage should be folded narrow; the two ends should be turned to the centre, and the bandage then folded into four, reducing it to a packet about $6\frac{1}{2}$ inches by $3\frac{1}{2}$ inches.

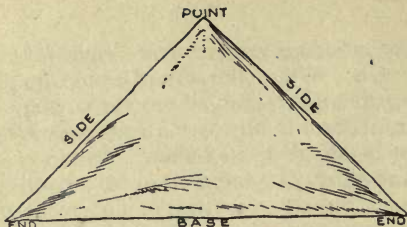


FIG. 8. BANDAGE SPREAD OUT.



FIG. 9. BANDAGE ONCE FOLDED.

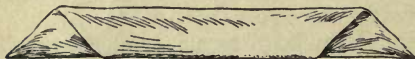


FIG. 10. BROAD BANDAGE.



FIG. 11. NARROW BANDAGE.



FIG. 12. THE DOTTED LINES SHOW THE FOLDS OF THE MEDIUM BANDAGE.

Large arm-sling (Fig. 13).—Spread out a bandage, put one end over the shoulder on the sound side, pass it round the neck so that it appears over the shoulder of the injured side, and let the other end hang down in front of the chest; carry the point behind the elbow of the injured limb, and bend the forearm



FIG. 13.



FIG. 14.

over the middle of the bandage; then carry the second end up to the first and tie them; bring the point forward, and secure with two pins to the front of the bandage.

Small arm-sling (Fig. 14).—Place one end of a

broad bandage over the shoulder on the sound side, pass it round the neck so that it appears over the shoulder of the injured side ; place the forearm over the middle of the bandage ; then bring the second end up to the first, and tie them. This sling is used in cases of fractured humerus, and occasionally when the large sling would be too conspicuous.

Slings may be improvised in many simple ways, such



FIG. 15.—REEF KNOT.



FIG. 16.—GRANNY KNOT.

as pinning the sleeve to the clothing, turning up the tail of the coat, passing the hand inside the buttoned coat or waistcoat, etc.

Reef Knots (Fig. 15, *are* to be used. Avoid granny knots (Fig. 16).

GENERAL RULES TO BE OBSERVED IN THE TREATMENT OF FRACTURES.

The object of First Aid Treatment of Fractures is to guard against further mischief, and especially to prevent a simple fracture from becoming compound or complicated. To attain this end :—

1. Attend to the fracture on the spot. No matter how crowded the thoroughfare, or how short the distance to a more convenient or comfortable place, no attempt must be made to move the patient until the limb has been rendered as immovable as possible by splints or other restraining apparatus.

2. Steady and support the injured limb at once, so that its further movement on the part of either the patient or the bystander is prevented.

3. Straighten the limb with great care, and if shortening is observed in the case of a fracture of a bone of the lower limb, pull upon the foot until the limb regains a more normal length. When the shape of the limb is improved, on no account let go until it is secured in position by splints, otherwise there is great danger of the fracture becoming compound or complicated.

4. Apply splints (when practicable) and bandages as follows :—

- (a) The splints ~~must~~ be firm, and long enough to keep the joints immediately above and

below the fractured bone at rest. They should, if practicable, be padded to fit accurately to the limb and be applied over the clothing.

- (b) The bandages must be applied firmly, but not so tightly as to constrict the circulation of blood in the limb. When the patient is in the recumbent position double the bandage over a splint to pass it under the trunk or lower limb. As a general rule :—

For the trunk the broad bandage should be used. Pass it once round the trunk and fasten it by tying the ends, or with two or three safety pins on the side opposite to the fracture, but if to secure a splint for a broken thigh, over the splint.

For the arm or forearm the narrow bandage should be used. Pass it twice round the limb, and tie the ends over the outer splint.

For the thigh or leg the narrow or medium bandage may be used. It is frequently convenient to double the bandage at the centre, pass it under the limb, bring the loop over the limb, pass both ends of the bandage through it in opposite directions, and tie them over the outer splint (Fig. 17).

In applying bandages near a fracture the upper one should be secured first.

5. When hæmorrhage accompanies a fracture it must be attended to first, and the wound covered by a clean dressing.

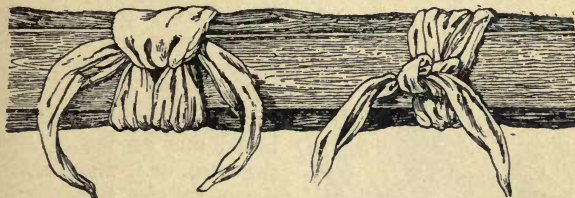


FIG. 17.

6. No attempt must be made to remove a patient suffering from a fracture of the spine, pelvis, or thigh, except in a recumbent position, preferably upon a stretcher.

7. In every case of fracture it is necessary to cover the patient to keep him warm, and so lessen the effects of the SHOCK of the accident.

8. In all doubtful cases, treat as a fracture.

SPECIAL FRACTURES.

Fracture of the Cranium.—A fracture of the upper part is usually caused by direct violence—for example, a blow on the head. A fracture of the base is caused by indirect violence, through a fall on the

head, a fall on the front or lower part of the spine, or a severe blow on the lower jaw. *If the upper part is fractured*, the signs are swelling, irregularity, and frequently insensibility, either immediate or coming on gradually. *If the base is fractured* in-

insensibility may come on immediately, blood or a clear fluid may issue from the ear channel, blood may escape from the nose, or it may pass down to the stomach, whence it may be vomited; the fracture may involve the orbit, causing a blood-shot eye.



FIG. 18.

TREATMENT.

Injury to the brain is the great danger attending a fracture of the cranium. For treatment see "Concussion and

Compression of the Brain," pages 131, 132.

Fracture of the Lower Jaw.—Pain, loss of power (inability to speak and to move the jaw freely), irregularity of the teeth, crepitus and bleeding from the gum are the usual signs and symptoms.

TREATMENT.

1.—Place the palm of the hand below the injured bone and press it gently against the upper jaw.

2.—Apply the centre of a narrow bandage under the chin, carry one end over the head, cross the ends at the angle of the jaw, carry the long end across the chin, and tie the ends on the side (Fig. 18).

Fracture of the Spine.—The vertebral column may be broken either by direct or indirect violence. Falling from a height on the back across a bar or upon an uneven surface is an example of direct fracture, and a fall on the head, causing a broken neck, is an example of indirect violence. What is commonly regarded as a broken back consists of a fracture of one or more of the vertebræ with displacement of the fragments, whereby the spinal cord and the nerves issuing from it may be torn, causing complete or partial paralysis of the parts below the fracture. Pain is present at the seat of injury.

TREATMENT.

1.—Prevent all movement on the part of the patient.

2.—Cover the patient warmly.

3.—To remove the patient, place him on a stretcher or shutter as follows :—

(a) Turn up the collar of his coat ; roll up a stick or umbrella in each side of the coat

so that the ends are level with the top of his head ; pass a broad bandage or handkerchief under the head and secure it to the sticks. If no coat is worn, or doubt as to its strength and length exists, pass a number of bandages under the patient to serve instead of, or in addition to, the coat.

- (b) A bearer on each side grasps the rolled coat with his hands well apart ; a third grasps the clothing on both sides on a level with the hips ; a fourth bearer takes charge of the legs.
- (c) On the word being given, all lift together and carry the patient by short side paces over the stretcher and carefully lower him on to it. If a fifth bearer is available the stretcher should be passed under the patient instead of carrying him over it.

4.—On arrival at shelter nothing further is to be attempted until the arrival of a doctor, except to give the patient water, tea, etc., if he is conscious.

Fractured Ribs.—The ribs usually fractured are the sixth, seventh, eighth, and ninth, and generally the fracture is midway between the breast-bone and the spine. The fracture may be caused by indirect violence, driving the fractured ends of the bone outwards, or by direct violence, driving the fractured ends of the bone inwards and sometimes injuring the

lungs or other internal organ. If the lower ribs on the right side are broken, the liver may be injured, and a fracture of the lower left ribs may wound the spleen. Evidence of the fracture is afforded by pain, especially on attempting to take a deep breath, and by short and shallow breathing. If the lungs are injured blood, frothy and bright red, may be coughed up and expectorated. If the liver or spleen is wounded internal hæmorrhage (see page 95) may occur.

TREATMENT.

(a) *When the fracture is not complicated by an injury to an internal organ:—*

- I.—Apply two broad bandages round the chest sufficiently firmly to afford comfort, with the centre of the first immediately above and that of the second immediately below the fracture. The lower bandage should overlap the upper to half its



FIG. 19.

extent. The knots are to be tied rather to the front on the opposite side of the body. Another good plan is to apply a strong towel, folded about eight inches wide, tightly round the chest, securing it with three or four safety pins.

- 2.—Place the arm on the injured side in a large sling. (Fig. 19).

(b) *When an internal organ is injured—*

1. —Do not apply bandages round the chest.
- 2.—Lay the patient down, inclined a little towards the injured side.
- 3.—Loosen the clothing, give ice to suck, and place an ice bag over the seat of injury. Treat as for internal hæmorrhage (see page 95).
- 4.—Place the arm on the injured side in a large sling.

Fracture of the Breast-bone (*sternum*).—

When this fracture can be felt or is suspected undo all tight clothing, and keep the patient quiet in an easy position until the arrival of a doctor.

FRACTURE OF THE BONES OF THE UPPER LIMB.

Fracture of the Collar-bone (*clavicle*).—This fracture is frequently caused by a fall on the hand or shoulder.—The arm on the injured side is partially

helpless, and the patient usually supports it at the elbow with his hand, and inclines his head towards the injured side. The fractured ends can generally be felt to overlap, the outer fragment being the lower. The general signs and symptoms of fracture are mostly present.

TREATMENT.

1.—Remove the coat (see page 19), and as much more of the clothing as is expedient.

2.—Place a pad about two inches thick and four inches across in the armpit.

3.—Gently bend the forearm well up, keeping the shoulder as far back as practicable, and support it in a "St. John" sling, made as follows :—

- (a) Lay an unfolded bandage across the chest over the injured limb with one end on the uninjured shoulder and the point beyond the elbow on the injured side. (Fig. 20).
- (b) Pass the lower end of the bandage under the injured limb, across the back, and tie the ends somewhat loosely in the hollow in front of the sound shoulder.
- (c) Fold the point over the elbow of the injured limb and secure it by one or two pins (Figs. 21 and 22).



FIG. 20.



FIG 21.



FIG. 22.

(Body bandage omitted to
show details of Sling.)

4.—Tightly secure the injured limb to the side by a broad bandage passed round the elbow and trunk, so as to lever out the shoulder, the pad forming the fulcrum.

5.—Now tighten the sling.

When both collar-bones are broken keep the

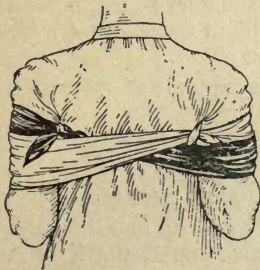


FIG. 23A.



FIG. 23B.

shoulders back by narrow bandages tied round each arm, close to the shoulder, passed across the back, over the opposite arm and tied together in front. The forearms should be raised and supported by the bandages. (Figs. 23A and 23B).

Fracture of the Shoulder-blade (*scapula*).—Apply the centre of a broad bandage in the armpit of

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the injured side, cross the ends over the uninjured shoulder and tie them under the armpit. Support the limb in a St. John sling (Fig. 24).

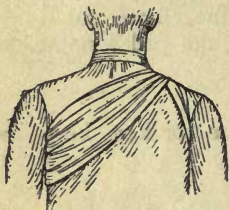


FIG. 24.

Fracture of the Arm (*humerus*). — The bone may be broken:—(a) Close up to the shoulder; (b) near the middle of the shaft; (c) close to the elbow.

All the general signs and symptoms of fracture are usually present.

TREATMENT.

When the Fracture is close to the Shoulder—

- 1.—Apply a broad bandage with its centre above the middle of the arm round the limb and body, tying it on the opposite side.
- 2.—Support the forearm by a small arm sling.

When the Fracture is near the Middle of the Shaft—

- 1.—Bend the forearm at a right angle to the arm.
- 2.—Apply splints, reaching from the shoulder to the elbow on the outer and inner sides of the arm, and, if enough can be procured, to the front and back also. The front splint

must on no account be so long as to press upon the blood-vessels at the elbow joint.

- 3.—Secure the splints by bandages above and below the fracture. If splints are not available, secure the arm to the side by two broad bandages.



FIG. 25.

- 4.—Support the forearm by a small arm sling. (Fig. 25).

Fractures involving the elbow joint, whether of the arm or forearm, are attended with so much swelling, and it is so difficult to ascertain the exact nature of the injury, that when the accident occurs indoors the limb should be laid upon a pillow in the most comfortable position; ice or cold water dressings

should be applied to the injured part, but no further treatment should be attempted pending the arrival of a doctor.

When the accident occurs out of doors—

- 1.—Take two pieces of thin flat wood, one long enough to reach from the armpit to below the elbow, the other long enough to reach from above the elbow to the finger tips ; tie them together to form a right angle. (Fig. 26).

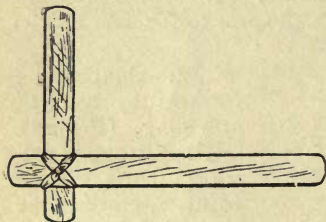


FIG. 26

- 2.—Apply the angular splint so made on the inner side of the flexed limb.
- 3.—Secure by bandages above and below the fracture.
- 4.—Support the limb by a large arm sling.
- 5.—On arrival at home remove the splint, and treat the injury as if it had occurred indoors.

Fracture of the Forearm.—When both bones (the Radius and Ulna) are broken, the general signs and symptoms of fracture are usually present. When one of the bones only is broken the signs and symptoms are as a rule pain, loss of power, swelling, and irregularity. An impacted fracture of the Radius

just above the wrist is a common result of a fall on the hand.

TREATMENT.

This is the same, whether the fracture is of one bone or of both.

1.—Bend the forearm at right angles to the arm,



FIG. 27.



FIG. 28.

keeping the thumb upwards, and the palm of the hand towards the body.

2.—Apply broad splints on the inner and outer sides from the elbows to the fingers.

3.—Apply bandages, embracing both splints, immediately above and below the fracture and round the hand (Fig. 27).

4.—Apply a large arm-sling.

Crushed Hand (fracture of the bones of the carpus, metacarpus, or fingers).

TREATMENT.

1.—Apply a carefully padded splint to the front of the hand, reaching from well above the wrist to beyond the tips of the fingers.

2.—To secure the splint apply a narrow bandage crossed in the manner of the figure 8 to the wrist and hand (Fig. 28).

3.—Apply a large arm-sling.

Fracture of the Pelvis.—When, after a severe injury in the neighbourhood of the haunch-bone, there is no sign of damage to the lower limbs, but the patient is unable to stand or even to move the lower limbs without great difficulty and pain, a fracture of the pelvis may be assumed to have occurred. The blood-vessels and organs, especially the bladder, within the pelvis are in danger of being wounded.

TREATMENT.

1.—Lay the patient in whatever position is found to give the greatest ease, and flex or straighten the lower limbs as the patient desires.

2.—Apply a broad bandage round the hips tight enough to support the parts, but not so tight as to press the broken bone further inwards.

3.—To remove the patient place him on a stretcher, acting on the same principle as that described under "Fracture of the Spine" (see page 45).

FRACTURE OF THE BONES OF THE LOWER LIMB.

Fracture of the Thigh-bone (*femur*).—The thigh-bone may be broken at its neck, anywhere in the shaft, or close to the knee. A fracture at the

neck is likely to occur in old people from very slight injury, and is often difficult to distinguish from a severe bruise of the hip, but it may be assumed that when, after an injury near the hip joint, the patient cannot, when lying on the back, raise the heel from the ground, the bone is broken. All the general signs and symptoms of fracture are usually present and a prominent sign is the position of the foot,

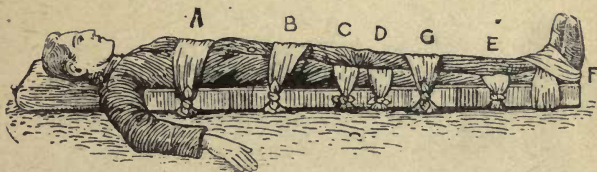


FIG. 29.

which, as a rule, lies on its outer side. Shortening may vary from one-half to three inches.

TREATMENT.

- 1.—Steady the limb by holding the ankle and foot.
- 2.—Gently draw down the foot and bring it into line with its fellow. When two or three assistants are at hand, it is one person's duty to hold the foot in position until the splints are secured.

- 3.—Apply a splint on the outer side from the arm-pit to beyond the foot.

4.—Apply a splint on the inner side from the top of the thigh (the fork) to the knee.

5.—Secure the splints by bandages as follows.—
 (a) Round the chest just below the armpits, (b) round the pelvis on a level with the hip joints, (c) above the fracture, (d) below the fracture, (e) round the leg, (f) round both ankles and feet, and tied below the feet, (g) a broad bandage round both knees (Fig. 29).

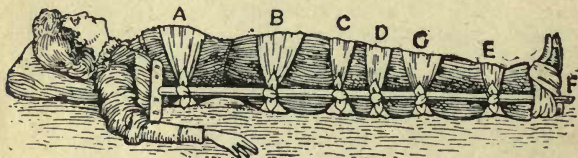


FIG. 30.



FIG. 31.

When single-handed, or when the patient is a woman, it is expedient, after extension of the limb, to tie the feet together, dispense with the inner splint, and pass the bandages round both limbs (Fig. 30).

Fracture of the Knee-cap (*patella*).—The knee-cap may be broken by falling on the knee (direct violence), but more frequently it is broken by muscular action, as follows:—

When the foot slips in the attempt to prevent a fall the muscles in the front of the thigh act with such force as to snap the knee-cap in two (Fig. 31).

Pain, loss of power (the limb will be quite helpless), and irregularity (a gap may be felt between the broken fragments of bone) accompany this injury.

TREATMENT.

- 1.—Lay the patient on his back, raise well and

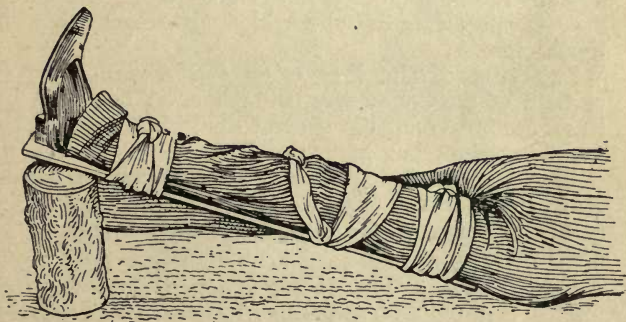


FIG. 32.

support the head and shoulders, straighten and raise the limb.

- 2.—Apply a splint along the back of the limb, reaching from the buttock to beyond the heel.

- 3.—Apply a narrow bandage with its centre imme-

diately above the knee-cap, cross the ends behind over the splint, and tie in front below the broken bone. To ensure firmness apply a second bandage in a similar way, but commenced below and tied above the broken bone.

4.—Further secure the splint by bandages round the thigh and leg.

5.—Support the foot well off the ground by a pillow, roll of clothing, etc., or if none of these are at hand by resting it on its fellow (Fig. 32).

6.—Apply an ice bag or a cold water dressing over the fracture.

Fracture of the Leg (*tibia and fibula*).—One or both of the bones may be broken. When both bones are broken all the general signs of fracture are usually present, but when one bone only is broken deformity is not always noticeable. A fracture of the fibula three or four inches above its lower end is frequently mistaken for a sprain and sometimes for a dislocation of the ankle.

TREATMENT.

- 1.—Steady the limb by holding the ankle and foot.
- 2.—Draw the foot into its natural position, and do not let go until the splints have been fixed.
- 3.—Apply splints on the outer and inner sides of the leg, reaching from above the knee to beyond the

foot. If only one splint is available place it on the outer side.

4.—Secure the splints by bandages (*a*) above, (*b*) below the fracture, (*c*) immediately above the knee,

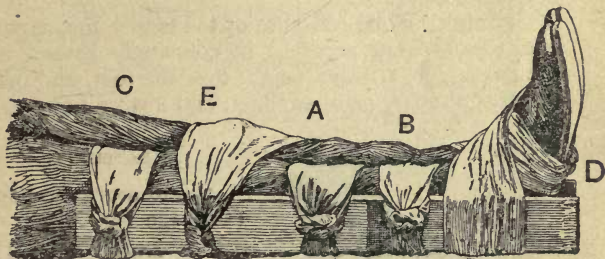


FIG. 33.

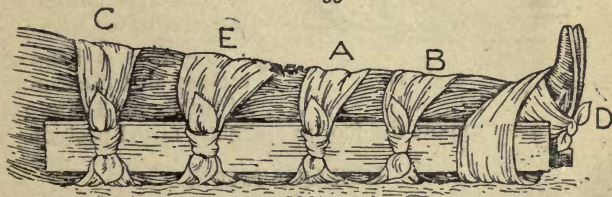


FIG. 34.

d) round both ankles, (*e*) a broad bandage round both knees (Fig. 33).

When single-handed, or when the patient is a

woman, after extending the limb tie both feet together, dispense with the inner splint, and pass the bandages round both limbs (Fig. 34). When no splint is available tying the legs, ankles, and knees together is of great service.

Crushed Foot (fracture of the tarsus, metatarsus and toes).—This accident is commonly caused by the passage of a heavy weight over the foot, and may be recognised by pain, swelling, and loss of power.



FIG. 35.

TREATMENT.

- 1.—Remove the boot (see page 19).
- 2.—Apply a well-padded splint to the sole of the foot, reaching from the heel to the toes
- 3.—Apply a bandage crossed after the manner of the figure 8 (Fig. 35).
- 4.—Support the foot in a slightly raised position.

DISLOCATIONS.

A dislocation is the displacement of one or more of the bones at a joint.

The joints most frequently dislocated are those of the shoulder, elbow, thumb, fingers, and lower jaw.

SIGNS AND SYMPTOMS OF DISLOCATION.

- 1.—**Pain** of a severe sickening character at or near the joint.
- 2.—**Loss of power** in the limb.
- 3.—**Numbness** of the parts below the seat of dislocation.
- 4.—**Swelling** about and below the joint.
- 5.—**Fixity** of the joint.—The limb cannot be moved at the joint by either the patient or others.
- 6.—**Deformity** of the limb.—The limb assumes an unnatural position, and is mis-shapen at the joint.

TREATMENT.

No attempt should be made by anyone except a doctor to reduce a dislocation. Pending his arrival:—

(a) *When the accident occurs out of doors—*

Support the limb in whatever position gives most ease to the patient, bearing in mind the necessity of lessening the effects of jolting during transport.

(b) *When the patient is indoors—*

- 1.—Remove the clothing from the limb.
- 2.—Place the patient on a couch or bed.
- 3.—Rest the limb on pillows in the most comfortable position.
- 4.—Apply cold (ice or cold water) dressings to the joint.
- 5.—When cold ceases to give comfort apply

warmth (flannels or towels wrung out of hot water).

6.—Treat shock (see page 135).

SPRAINS.

When, by a sudden wrench or twist, the ligaments and the parts around a joint are stretched and torn the joint is said to be sprained. "Going over" the ankle is a common example.

SIGNS AND SYMPTOMS.

- 1.—Pain at the joint after a twist or wrench.
- 2.—Inability to use the joint.
- 3.—Swelling and discoloration.

TREATMENT OF SPRAINED ANKLE.

When out of doors—

- 1.—Apply a bandage tightly over the boot, beginning on the sole at the instep, crossing it on the front of the ankle, and carrying it round and round the ankle, where it is to be firmly tied.
- 2.—Wet the bandage after application; it is thereby tightened.

After reaching shelter—

- 1.—Remove the boot and stocking (see page 19)
- 2.—Place the limb in the most comfortable position; usually that is well raised.

3.—Apply ice or cold water dressings to the joint as long as they relieve pain.

4.—When cold fails to give comfort, apply hot fomentations.

When other joints are sprained, treat them as if dislocated.

When in doubt as to the nature of the injury, treat as a fracture.

STRAINS AND RUPTURED MUSCLES.

When, during severe exertion, muscles or tendons are over-stretched they are said to be strained, if they are actually torn they are described as ruptured.

SIGNS AND SYMPTOMS.

1.—A sudden sharp pain.

2.—When the muscles of a limb are strained they may swell and cause severe cramp.

3.—Further exertion is difficult or impossible ; for example, if the strain has occurred in the back the patient may be unable to stand upright.

TREATMENT.

1.—Place the patient in the most comfortable position, and afford support to the injured part.

2.—Apply hot water bottles or hot fomentations when the pain is very severe.

A so-called strain in the groin (hernia) is an injury of a totally different nature (see page 114).

QUESTIONS ON CHAPTER II.

*The numerals indicate the pages where the answers
may be found.*

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First Aid Students should practise improvising material, folding bandages, tying knots, making slings, and the treatment of the following injuries.

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CHAPTER III.

THE ORGANS OF CIRCULATION.

THE organs concerned in the circulation of the blood are the **Heart**, the **Arteries**, the **Veins**, and the **Capillaries**.

The Heart is situated in the chest behind the breast-bone and rib cartilages, between the lungs and immediately above the diaphragm; it lies obliquely with a quarter of its bulk to the right and the remaining three-quarters to the left of the middle line of the body. Its beat may be felt just below and to the inner side of the left nipple. The heart has four cavities, two on either side of a central partition. The two upper cavities are named the **right and left auricles**, the two lower the **right and left ventricles**.

Arteries are vessels which convey blood from the heart. Veins carry blood to the heart. Capillaries connect the arteries and veins.

In the general (systemic) circulation arterial blood is driven from the left ventricle of the heart into the aorta (the main artery of the body). From the aorta branch arteries are given off to all parts of the body. These divide and sub-divide, and become so small as to assume microscopic dimensions, when they are termed capillaries.

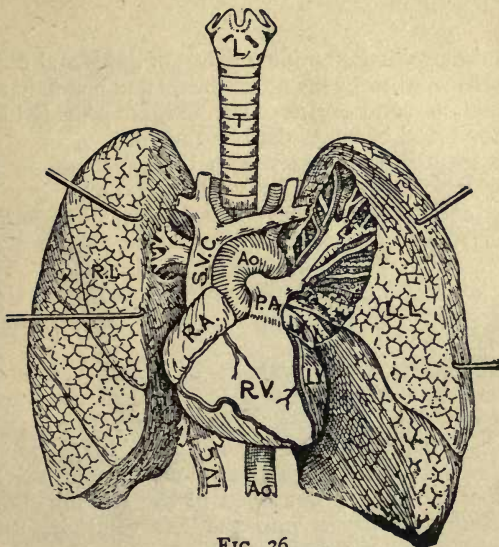


FIG. 36.

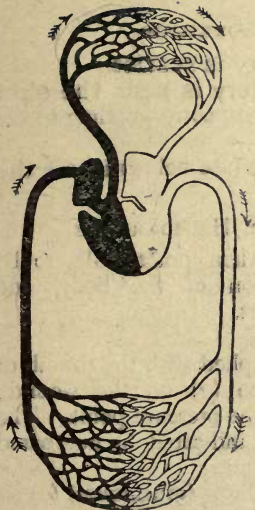
L. Larynx (voice box) ; T. Trachea (wind-pipe) ; R.L. Right Lung ; L.L. Left Lung (the lungs are drawn back to expose the heart and blood vessels) ; R.A. Right Auricle ; L.A. Left Auricle ; R.V. Right Ventricle ; L.V. Left Ventricle ; P.A. Pulmonary Artery ; Ao. Aorta ; S.V.C. Superior vena cava (the large vein carrying blood from the upper part of the body to the heart) ; I.V.C. Inferior vena cava (the large vein carrying blood from the lower part of the body to the heart). The four pulmonary veins cannot be shown in the diagram

In the capillaries an interchange of gases and fluids takes place, whereby the nourishment and maintenance of the tissues and organs of the body are provided for, and the blood becomes dark and impure.

Venous blood passes from the capillaries to the veins, which convey it towards the heart, getting larger and larger as they proceed by being joined by neighbouring veins until they finally, as two large vessels, reach the right auricle of the heart. The veins, especially in the limbs, are provided with valves at frequent intervals, which prevent the backward flow of the blood.

The pulmonary system of blood vessels is concerned in carrying the blood through the lungs. From the right auricle the blood passes to the right ventricle, and is thence carried to the lungs, where it is purified by contact with air, and becomes scarlet in colour; it is then conveyed to the left auricle of the heart and passes into the left ventricle, thus completing the circulation.

The heart contracts in adults at an average rate of seventy-two times a minute, but the rate varies, increasing as the position is changed from the lying to the sitting or to the standing position; hence the importance of adjusting the patient's position in cases of hæmorrhage. At every contraction of the left ventricle blood is forced into the arteries, causing the pulse, which may be felt wherever the finger can be



Explanation.— In the middle of the diagram is the heart with its four chambers. Above the heart is shown the lung (pulmonary) circulation. The lower part represents the general (systemic) circulation. Vessels containing impure (venous) blood are shown black, while those containing pure (arterial) blood are shown white. The connecting vessels represent the capillaries. The arrows show the direction of the flow of blood.

FIG. 37.
DIAGRAM OF THE CIRCULATION OF THE BLOOD.

placed on an artery as it passes over a bone. In the veins no pulse is to be found.

HÆMORRHAGE.

Hæmorrhage, or bleeding, is of three kinds:—

1. Arterial. 2. Venous. 3. Capillary.

ARTERIAL HÆMORRHAGE.

- 1.—Blood from an artery is scarlet.
- 2.—If the wounded artery is near the skin the blood spurts out in jets corresponding to the pulsation of the heart.
- 3.—The pressure point (see below) is on the heart side of the wound.

ARREST OF ARTERIAL HÆMORRHAGE.

Arterial hæmorrhage is, when practicable, to be arrested by pressure, position of the body, and elevation of the bleeding part.

Pressure may be :—

- 1.—**Digital**—that is, applied with the thumb or fingers, and may be (*a*) on the wound ; (*b*) at a spot called the pressure point. The pressure points are indicated by numbered dots on the frontispiece.
- 2.—**By a pad and bandage** (tourniquet) (*a*) on the wound ; (*b*) on the pressure point.
- 3.—**By flexion.**

To apply a pad and bandage to the wound, place a piece of lint or linen or a clean handkerchief folded into a hard pad, on the bleeding point, and secure it by a bandage tightly tied round the injured part. To fold the handkerchief, bring the four corners to the centre, and repeat the process until a hard pad is formed. The smooth surface is

placed on the wound, and, to prevent the pad from unfolding, the puckered surface may be stitched or fixed by a safety pin. A hard substance, such as a stone, may be enclosed in the centre of the pad.

A Tourniquet may consist of *a pad* to be placed on the pressure point, *a strap, cord, or bandage* to encircle the limb and pad, and *a tightening arrangement*, such as a stick or other means of twisting the band to tighten it.

To improvise and apply a tourniquet :—

- 1.—Apply a firm pad on the pressure point.
- 2.—Encircle the limb by a narrow bandage with its centre over the pad.
- 3.—Tie the ends of the bandage in a half knot on the opposite side to the pad.
- 4.—Lay the twisting stick on the half knot, and over it tie a reef knot.
- 5.—Twist the stick to tighten the bandage, thereby pressing the pad upon the artery, and arresting the flow of blood.
- 6.—Lock the stick in position by the ends of the bandage already applied, or by another bandage passed round the stick and limb.

The pad of the tourniquet must be accurately placed upon the pressure point so as completely to compress the artery ; otherwise arterial blood will be allowed to pass along the limb, and the veins, being compressed by the tourniquet, will not allow the

blood to return through them to the heart, and the result will be dangerous swelling and congestion.

Should a suitable pad not be at hand, a knot may be made in the centre of the bandage, and when available, a stone, cork, etc., enclosed in it to give it firmness and bulk. See that the bulging and not the flat side of the knot is next the skin.

An elastic bandage passed tightly round the limb, immediately above the seat of arterial hæmorrhage, will arrest bleeding. The simplest prepared form of this bandage is a strip of elastic webbing, twenty-five to thirty inches long and two inches wide, with a piece of tape sewn at each end. An elastic belt or brace will serve the same purpose. Except when part of a limb is torn off, it is not advisable to use an elastic cord or bandage if other apparatus can be had, as it cuts off all circulation in the limb.

Flexion consists of the application of a pad on the pressure point at the knee or elbow joint, flexing the limb to make pressure, and securing the limb in the flexed position by a bandage crossed like the figure 8.

GENERAL RULES FOR TREATMENT OF A WOUND ACCOMPANIED BY ARTERIAL HÆMORRHAGE.

- I. Stop bleeding.
- II. Prevent injurious germs from getting into the wound.

To attain these ends :—

1. Place the patient in a suitable position, bearing in mind that the blood escapes with less force when the patient sits, and is still more checked when he lies down.

2. Elevate the bleeding part, as thereby less blood finds its way into it.

3. Expose the wound, removing whatever clothing is necessary. (See Rule 8, *a*.)

4. Apply digital pressure.

(*a*) If the wound is small on the bleeding spot.

(*b*) If the wound is large on the pressure point next to the wound on the heart side. The nearest pressure point is chosen in order to avoid cutting off the circulation from as much of the part as possible, but sometimes it is necessary to apply pressure still nearer to the heart.

5. Remove foreign bodies, such as broken glass, bits of clothing, hair, etc., seen in the wound; do not search for foreign bodies you cannot see.

6. Cover the wound with a clean and firm absorbent dressing. A hard dry pad of boracic gauze or lint is to be preferred, but absorbent cotton wool, lint, or gauze, or a clean piece of linen will answer the purpose. Should any doubt be entertained as to the cleanliness of the dressing, a clean piece of unprinted paper, such as the inside of an

envelope, should be placed next the wound before applying the pad. (Compare pages 75 and 76.)

7. Bandage tightly over the pad unless :—

(a) Foreign bodies are suspected to be left unseen in the wound.

(b) There is danger of causing injury to a fracture.

In these cases a light dressing only should be applied.

8. Apply a pad and bandage or flexion on the pressure point (see Rule 4, b), but only in the following cases :—

(a) As a temporary measure while the wound is being exposed, examined and covered.

(b) As a more permanent measure when bleeding cannot be stopped by the pad and bandage on the wound, or when, in accordance with Rule 7, the tight bandage has not been applied.

9. Afford support to the injured part.

When part of a limb has been torn off or the wound is lacerated (for example by the claw of an animal or by machinery) hæmorrhage frequently does not come on at once, but as there is a danger of severe hæmorrhage later, means for its arrest should be applied to the limb, but not tightened unless necessary.

Do not disturb a clot of blood formed over a wound.

No attempt should be made to cleanse a wound except with sterilised water (that is previously boiled

and allowed to cool), and experience, especially in recent wars, has shown that those wounds which were provisionally treated with a dry dressing and subsequently dressed by a surgeon with proper appliances did best.

Students practising arrest of arterial hæmorrhage should feel the pulse to see when the current of blood in the artery has been stopped, and should then immediately relax the pressure made on the artery. In this way the importance of the accurate application of pressure will be realised, and the amount of force necessary will be ascertained.

THE COURSE OF THE MAIN ARTERIES, AND THE ARREST OF HÆMORRHAGE.

(The numbers of the pressure points refer to those on the Frontispiece.)

THE LARGE ARTERIES WITHIN THE CHEST AND ABDOMEN.

The Aorta is the central or trunk artery of the body. Commencing at the left ventricle it forms an arch behind the upper part of the breast-bone. From the arch are given off the large branches which carry the blood to either side of the head and neck and to the upper limbs. The Aorta passes down on the left of the spine to just below the navel, where it divides into two great branches (the iliacs)

which convey the blood to the organs in the pelvis and to the lower limbs.

Wounds of these arteries are one cause of internal hæmorrhage (see page 96).

ARTERIES OF THE HEAD AND NECK.

The Carotid Arteries (right and left) leave the upper part of the chest and pass up on either side of the windpipe and, just below the level of the angle of the lower jaw, divide into the Internal and External Carotid Arteries. **The Internal Carotid Artery** ascends deeply in the neck, and enters the cranium to supply the brain with blood. **The External Carotid Artery** gives off a number of branches; to the front the artery of the tongue (Lingual), the artery to the face (Facial); to the back the Occipital; the artery itself is continued upwards in front of the ear, where it changes its name to the Temporal, and supplies the scalp in the neighbourhood of the temples.

When a Carotid Artery is wounded, as in the case of a cut throat, apply the thumb of one hand on the artery at pressure point 1, pressing backwards against the backbone and taking care to avoid the windpipe. It may also be necessary to apply pressure with the other thumb above the wound for two reasons: (a) To arrest the flow of blood from the main (jugular) vein in the neck, which runs

alongside of the carotid artery and is usually wounded at the same time; (b) To check the flow of blood from the upper end of the carotid artery itself, which is often considerable owing to communication between the branches of this artery and those of its



FIG. 38.



FIG. 39.

fellow. Digital pressure must be maintained, by relays of assistants if necessary, until the doctor arrives (Fig. 38).

The Facial Artery crosses the lower jaw in a slight hollow two fingers' breadth in front of the angle, and sends branches to the chin, lips, cheek, and

outside of the nose. Hæmorrhage from wounds of the face below the level of the eye is to be arrested by :—

- (a) Digital pressure on pressure point 2 (Fig. 39),
or
- (b) Grasping the lips or cheek on both sides of the wound by the finger inside and the thumb outside the mouth or *vice versa*.



FIG. 40.



FIG. 41.

The Temporal Artery may be felt pulsating in front of the upper part of the ear. Hæmorrhage from the region of the temple may be arrested by pressure applied at pressure point 3 (Fig. 40).

The Occipital Artery supplies branches to the

region of the scalp from behind the ear to the back of the head. Hæmorrhage from this region may be arrested by digital pressure on pressure point 4, four fingers' breadth behind the ear (Fig. 41). This point is difficult to find, and it is usually sufficient to apply pressure immediately below the wound.

Hæmorrhage from the Forehead or anywhere in the Scalp may be arrested by applying a small firm pad on the bleeding point and securing it by a narrow bandage with its centre laid on the pad, the ends carried round the head in the direction most convenient, and tied tightly over the pad (Fig. 42).



FIG. 42.

When a wound of the forehead or scalp is associated with a fracture, the best plan is to apply a ring pad around the seat of injury. To make a ring pad, pass one end of a narrow bandage round your fingers; pass the other end of the bandage through the ring thus formed and continue to pass it through and through until the whole of the bandage is used and a ring as shown in Fig. 43 is formed.

ARTERIES OF THE UPPER LIMBS.

The **Subclavian Artery** passes from a point behind the inner end of the collar-bone across the first rib to the armpit.

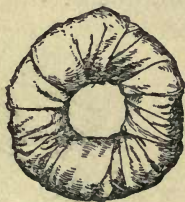


FIG. 43.



FIG. 44.

To apply digital pressure :—

- 1.—Bare the neck and upper part of the chest.
- 2.—Place the patient's arm against the body so as to depress the shoulder, and cause him to incline his head towards the injured side.
- 3.—Take your stand opposite the shoulder.
- 4.—Using the left hand for the right artery, and *vice versa*, grasp the neck low down, placing the fingers behind the shoulder and the thumb immediately above the centre of the collar-bone in the hollow between the muscles attached to the bone (pressure point 5).

- 5.—Press the thumb deeply downwards and backwards against the first rib, which is beneath the collar bone at this spot (Fig. 44).

The Axillary Artery, which is a continuation of the subclavian, keeps close to the shoulder joint, and can be felt pulsating when the fingers are deeply pressed into the armpit. Digital pressure is difficult to apply to this artery.

To apply a pad and bandage:—

- 1.—Place a hard pad the size of a billiard ball in the armpit (pressure point 6).

- 2.—Apply the centre of a narrow bandage on the pad; cross the bandage on

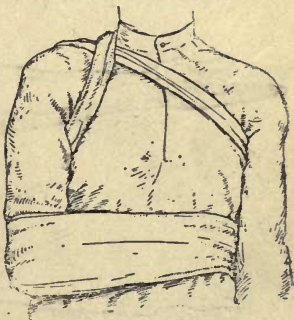


FIG. 45.

- the shoulder; pull the ends tight and tie them under the opposite armpit, taking care that the pad does not slip.
- 3.—Flex the forearm and tie the limb tightly to the trunk with a broad bandage, applied on a level with the elbow (Fig. 45).

The Brachial Artery is a continuation of the Axillary, and runs down the arm on the inner side of the biceps muscle, gradually passing forward until it reaches the middle of the front of the elbow. The inner seam of the coat sleeve above the elbow roughly indicates its course.

Digital or instrumental pressure may be applied at or near pressure point 7.



FIG. 46. .

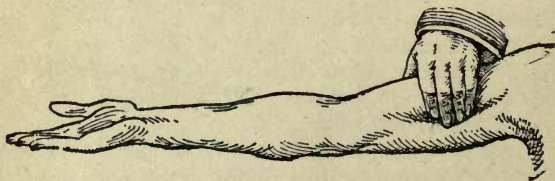


FIG. 47.

To apply digital pressure extend the limb at right angles to the body, palm of the hand upwards. Stand behind the limb, and pass the fingers under the back

of the arm over the seam of the coat or the groove on the inside of the biceps muscle. Press the pulps (not the tips) on the artery (Fig. 46). Some prefer to pass the hand over the front of the muscle (Fig. 47). A slight turn of the hand outwards as it grasps the arm will better ensure compression of the artery.

The Brachial artery may be compressed at the

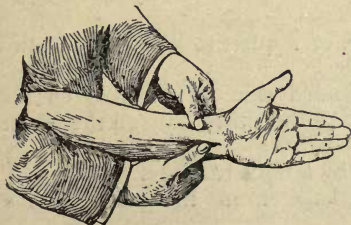


FIG. 49.



FIG. 48.

elbow (pressure point 8) by flexion. The pad may be a folded handkerchief with a small stone or a cork wrapped up in it, but when no pad is available the coat sleeve rolled or gathered up will serve instead (Fig. 48).

Just below the elbow the Brachial artery divides into the Radial and Ulnar arteries, which run along the front of the forearm on the outer and inner sides respectively. The pressure points (9 and 10) are about one inch above the wrist and about half an inch from the outer and inner sides of the forearm, where the arteries may be felt pulsating. Branches of these arteries join to form the Palmar Arches in the hand. The arteries run along on either side of the fingers to the tip.

Pressure may be applied to the Radial and Ulnar arteries at pressure points 9 and 10, by the thumbs (Fig. 49) or as follows:—

- 1.—Cut the cork of a quart or pint bottle in two lengthwise.
- 2.—Lay the rounded side of one half on the Radial, and of the other half on the Ulnar artery.
- 3.—Secure them by a tight bandage.

To arrest hæmorrhage from the palm of the hand:—

- 1.—Apply a firm pad, and make the patient grasp it firmly.
- 2.—Spread out a triangular bandage, turn up the base about four inches, lay the back of the patient's hand on the centre of the bandage, fold the point over the knuckles and wrist, pass the two ends round the wrist, make the

patient pull on the point of the bandage, cross the ends over the fingers twice and tie them as firmly as possible. Bring the point (A) down to the knuckles and fasten with a pin at B (Fig. 50).

- 3.—Elevate the forearm and support it with a "St. John" sling (see page 49).

Arterial hæmorrhage from the fingers may be arrested by applying a small pad on the wound, and securing it firmly with a strip of tape, linen or plaster.



FIG. 50.

ARTERIES OF THE LOWER LIMBS.

The Femoral Artery, a continuation of the iliac, enters the thigh in the centre of the fold of the

groin, where it may be felt pulsating immediately below the skin. The course of the artery may be indicated by a line drawn from the centre of the groin to the inner side of the back part of the knee. After traversing two-thirds of this line, the femoral artery passes behind the thigh bone to the back of the knee joint as the Popliteal artery.

Digital pressure may be applied to the Femoral artery at the groin (pressure point 11) as follows:—

- 1.—Lay the patient on his back.

- 2.—Kneel beside the patient.
- 3.—To find the groin, raise the foot high so as to flex the thigh ; the fold in the clothing at the top of the thigh will indicate the groin
- 4.—Place the thumbs one on the other upon the pressure point, grasping the thigh with the hands (Fig. 51).
- 5.—Press firmly against the brim of the pelvis.

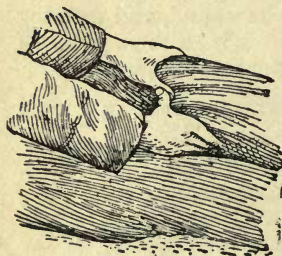


FIG 51.

As there is immediate danger of death it is important not to waste time in removing the trousers.

When the Femoral artery is wounded in the upper third of its course, pressure must be maintained at the groin. No really satisfactory tourniquet has been devised for compression at this point, and relays of

assistants should be employed to keep up the pressure until the doctor arrives ; each fresh assistant places his thumbs over those of his predecessor, who slips his away from beneath, and thus gushes of blood are prevented during the change.

Application of a tourniquet to the Femoral artery (pressure point 12) :—

When practising compression of this artery, it is a

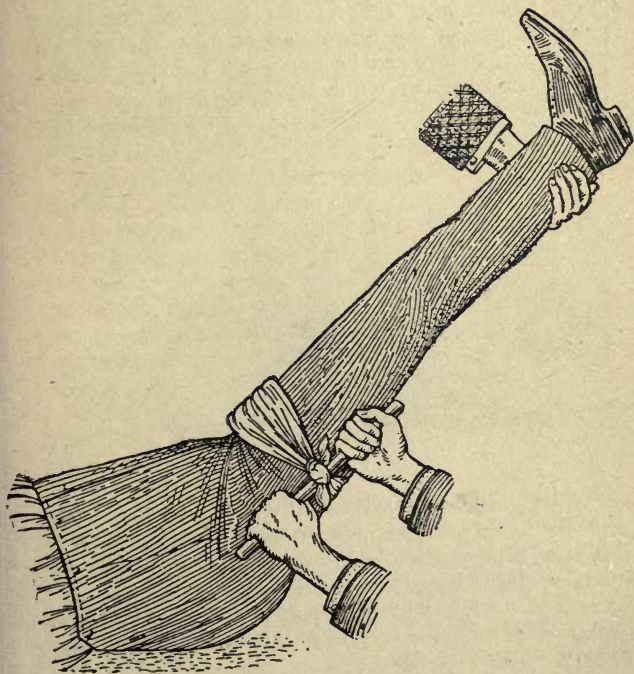


FIG. 52.

good plan to draw a chalk line from the centre of the groin to the inner side of the back of the knee; place the pad of the tourniquet on this line as high up as the bandage can be applied. The pad should be the size of a lawn tennis ball (Fig. 52).

Pressure may be applied to the **Popliteal artery** by flexion at the knee (pressure point 13); the pad

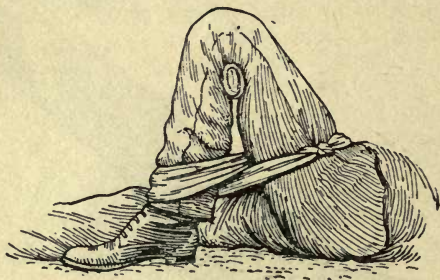


FIG. 53.

should be the size of a lawn tennis ball, or if no pad is available the trouser leg may be rolled or gathered up to serve instead. It is not necessary to take off the clothing (Fig. 53).

Just below and behind the knee joint the Popliteal artery divides into the Anterior (front) and Posterior (back) Tibial arteries.

The Posterior Tibial Artery passes down the

back of the leg to the inner side of the ankle. It is at first deeply placed between the muscles of the calf, but it approaches the surface as it proceeds, so that it can be felt pulsating behind the large bone at the inner side of the ankle. It enters the sole as the **Plantar Arteries**, which run forward amongst the muscles to supply the foot and toes.

The Anterior Tibial Artery, on leaving the Popliteal, at once passes forward between the leg bones, and, deeply placed amongst the muscles, runs down the leg to the centre of the front of the ankle. This artery is continued as the **Dorsal Artery of the Foot**, which, passing forward over the tarsus, dips down to the sole between the first and second metatarsal bones. Here it forms with the Plantar arteries what is known as the **Plantar Arch**.

At the ankle (pressure points 14 and 15) pressure may be applied by the fingers or by pads and bandages.

VENOUS HÆMORRHAGE.

- 1.—Blood from a vein is dark red.
- 2.—It flows in a slow continuous stream.
- 3.—It issues from the side of the wound further from the heart.
- 4.—In the case of a wound of a varicose vein it flows also from the side of the wound nearer to the heart, especially if the patient is kept standing.

Varicose Veins.—The veins of the leg are specially apt to become varicose. A varicose vein is dilated, winding, and with bead-like (varicose) projections along its course. A vein becomes varicose from several causes, such as long standing or tight garters. The first effect is to throw extra work upon the valves, and the bead-like projections are caused by the blood accumulating in the pockets behind the valves. In time the vein becomes so dilated that the valves can no longer span it.

GENERAL RULES FOR TREATMENT OF A WOUND
ACCOMPANIED BY VENOUS HÆMORRHAGE.

1.—Place the patient in a suitable position, bearing in mind that the blood escapes with less force when the patient sits and is still more checked as he lies down.

2.—Elevate the part, as thereby less blood finds its way into it.

3.—Expose the wound, removing whatever clothing is necessary.

4.—Remove any constrictions, such as the collar or garters, from the heart side of the wound.

5.—Apply digital pressure on the wound until you can apply a pad and tight bandage. If that does not stop the bleeding, make pressure near the wound on the side away from the heart. In the case of a wound of a varicose vein it may also be necessary to

apply a pad and bandage to the vein immediately above the wound, especially if the limb cannot be maintained in an elevated position.

6.—Treat the wound as directed by Rules 5, 6 and 7, stated on pages 77 and 78.

7.—Afford support to the injured part.

CAPILLARY HÆMORRHAGE.

1.—The blood is red.

2.—It flows briskly in a continuous stream, or may merely ooze from the wound.

3.—It wells up from all parts of the wound.

A slight amount of pressure will suffice to arrest capillary hæmorrhage.

INTERNAL HÆMORRHAGE.

Wounds of the blood vessels within the trunk cause hæmorrhage into the cavity of the chest or of the abdomen.

SIGNS AND SYMPTOMS OF INTERNAL HÆMORRHAGE.

1.—Rapid loss of strength, giddiness and faintness, especially when the upright position is assumed.

2.— Pallor of the face and lips.

3.—Breathing hurried and laboured, and accompanied by yawning and sighing.

4.—The pulse fails, and may altogether disappear at the wrist.

5.—The patient throws his arms about, tugs at the clothing round the neck, and calls for air.

6.—Finally the patient may become totally unconscious.

TREATMENT.

1.—Keep the patient in a recumbent position.

2.—Undo all tight clothing about the neck.

3.—Provide for free circulation of air; fan the patient.

4.—Sprinkle cold water on the face; hold smelling salts to the nostrils; avoid other forms of stimulants, at all events until the hæmorrhage has been controlled.

5.—Give ice to suck or cold water to drink; if the seat of the hæmorrhage is known, apply an ice bag over the region.

6.—Should the patient be reduced to a state of collapse, raise the feet and bandage the limbs firmly from the toes to the hips and from the fingers to the shoulders.

HÆMORRHAGE FROM THE NOSE (NOSTRILS).

1.—Place the patient in a sitting position in a current of air before an open window, with the head thrown slightly back and the hands raised above the head.

2.—Undo all tight clothing around the neck and chest.

3.—Apply cold (ice, a cold sponge or bunch of

keys) over the nose and also the spine at the level of the collar ; place the feet in hot water.

4.—Cause the patient to keep the mouth open, and so avoid breathing through the nose.

Blood issuing from the mouth may come from the tongue, the gums, the socket of a tooth after extraction, the throat, the lungs, or the stomach.

HÆMORRHAGE FROM THE TONGUE, THE GUMS, THE SOCKET OF A TOOTH, OR THE THROAT.

1.—Give ice to suck or cold water to hold in the mouth. If this is not successful give water as hot as can be borne to hold in the mouth.

2.—If necessary make pressure on the carotid arteries.

3.—If bleeding from the front part of the tongue is excessive compress the part by a piece of clean lint held between the finger and thumb.

4.—If the bleeding is from the socket of a tooth, plug the socket with a piece of clean lint or cotton wool ; over this place a small cork or other substance of suitable size, and instruct the patient to bite on it.

HÆMORRHAGE FROM THE LUNGS.

Blood from the lungs is coughed up, and is scarlet and frothy in appearance.

Treat as for Internal Hæmorrhage (see page 95).

HÆMORRHAGE FROM THE STOMACH.

Blood from the stomach is vomited ; it is of a dark colour and has the appearance of coffee grounds ; it may be mixed with food.

Treat as for Internal Hæmorrhage (see page 95), except that nothing is to be given by the mouth.

Blood issuing from the Ear Channel, which generally indicates a fracture of the base of the cranium, must be wiped away as it issues ; no attempt is to be made to plug the ear.

QUESTIONS ON CHAPTER III.

*The numerals indicate the pages where the answers
may be found.*

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| What is the effect of the patient's position on the rate at which the heart contracts? | 72 |
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| How would you treat bleeding from the gums or throat? ... | 97 |
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| And if the bleeding were from the socket of the tooth? ... | 97 |
| How would you distinguish between bleeding from the lungs and from the stomach? | 97 |
| And what would be the difference in the treatment? ... | 97 |
| Of what is bleeding from the ear channel generally a sign? ... | 98 |
| The Student should practise placing supposed patients in a proper position for the arrest of hæmorrhage (see pages 72, 77 and 94), folding firm pads (74 and 75), tying hard knots in bandages to form a tourniquet (76), and the application of pressure at all the pressure points shown in the frontispiece, at various points on the forehead and scalp, and on the palm of the hand. Pressure should be digital, by pad and bandage, or flexion, as directed in the text. | |

| | | |
|---|---|----------|
| Pressure points—Carotid artery, 80. | Facial, 82. | |
| Temporal, 82. | Occipital, 83. | |
| Axillary, 85. | Brachial (by pad and bandage, pressure being made against the humerus and by flexion at the elbow), 86. | |
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CHAPTER IV.

BRUISES.

A blow anywhere on the surface of the body may cause extensive hæmorrhage beneath the skin, without breaking it—a “black eye” is an instance. The injury is accompanied by discoloration and swelling.

TREATMENT.

Apply ice or cold water dressings. A piece of lint soaked in extract of witch hazel may be placed on the affected part.

BURNS AND SCALDS.

A burn is caused—

(a) By dry heat, such as fire or a piece of hot iron.

(b) By a rail, wire or dynamo charged with a high pressure electric current.

(c) By a corrosive acid, such as oil of vitriol.

(d) By a corrosive alkali, such as caustic soda, ammonia, or quicklime.

(e) By friction, caused, for example, by contact with a revolving wheel. (Brush burn.)

A scald is caused by moist heat, such as boiling water, hot oil or tar.

The effect may be a mere reddening of the skin; blisters may be formed; or even the deeper tissues

of the body may be charred and blackened. The clothing may adhere to the burnt skin, and its removal is impossible without further detriment to the injured part. The great danger is Shock.

TREATMENT.

1.—Carefully remove the clothing over the injured part. If stuck to the skin, the adherent clothing must be cut around with scissors, soaked with oil, and left to come away subsequently.

2.—Do not break blisters.

3.—Immediately cover up the part. Soak or smear pieces of lint or linen with oil, or vaseline, lanoline, or cold cream; a small quantity of boracic powder added to these will be of benefit. The inside of a raw potato scraped out and spread on lint makes a soothing application. When the injured surface is extensive do not cover it with one large sheet of lint, but with strips about the breadth of the hand; this is advisable as they fit better on the part, and during subsequent dressings one strip can be removed at a time, and a fresh dressing applied before the adjacent strip is taken off. The shock to the system is thereby less than if the whole of the burnt surface were laid bare to the air by the removal of all the dressings at one time. When covered by the oily dressing envelop the part in cotton wool or a piece of flannel and apply a bandage.

When the face is burnt, cut a mask out of lint or linen, leaving holes for the eyes, nose and mouth. Dip this in oil or smear it with vaseline and apply it to the face and cover it with cotton wool, leaving openings to correspond with the holes in the mask.

When possible place the injured part in water at the temperature of the body (98 degrees) until suitable dressings can be prepared. A dessert spoonful of baking soda added to a basinful of the warm water will make a soothing lotion.

As it is important not to leave the part exposed to the air, it is the duty of the bystanders to prepare the dressings while the clothing is being removed.

4.—Treat Shock.—This is particularly necessary in the case of every burn or scald of any considerable extent (see page 135). Be very apprehensive of danger in the case of even slight burns of the neck.

5.—If the burn is caused by a corrosive acid, bathe the part with a weak alkaline lotion, such as washing soda, baking soda (bicarbonate of soda), magnesia, or slaked lime in warm water before applying the dressings.

6.—If the burn is caused by a corrosive alkali, bathe the part with a weak acid lotion, such as lemon juice or vinegar diluted with an equal quantity of water. *Caution.*—Before using water brush off any lime that remains on the part.

7.—When a woman's dress catches fire—

- (a) Lay the woman flat on the floor at once, so that the flames are uppermost; that is to say, if the front of the dress is on fire lay her on her back, and if the back of the dress is burning, place her face downwards. The reason for this is that flames ascend, so that if the upright position is assumed, the flames will quickly reach and burn the body, neck, and face; or if the woman lies with the flames undermost, they will, if unextinguished, pass over and burn the limbs and set fire to the rest of the dress.
- (b) As soon as the woman is laid flat, smother the flames with anything at hand, such as a rug, coat, blanket, or table cover; if made wet so much the better.
- (c) A woman rendering assistance should hold a rug or blanket in front of herself when approaching the flames.
- (d) If a woman's dress catches fire when nobody is by, she should lie flat, flames uppermost, smother the flames with anything handy, and call for assistance, or crawl to the bell-pull and ring; on no account should she rush into the open air.

The use of fire guards would prevent many calamities.

BITES OF SNAKES AND RABID ANIMALS, AND WOUNDS BY POISONED WEAPONS.

Hydrophobia is caused by the bite of an animal, such as a dog, cat, fox, wolf, or deer suffering from rabies. The special poisons introduced into wounds caused by venomous snakes and poisoned weapons cause immediate danger to life.

TREATMENT.

1.—Immediately place a constriction between the wound and the heart so as to prevent the venous blood from carrying the poison through the body. If, for example, a finger is bitten it should be encircled on the side of the wound nearest to the heart, with the finger and thumb, and as soon as possible a ligature (a string, piece of tape, or strip of handkerchief) should be placed tightly round the root of the finger. Compression with the finger and thumb must not be relaxed until the ligature has been applied. Additional ligatures may, with advantage, be applied at intervals up the limb.

2.—Encourage bleeding for a time :—

- (a) By bathing the wound with warm water.
- (b) By keeping the injured limb low ; the upper limb should be allowed to hang down, and in the case of the lower limb the patient should be seated with the foot on the ground.

3.—Cauterise the wound, if it is quite impossible to obtain the services of a doctor. This is best done by burning with a fluid caustic, such as caustic potash, pure carbolic acid, or nitric acid, or if these are not at hand, with a red-hot wire or a fusee. The usual solid caustic is insufficient, as it does not reach the bottom of the wound, where the poison is. To ensure the caustic reaching the bottom of the wound, it should be applied on a piece of wood, such as a match cut to a point. When the caustic has been thoroughly applied, but not till then, the ligatures may be removed.

4.—Cover the wound, after a while, with a clean dressing.

5.—Afford support to the injured part.

6.—Treat shock if it occurs (see page 135).

7.—In the case of a bite by a venomous snake, rub in powdered permanganate of potash and inject under the skin in the neighbourhood of the wound a solution of permanganate of potash.

STINGS OF PLANTS AND ANIMALS.

These give rise to serious inconvenience, and in some cases grave symptoms develop.

TREATMENT.

1.—Extract the sting if left in.

2.—Mop the part freely with dilute ammonia

or spirits. A paste of bicarbonate of soda and sal volatile is an efficient application. A solution of washing soda or potash or the application of the blue bag will relieve pain.

3.—Treat collapse if it occurs (see page 135).

FROST BITE.

During exposure to severe cold, parts of the body, usually the feet, fingers, nose, or ears, lose sensation and become first waxy white and afterwards congested and of a purple appearance. As sensation is lost in the part, it is often only by the remarks of bystanders that the frost-bitten person is made aware of his condition.

TREATMENT.

1.—Do not bring the patient into a warm room until, by friction of the hand or by rubbing with soft snow, sensation and circulation in the affected parts are restored. Neglect of this precaution may lead to death of the tissues of the frost-bitten part.

2.—When circulation is restored, keep the patient in a room at a temperature of 60 degrees.

NEEDLE EMBEDDED UNDER THE SKIN.

When a needle breaks off after penetrating the skin and disappears, take the patient to a doctor at once. If the wound is near a joint, keep the limb at rest on a splint.

FISH-HOOK EMBEDDED IN THE SKIN.

Do not attempt to withdraw the fish-hook by the way it went in, but cut off the dressing of the hook, so that only the metal is left, and then force the point onwards through the skin until the hook can be pulled out.

INJURIES TO JOINTS.

When a joint is injured by a bullet, stab, or other cause —

- 1.—Wrap the part in cotton wool.
- 2.—Afford rest and support to the injured limb; if the upper limb, in a flexed position by a sling; if the lower limb, in a straight position by a splint.

FOREIGN BODY IN THE EYE.

- 1.—Prevent the patient rubbing the eye, tying down a child's hands if necessary.
- 2.—Pull down the lower eyelid, when, if the foreign body is seen, it can readily be removed with a camel's hair brush, or with the corner of a handkerchief twirled up and wetted.
- 3.—When the foreign body is beneath the upper eyelid lift the lid forward, push up the lower lid beneath it and let go. The hair of the lower lid brushes the inner surface of the upper one, and may dislodge the body. Should the first attempt be unsuccessful, repeat it several times if necessary. If

the foreign body is not dislodged call the services of a doctor as soon as possible. **When, however, skilled help cannot be had,** proceed as follows :—

- (a) Seat the patient so as to face the light, and stand behind him, steadying his head against your chest.
- (b) Place a small rod, such as a match or bodkin, on the upper eyelid, half-an-inch above the edge, pressing it backwards as far as possible.
- (c) Pull the upper eye-lashes upwards over the rod, and thereby evert the eyelid.
- (d) Remove the foreign body.

4.—When a piece of steel is embedded in the eyeball drop a little olive or castor oil on the eyeball after pulling down the lower eyelid, close the lids, apply a soft pad of cotton wool and secure it by a bandage tied sufficiently firmly to keep the eyeball steady ; take the patient to a doctor.

5.—When quick-lime is in the eye brush away as much of it as possible ; bathe the eye with vinegar and warm water, and treat as for a piece of steel embedded in the eyeball.

FOREIGN BODY IN THE EAR PASSAGE.

As a rule make no attempt to treat a patient with a foreign body in the ear if the services of a doctor can possibly be had ; any attempts to remove the foreign body may lead to fatal consequences. If a child

cannot be induced to keep the fingers from the ear, tie his hands down or cover up the ear. If an insect is in the ear-passage, fill the ear with olive oil, when the insect will float and may be removed. Never syringe or probe the ear.

FOREIGN BODY IN THE NOSE.

Induce sneezing by pepper or snuff. Cause the patient to blow his nose violently after closing the unaffected nostril. There is no immediate danger from a foreign body in the nose.

THE ABDOMEN.

The abdomen is bounded above by the diaphragm; below by the pelvis; behind by the lumbar vertebræ; and in front and at the sides by muscular walls. (Fig. 54.)

THE ORGANS OF THE ABDOMEN.

The Stomach lies immediately below the "pit of the stomach" just below the breast-bone.

The Liver lies in the upper part of the abdomen, where it is mostly covered by the right lower ribs.

The Spleen lies beneath the ribs at the upper part of the left side of the abdomen.

The Intestines occupy the greater part of the cavity of the abdomen.

The Kidneys lie at the back, in the region of the loin.

The Bladder lies in the pelvis.

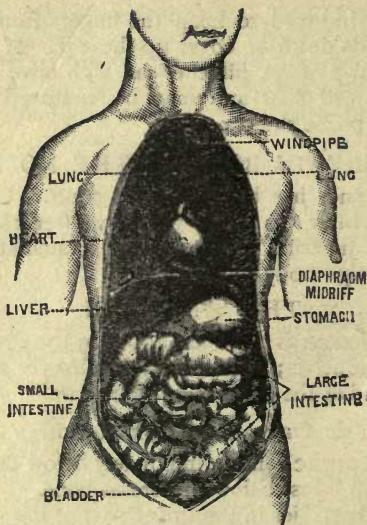


FIG. 54.

WOUND IN THE FRONT WALL OF THE ABDOMEN.

When the intestines or other organs protrude through the wound, whether vertical or transverse, bend the knees, raise the shoulders, and apply lint, a towel, or cotton wool wrapped in soft linen, and keep the

patient warm until the doctor arrives. When there is no protrusion of organs, *if the wound is vertical*, lay the patient flat on the back with the lower limbs straight; *if the wound is transverse*, bend the knees and raise the shoulders.

INJURIES TO THE ORGANS WITHIN THE ABDOMEN AND PELVIS.

Injuries of the Stomach are attended by extreme collapse and sometimes by vomiting of dark blood like coffee-grounds. For treatment see "Hæmorrhage from the Stomach" (page 98).

Injuries of the Liver, Spleen and Intestines may be caused by a blow, a stab or a bullet; the liver or spleen may be injured by a fracture of the lower ribs. The Signs and Symptoms are those of internal hæmorrhage accompanied by pain and swelling at the seat of injury, and the treatment is as for that condition (see page 95).

The Kidneys may be injured by a fracture of the eleventh or twelfth ribs, also by a crush, blow, stab or bullet. Blood may escape with the urine, and there may be pain and swelling over the injured kidney.

The Bladder may be injured by a fracture of the pelvis. The signs and symptoms are either inability to pass water, or if a little is passed it is tinged with blood.

TREATMENT OF INJURY TO THE KIDNEYS OR BLADDER.

1.—Keep the patient quiet until the doctor arrives.

2.—Apply hot fomentations over the painful or injured part.

Rupture (hernia) consists of a protrusion of an internal organ, usually the bowel, through the muscular wall of the abdomen, most frequently at the groin. Should a sudden swelling accompanied by pain and sickness take place in that region

1.—Send for a doctor instantly.

2.—Lay the patient down with the buttocks raised.

3.—Apply ice or cold water dressings to the affected part.

QUESTIONS ON CHAPTER IV.

*The numerals indicate the pages where the answers
may be found.*

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| How would you treat a bruise? | 102 |
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| What is the great danger of a burn or scald? | 103 |
| State the general treatment for burns and scalds | 103, 104 |
| How would you treat a burn caused by a corrosive acid? | 104 |
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| State the treatment of injuries to the kidneys or bladder | 114 |
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CHAPTER V.

THE NERVOUS SYSTEM.

Two systems of nerves, the Cerebro-spinal and the Sympathetic, regulate the movements and functions of the body.

The Cerebro-spinal System is made up of the Brain, the Spinal Cord and Nerves, and through its agency sensations are received and the will causes the action of the voluntary muscles. For example, when a part is injured a sensation of pain is conveyed to the brain by the nerve, thus affording an indication of the seat of injury, or a warning of a possible danger of further damage. On attention being directed to the injury, an attempt is instantly made to ease the pain or to move the injured part from danger.

The **Brain** is situated within the cranium, and is divided in the middle line, so that, with the exception of some connecting bands, the right and left sides are separate.

The **Spinal Cord** is the long cord of nervous matter lying within the spinal canal (see Vertebral Column, page 23). It leaves the brain through an opening in the base of the cranium and extends to the upper lumbar vertebræ.

The **Nerves** proceed from the brain and spinal cord in pairs as pearly-white trunks, and their branches can be traced throughout the tissues of the body. When a nerve is torn through there is paralysis of motion and sensation in the region in which its branches are distributed.

The **Sympathetic System** extends as a nervous chain on each side of the front of the spinal column along its entire length, and sends branches to all the organs of the chest and abdomen to control the involuntary muscles, and thereby regulate the vital functions. This system is not under the control of the will, and acts alike during sleep and activity.

THE RESPIRATORY SYSTEM.

The air reaches the lungs by way of the nostrils (or mouth), the throat, the wind-pipe, and the bronchial tubes. The nostrils convey it to the back of the throat, whence it enters the wind-pipe by an opening guarded by a sort of trap door or valve, so that in health air, but not solids or fluids, may enter. During insensibility, however, the valve fails to act, so that should solids or fluids be given by the mouth, they may enter the wind-pipe and cause asphyxia. The wind-pipe extends to two inches below the top of the breast-bone, where it divides into the right and left bronchial tube. Each bronchial tube enters a lung and divides into small and still smaller tubes, until

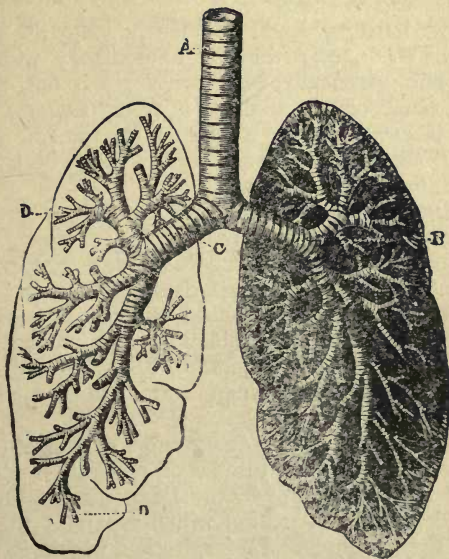


FIG. 55. THE LUNGS AND BRONCHIAL TUBES.

A. Trachea, or Wind-pipe. B. Left Bronchus. C. Right Bronchus. D. Smaller Bronchial Tubes.

the ultimate recesses of the lung—the air cells or air spaces – are reached.

The Lungs, Right and Left, occupy the greater part of the chest; they lie immediately within the ribs, and practically wherever a rib is felt, whether front, back or sides, there is lung beneath. Each lung is enveloped in a fine membrane (the *pleura*) which allows it to move within the chest during breathing without friction.

Respiration, or breathing, consists of two acts, **Inspiration**, an expansion of the chest, during which air is drawn into the lungs, and **Expiration**, a contraction of the chest, during which air leaves the lungs. A pause follows the act of expiration. In health fifteen to eighteen breaths are taken per minute, and at each inspiration about 20 to 30 cubic inches of air enter the lungs, and a similar quantity is expelled at each expiration.

The expansion and contraction of the chest are effected partly by the muscles of respiration attached to the ribs, but chiefly by the **Diaphragm**, the large arched muscular partition which separates the chest from the abdomen. In inspiration, which is chiefly a muscular act, the ribs are raised, and the arch of the diaphragm falls and becomes flattened, thus increasing the capacity of the chest and causing the air to enter. In expiration, an act performed almost without effort, the ribs fall and the arch of the

diaphragm rises ; this lessens the capacity of the chest and forces air out. The mechanism of respiration is somewhat like that of ordinary household bellows, but without a valve ; the ribs may be compared to the boards of the bellows, while the diaphragm corresponds to the leather, the air passages being equivalent to the nozzle.

As the blood depends upon the air for its purification and the oxygen necessary to maintain life, interference with breathing very soon may produce a dangerous state called asphyxia, examples of which are afforded by drowning, suffocation, choking, etc.

ARTIFICIAL RESPIRATION.

PROFESSOR SCHÄFER'S METHOD.

1.—Make no attempt to loosen or remove clothing.

2.—Lay the patient in a prone position (*i.e.*, back upwards) with his head turned to one side, so as to keep his nose and mouth away from the ground. No pad is to be placed under the patient, nor need the tongue be drawn out, as it will fall naturally.

3.—Kneel at one side facing the patient's head, and place the palms of your hands on his loins, one at each side, the thumbs nearly touching one another in the small of the back, and the fingers extending over the lowest ribs. Leaning your body forward, let its weight press straight downwards upon the

loins and lower part of the back, thus compressing the abdomen against the ground and driving air out of the chest. This produces expiration (Fig 56). Draw back

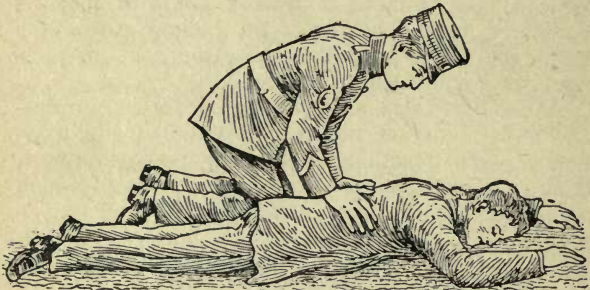


FIG. 56. EXPIRATION.



FIG. 57. INSPIRATION.

your body somewhat more rapidly and relax the pressure, but do not remove your hands; this produces inspiration (Fig. 57).

4.—Alternate these movements, by a rhythmic swaying backwards and forwards of your body, twelve to fifteen times a minute, persevering until respiration is restored, or a doctor pronounces life to be extinct.

DR. SILVESTER'S METHOD. .

1.—Adjust the patient's position.—Without wasting a moment place the patient on his back on a flat surface, inclined if possible from the feet upwards. Remove all tight clothing from about the neck and chest, and bare the front of the body as far as the pit of the stomach; unfasten the braces and the top button of trousers in men, and the corsets in women. Raise and support the shoulders on a small, firm cushion or folded article of dress placed under the shoulder-blades.

2.—Maintain a free entrance of air into the windpipe—Cleanse the lips and nostrils; open and wipe the mouth; an assistant must draw forward the patient's tongue as far as possible, and keep it in that position.

3.—Imitate the movements of breathing.
Induce Inspiration.—Kneel at a convenient distance behind the patient's head, and grasping his forearms just below the elbow, draw the arms

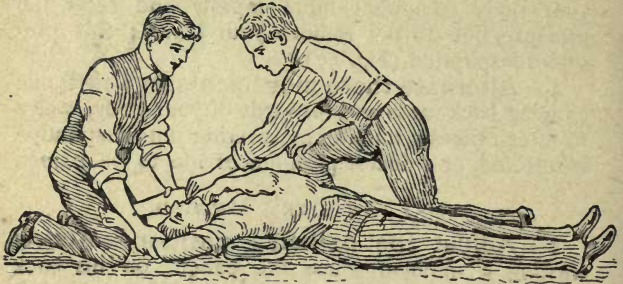


FIG. 58. INSPIRATION.



FIG. 59. EXPIRATION.

upwards, outwards, and towards you, with a sweeping movement, making the elbows touch the ground



FIG. 60. INSPIRATION.



FIG. 61. EXPIRATION.

(Fig. 58). The cavity of the chest is thus enlarged, and air is drawn into the lungs.

Induce expiration.—Bring the patient's flexed arms slowly forward, downwards and inwards, press the arms and elbows firmly on the chest on either side of the breast-bone (Fig. 59). By this means air is expelled from the lungs.

Repeat these movements alternately, deliberately, and perseveringly about fifteen times a minute.

When a sufficient number of assistants are present, Howard's method may be combined with Silvester's, as follows:—

The additional assistant kneels astride the patient's hips with the balls of the thumbs resting on either side of the pit of the stomach, and the fingers grasping the adjacent parts of the chest. Using his knees as a pivot, he presses forward on his hands. Then *suddenly*, with a final push, he springs back and remains erect on his knees while he slowly counts 1, 2, 3. These motions are to be repeated to correspond with those being performed by Silvester's method, pressure on the chest being made simultaneously by those performing the two methods (Figs. 60 and 61).

LABORDE'S METHOD.

When from any cause the above methods cannot be carried out, *Laborde's method* of artificial respiration should be tried. It is especially useful in suffocated children, and when the ribs are broken.

The patient is placed on his back or side; the mouth cleared; the tongue is seized—using a handkerchief or something to prevent it slipping from the fingers—the lower jaw depressed; the tongue is pulled forward and held for two seconds in that position, then allowed to recede into the mouth. These movements should be repeated about fifteen times a minute.

Artificial respiration must be continued until breathing is established, or until a doctor arrives. When natural breathing commences, regulate the artificial respiration to correspond with it. Success may result even after two hours' time.

Excite respiration.—Whilst artificial respiration is being applied, other useful steps may be employed, such as applying smelling salts or snuff to the nostrils, and flicking the chest with a *damp* towel.

Induce circulation and warmth after natural breathing has been restored. Wrap the patient in dry blankets or other covering, and rub the limbs energetically towards the heart. Promote warmth by hot flannels, hot-water bottles, or hot bricks (wrapped in flannel) applied to the feet, to the limbs and body. When the power of swallowing has returned give hot tea or coffee, or meat extract. The patient should be kept in bed and encouraged to go to sleep. Large poultices or fomentations applied to the

front and back of the chest will serve to assist breathing.

Watch the patient carefully for some time to see that the breathing does not fail ; should any signs of failure appear, at once begin artificial respiration.

INSENSIBILITY.

Unconsciousness or Insensibility may arise as follows :—

Injury to the Head.—Concussion and Compression of the brain.

Disease of the Brain.—Apoplexy, Epilepsy, Hysteria.

Various Causes.—Shock, Fainting (Syncope), Collapse, Alcoholic and other poisoning, Sunstroke and Heat-stroke, Infantile Convulsions, Asphyxia.

GENERAL RULES FOR TREATMENT OF INSENSIBILITY.

1.—If a person appears about to lose consciousness, prevent him from falling, and lay him gently down.

2.—**Arrest Hæmorrhage** when apparent ; attending to minor injuries is less important than treating the unconscious state.

3.—**Lay the patient in the position in which breathing is most easy**—usually this will be on the back, or inclined to one side. As a general rule

raise the head and shoulders *slightly* when the face is flushed, and keep the head low when the face is pale.

4.—Undo all tight clothing round the neck, chest and waist, unfastening the braces and top button of the trousers in men, and the corsets in women, the object being to relieve pressure on the air passages, lungs, heart and abdominal organs. Be sure that there is no obstruction to the air passages by the tongue or by a foreign body in the throat. The possibility of false teeth obstructing breathing must be considered.

5.—Provide for a sufficiency of fresh air by opening doors and windows, and by keeping back a crowd.

6.—When breathing cannot be discerned apply artificial respiration.

7.—Obtain a doctor's help as soon as possible.

8.—Unless unavoidable, never leave the patient until you have placed him in charge of a responsible person.

9.—Give no food or fluids whatever by the mouth while the patient is insensible.

10.—Should the spine or an important bone of the upper or of the lower limb be fractured, it must be steadied and maintained at rest as soon as possible. Should the unconsciousness be prolonged, the patient may be removed in a recumbent position.

to shelter, provided that the broken bone is adequately supported.

11.—When the patient is in a state of convulsion, support his head, and after wrapping a piece of wood or any other hard material in a handkerchief, hold it in his mouth to prevent biting of the tongue. Do not forcibly restrain his limbs ; prevent him from hurting himself by pulling him away from a source of danger, such as machinery, a wall, or fireplace ; light pieces of furniture should be pushed out of the way.

12.—On return to consciousness water may be given to drink. If the pulse is feeble give warm tea or coffee, provided hæmorrhage, either internal or external, is not present. A desire to sleep should be encouraged, except in cases of opium poisoning, a condition that may generally be recognised by the history of the case, and also by the pupils of the eyes (the black openings in the grey, blue or brown iris) being minutely contracted (pin-head pupils).

13.—It must not be assumed that a person is insensible as the result of drink merely because the breath smells of alcohol ; frequently when people are feeling ill they take or are given alcoholic stimulants, after which they may become insensible, not from the drink, but from the cause that induced them to take it, for example, insensibility coming on, effects of poisoning, etc. Even if

drink is believed to be the actual cause of insensibility, it must be borne in mind that the patient is in a very dangerous state, and he must be treated for Collapse by being covered up and kept warm.

The above general rules will enable first aid to be rendered efficiently in most cases of insensibility, although the exact form from which the patient is suffering is unknown.

CONCUSSION OF THE BRAIN.

The patient may be stunned by a blow or fall on the head, or by a fall on the feet or lower part of the spine. He may quickly regain consciousness, or insensibility, more or less complete, may be prolonged.

TREATMENT.

1.—Apply the general rules for the treatment of Insensibility.

2.—Be very apprehensive of danger in all cases of injury to the head. The patient may be stunned, and after a short interval may recover some degree of consciousness, or even the brain may apparently have escaped injury; yet in both instances there is a grave risk that a structure within the cranium has been injured, and that a serious state of insensibility may develop later. (See Fracture of the Cranium, page 43). A caution should therefore be given to a patient who has lost consciousness even

for only a moment after an injury to the head not to resume physical or mental activity without the consent of a doctor.

COMPRESSION OF THE BRAIN, APOPLEXY.

Compression of the Brain may result from the same causes as produce Concussion; in fact, Compression is frequently preceded by Concussion.

Apoplexy usually occurs in elderly people, and no signs of injury are necessarily present.

In both conditions the face is flushed; the breathing stertorous; one side of the body may be more limp than the other, and the pupil of one eye may be larger than that of the other; the temperature of the body is generally raised.

TREATMENT.

1.—Apply the general rules for treatment of Insensibility.

2.—Promote warmth in the lower part of the body by the application of hot water bottles to the abdomen and lower limbs. Care must be taken not to burn the patient with the bottles, which should be wrapped in flannel, and their heat tested with the elbow.

EPILEPSY.

Epilepsy may occur in persons of any age, but usually occurs in young adults. The patient falls to

the ground, sometimes with a scream, and passes into a state of convulsion, throwing his limbs about.

The treatment is according to the General Rules, especially Rule 11.

HYSTERICAL FITS (HYSTERIA).

SIGNS AND SYMPTOMS.

The patient, usually a young girl, in consequence of mental excitement, suddenly loses command of her feelings and actions. She subsides on a couch or in some comfortable position, throws herself about, grinding her teeth, clenching her fists, shaking her hair loose; she clutches at anyone or anything near her, kicks, cries and laughs alternately. The eyeballs may be turned upwards, and the eyelids opened and shut rapidly. At times froth appears at the lips, and other irregular symptoms may develop.

TREATMENT.

1.—Avoid sympathy with the patient, and speak firmly to her.

2.—Threaten her with a cold water douche, and if she persists in her "fit," sprinkle her with cold water.

3.—Apply a mustard leaf at the back of the neck.

Medical treatment is necessary to cure the condition of mind and body which gives rise to hysterical attacks.

SHOCK, FAINTING (SYNCOPE), COLLAPSE.

CAUSES.

1.—Injury in the region of the abdomen, extensive wounds and burns, fractures, lacerated wounds, and severe crush are some of the more frequent physical causes of shock.

2.—Fright, anticipation of injury, and sudden bad news, or sometimes sudden removal of fear and anxiety after prolonged suspense, produce shock or fainting.

3.—Some poisons cause shock, while others, such as alcohol, so depress the nervous system that collapse ensues.

4.—Hæmorrhage or heart weakness, a close or crowded room, tight clothing, fatigue, or want of food may bring on fainting or collapse.

SIGNS AND SYMPTOMS.

The general condition of shock may be recognised by extreme pallor, a feeling of cold, clammy skin, feeble pulse, and shallow breathing accompanied, if hæmorrhage has been severe, by yawning and sighing. The term "collapse" signifies a very serious condition in which the life of the patient is in the greatest danger; the temperature of the body falls below the normal, and one great object of treatment is to prevent it sinking to a point at which life is impossible. An attendant danger of the condition of

collapse is the liability to sudden relapse after a temporary improvement, and the utmost care and watchfulness must therefore be exercised to maintain the heat of the body and to guard against failure of the heart and lungs.

TREATMENT.

1.—Remove the cause by arresting hæmorrhage, attending to injuries, loosening all tight clothing especially about the chest and abdomen, removing from a close or crowded room, using encouraging words, etc.

2.—Lay the patient on the back, with the head low. Raise the lower limbs; when the patient is in bed this is best done by raising the foot of the bedstead.

3.—Provide for a free circulation of fresh air.

4.—If hæmorrhage has been severe and the patient is collapsed, firmly bandage the limbs from the toes to the hips, and from the fingers to the armpits.

5.—To stimulate the action of the heart, sal volatile and water may be given if the patient can swallow, or smelling salts may be held to the nostrils.

6.—It is of the utmost importance to use every means of preventing a fall of temperature below the normal point. To accomplish this cover the patient with extra clothing, or by placing

rugs or blankets over him; get him to bed in a warm but well ventilated room as soon as possible. Apply warmth to the feet and to the pit of the stomach by hot water bottles or hot flannels. (Test the heat of these with the elbow before applying them.) If the patient can swallow, give hot drinks, such as milk, tea or coffee. It is well to add sugar, as it aids in raising the temperature of the body.

7.—If breathing cannot be discerned, apply artificial respiration.

8.—If want of nourishment has been the cause of fainting or collapse, give food sparingly at first.

SUNSTROKE AND HEAT-STROKE.

When exposed to great heat, as in the stoke-hole of a steamer, especially in the tropics, or to the rays of the sun during a march in very hot weather when heavily burdened, persons may develop sickness, faintness, giddiness, and difficulty in breathing. The patient complains of thirst, the skin becomes dry and burning, the face very flushed, the pulse quick and bounding. A very high temperature, stertorous (snoring) breathing, and insensibility may ensue.

TREATMENT.

- 1.—Undo all tight clothing.
- 2.—Remove the patient to a cool, shady spot.

- 3.—Strip the patient to the waist.
- 4.—Lay the patient down, with the head and trunk well raised.
- 5.—Procure as free a circulation as possible of fresh air, and fan the patient vigorously.
- 6.—Apply ice bags or cold water freely to the head, neck, and spine, and maintain this treatment until the symptoms subside.
- 7.—On return to consciousness, the patient may have water to drink.

CONVULSIONS IN CHILDREN.

Teething or stomach troubles are the commonest causes of this ailment.

SIGNS.

Spasm of the muscles of the limbs and trunk, blueness of the face, insensibility, more or less complete, and occasionally squinting, suspended respiration, and froth at the mouth are the prominent signs.

TREATMENT.

- 1.—Support the child in a warm bath slightly above the temperature of the body (98 degrees), so that the water reaches to the middle of the trunk.
- 2.—Place a sponge dipped in cold water on the top of the head.

ASPHYXIA.

When, owing to want of air, the blood is not supplied with oxygen the patient becomes insensible, and is said to be asphyxiated. This condition may be brought about as follows :—

I. Obstruction of the air passages.

(a) BY DROWNING.

(b) BY PRESSURE FROM OUTSIDE : Strangulation, hanging, smothering.

(c) BY A FOREIGN BODY IN THE THROAT: Choking.

(d) BY SWELLING OF THE TISSUES OF THE THROAT : Inflammation, scald of the throat, poisoning by a corrosive.

II. Inhaling poisonous gases. By coal gas (as used in the house), producer, or water, gas, smoke, fumes from a charcoal or coke fire, sewer gas, lime-kiln gas, carbonic acid gas.

III. Pressure on the chest, as when crushed by sand or debris, or by a crowd.

IV. Nervous affections, as the result of narcotic and certain other poisons, collapse, electric shock, or stroke by lightning.

GENERAL TREATMENT.

In all cases of Asphyxia attempts must be made to **remove the cause**, or to remove the patient from the cause. When this has been done **artificial**

respiration must be applied, taking care that the air passages are not obstructed, and that there is abundance of fresh air.

DROWNING.

Persons completely immersed in water for even ten or fifteen minutes have been restored by artificial means. Therefore, if the body is recovered within a reasonable time, absence of signs of life is not to deter immediate attempts to restore animation.

The first thing to do when the body is recovered is to get rid of the water and froth obstructing the air passages, and then artificially to restore breathing. This is best accomplished either by proceeding at once to perform artificial respiration by Schäfer's method, or as follows :—

1.—As quickly as possible loosen the clothing, and clear the mouth and the back of the throat.

2.—Turn the patient face downwards, with a pad below the chest, and with the forehead upon the right forearm.

3.—Whilst in this position apply pressure by the hands to the patient's back over the lower ribs, and keep the pressure up for three seconds.

4.—Turn the patient on the right side, maintaining that position also for three seconds.

5.—Repeat these movements alternately as long as froth and water issue from the mouth.

These operations (Marshall Hall's method) in themselves tend to promote respiration, but when the air passages are clear of froth and water Silvester's method of artificial respiration may be used by itself or with Howard's method in conjunction.

While performing these operations send someone to the nearest house to procure blankets and dry clothing, hot water bottles, etc., and to fetch a doctor.

STRANGULATION.

Cut and remove the band constricting the throat. Apply artificial respiration.

HANGING.

Do not wait for a policeman : grasp the lower limbs and raise the body to take the tension off the rope ; cut the rope, free the neck. Apply artificial respiration.

SMOTHERING.

Remove whatever is smothering the patient. Apply artificial respiration.

CHOKING.

Open the mouth, forcibly if need be ; pass the forefinger right to the back of the throat and attempt to dislodge the foreign body ; if vomiting results, so much the better. If unsuccessful, thump the back hard whilst the head is bent forward. Apply artificial respiration.

SWELLING OF THE TISSUES OF THE THROAT.

Whether the swelling is caused by inflammation by swallowing very hot water, as not infrequently happens to children attempting to drink from the spout of a kettle, or by the effect of a corrosive poison, the *treatment* is as follows:—

1.—Apply a sponge, piece of flannel or other cloth, wrung out of very hot water, to the front of the neck, from the chin to the top of the breast-bone.

2.—Set the patient before the fire.

3.—Give ice to suck if it can be had ; if not, give cold water to drink.

4.—Give animal or vegetable oil, a dessertspoonful at a time, to soothe the scalded throat and ease the pain.

5.—If breathing has ceased apply artificial respiration.

SUFFOCATION BY SMOKE OR GASES.

1.—Remove the patient into the fresh air. Before entering a building full of smoke tie a handkerchief, wet if possible, round the head so as to cover the nose and mouth. It is well to move slowly, keeping low, or even crawling, whilst in a room full of smoke in search of a suffocated person. Every opportunity of letting in fresh air by opening doors or windows should be seized.

- 2.—Apply artificial respiration.
- 3.—In the case of producer or water gas, inhalation of oxygen will also be necessary.

ELECTRIC SHOCK.

Electric current is conveyed by a cable, wire, rail, or bar, called the "Positive," and returns to the source of supply by another cable, wire, rail, or bar, called the "Negative," or through the earth. In the case of an electric railway, the current is generally conveyed by an insulated rail called the third rail, and returns through the running rails or an insulated rail called the fourth rail, and in the case of an electric tramway it is frequently conveyed by an overhead conductor or trolley wire, and returned through the running rails.

Through contact with a "positive" the shock may be so severe as to cause insensibility, and the sufferer will be unable to extricate himself, and must be liberated with all possible speed. As it is generally impossible or inexpedient to switch off the current some other method must usually be adopted; but precautions must be taken or else the person rendering assistance will himself receive a shock.

To liberate the sufferer from contact—

1.—Insulate yourself from the earth by standing on an "insulator" or "non-conductor," that is, a body which resists the current. Amongst such bodies

are indiarubber, dry glass, dry bricks, dry silk, dry cloth, dry wood and dry hay or straw.

2.—Protect your hands from contact with the sufferer or the electric medium by covering them with an insulator. Although indiarubber is probably the best insulator, do not waste time in running for indiarubber gloves, but use dry articles of clothing; an indiarubber tobacco pouch or cap, or folded newspaper, would serve to protect the hands in an emergency. If no means of insulating the hands are at hand an attempt may be made to drag the sufferer away by means of a loop of dry rope or a crooked stick; an umbrella is not safe because the metal ribs would act as conductors* of electricity, and it is not infrequently the case that the "stick" of the umbrella is a metal tube.

3.—Pull the sufferer away from contact. Care should be taken to avoid touching with naked hands the sufferer's hands, wet clothing, or boots if the soles are nailed. The armpits should be avoided as perspiration usually makes the clothing damp there.

When the sufferer is removed from contact—

1.—Apply the general treatment for insen-

* A conductor is a body through which electricity readily passes. Amongst such bodies are copper, brass, iron, moisture and one's own body.

sibility (loosen clothing, procure free circulation of air and place in a recumbent position).

2.—Dip a towel in cold water and attempt to arouse him by sharply flicking the face and chest.

3.—Commence artificial respiration if other methods fail to restore animation. "Laborde's" method (see page 126) has been found to be very successful.

4.—Treat burns if there are any (see pages 103, 104).

EFFECTS OF LIGHTNING.

A person struck by lightning is usually more or less deprived of consciousness. The treatment is the same as that for electric shock, except, of course, that the instructions for removing the patient from contact with the electric medium do not apply.

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*The numerals indicate the pages where the answers
may be found.*

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CHAPTER VI.

POISONING.

Poisons may be classified according to their treatment under two heads :—

1.—Those which do not stain the mouth, and in the treatment of which an emetic is to be given. Amongst these are :—

- (a) Arsenic, Phosphorus (contained in rat poison and lucifer matches), Tartar emetic and Corrosive Sublimate, which cause a metallic taste in the mouth and a burning pain in the mouth, throat and stomach.
- (b) Strychnine, Prussic Acid, Belladonna (deadly nightshade plant) and several other varieties of plants, such as laburnum seeds, etc.; these give rise to convulsions, delirium, failure of respiration and collapse.
- (c) Poisonous meat, fish and fungi (often mistaken for mushrooms). Suspicion of these poisons should be directed to cases where several persons who have partaken of the same food develop similar signs and symptoms.
- (d) Alcohol, which may cause collapse.
- (e) Opium and its preparations, Morphia,

Laudanum, Paregoric, Chlorodyne, Syrup of Poppies and various soothing drinks and cordials; these cause a tendency to go to sleep, which continues until sleep becomes deep and breathing stertorous; the pupils of the eyes become minutely contracted (pin-head pupils).

2.—Those which burn or stain the mouth, and in the treatment of which no emetic is to be given. These are of two classes:—

(a) Acids, such as Nitric Acid (Aqua fortis), Sulphuric Acid (Oil of Vitriol), Hydrochloric, or Muriatic, Acid (Spirits of Salt), strong Carbolic Acid (Phenol), Oxalic Acid, which is contained in oxalate of potash, salts of sorrel, salts of lemon and some polishing pastes.

(b) Alkalies, such as Caustic Potash, Caustic Soda and Ammonia.

SUMMARY OF SIMPLE DIRECTIONS FOR THE TREATMENT OF POISONING.

1.—Send for a doctor at once, stating what has occurred and if possible the name of the poison.

2.—Except when the lips and mouth are stained or burned by an acid or alkali,

promptly give an emetic—that is, make the patient vomit as follows:—

- (a) *Tickle the back of the throat* with the finger or with a feather.
- (b) *Mustard*—a *dessert-spoonful* in a tumblerful of luke-warm water.
- (c) *Salt*—a *table-spoonful* in a tumblerful of luke-warm water.
- (d) *Ipecacuanha Wine*—for a young child, a *tea-spoonful* repeated at intervals of fifteen minutes.

3.—In all cases when the patient is not insensible, give Milk, Raw Eggs beaten up with milk or water, Cream and Flour beaten up together, Animal or Vegetable Oil (except in phosphorus poisoning), and Tea.

Olive, Salad, and Cod-liver oil, or oil such as that in which sardines are preserved, may be given; mineral machine oils and paraffin are unsuitable. Oil is soothing, and is therefore especially useful in poisoning by Acids, Alkalies and such substances as Arsenic and Corrosive Sublimate. (Demulcent drinks, such as barley water or thin gruel, act in the same manner, and are free from danger in cases of phosphorus poisoning.)

These may be given either before or after the emetic if the poison calls for one.

Strong Tea acts as a neutraliser of many poisons

and is always safe. A handful of tea should be thrown into a kettle and boiled.

4 —If the lips and mouth are stained or burned give no emetic, but—

(a) If an acid is known to be the poison give an Alkali at once. First wash the mouth out freely with lime water or other alkaline mixture, such as soda, chalk, whiting, or magnesia or wall plaster in water, and afterwards let the patient sip a little of it. Soda and potash are not to be given in the case of poisoning by oxalic acid.

(b) If a strong Alkali is known to be the poison give an acid at once. First wash the mouth out freely with lemon juice or vinegar diluted with an equal quantity of water, and afterwards let the patient sip a little of it.

In both cases give oil (Rule 3).

5.—When a person has swallowed poison and threatens to go to sleep, keep him awake by walking him about and slapping his face, neck and chest with a wet towel. Strong black coffee may be given to drink. Slapping the soles of the feet may also be tried.

6.—If the throat is so swollen as to threaten obstruction to the air passage, apply hot flannels or poultices to the front of the neck and give frequent sips of cold drinks.

7. - Apply artificial respiration if breathing cannot be discerned.

8. - Treat shock and collapse.

9. - Preserve any vomited matter, food, or other substance, suspected of being the poison. Do not wash vessels which may have contained the poison, and carefully guard them.

Certain poisons require special treatment, and a few of the commoner of these are mentioned below with their treatment.

CARBOLIC ACID.

The odour of the breath will aid in the detection of this poison; the lips and mouth are usually stained white, and several nervous symptoms come on.

TREATMENT.

1. - Give milk, to a pint of which half an ounce of Epsom Salts has been added.

2. - Treat according to the general rules.

PRUSSIC ACID.

The action of this poison is extremely rapid. Giddiness, staggering, insensibility accompanied by panting respiration, profound collapse and possibly convulsions are the general signs, and in addition a smell of bitter almonds is often present.

TREATMENT.

1. - Place the patient in the open air.

2.—Dash cold water on the head and spine continuously.

3.—Apply artificial respiration.

4.—Hold smelling salts to the nostrils.

5.—Treat shock and collapse. (See page 135)

POISONOUS MEAT, FISH AND FUNGI.

The signs and symptoms are vomiting and purging (diarrhœa), colic, headache, great weakness, raised temperature and a quick pulse.

TREATMENT.

1.—Give an emetic.

2.—When the emetic has acted, give castor oil.

3.—Treat collapse. (See page 135.)

STRYCHNINE.

The signs and symptoms are a feeling of suffocation, livid features, and convulsions. The patient rests on his head and feet, and the body is arched.

TREATMENT.

1.—Give an emetic.

2.—Apply artificial respiration.

ALCOHOL.

1.—Give an emetic if the patient can swallow.

2.—Treat collapse by keeping the patient warm, etc. (See page 135)

QUESTIONS ON CHAPTER VI.

*The numerals indicate the pages where the answers
may be found.*

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CHAPTER VII.

BANDAGING.

Esmarch's Triangular Bandage has been described in Chapter II. It may be applied to keep a dressing on a wound, burn or scald of any part of the body, or for an injury of a joint.

For the Scalp (Fig. 62). Fold a hem about $1\frac{1}{2}$

inches deep along the base of a bandage; place the bandage on the head so that the hem lies on the forehead **close down to the eyebrows**, and the point hangs down at the back; carry the two ends round the head **above** the ears and tie them on the forehead; draw the point first downwards, and then turn it up and pin it on to the bandage on the top of the head.



FIG. 62.

For the Forehead, Side of the Head, Eye, Cheek, and for any part of the body that is round (as the arm or thigh, etc.), the narrow bandage should be used, its centre being placed over the

dressing, and the ends being carried round the head or limb, as the case may be, and tied over the wound.

For the Shoulder (Fig. 63). Place the centre of a bandage on the shoulder, with the point running



FIG. 63.



FIG. 64.

up the side of the neck ; fold a hem along the base ; carry the ends round the middle of the arm and tie them. Place one end of a broad bandage over the point of the first bandage and sling the arm by carrying the other end over the sound shoulder and tying the ends at the side of the neck ; turn down the point of the first bandage, draw it tight and pin it.

For the Hip (Fig. 64). Tie a narrow bandage round the body above the haunch bones, with the knot on the injured side. Fold a hem according to the size of the patient along the base of a second bandage; place its centre over the dressing, carry the ends round the thigh and tie them; then carry the point up under the



FIG. 65.



FIG. 66.

first bandage, turn it down over the knot and pin it.

For the Hand when the fingers are extended (Fig. 65). Fold a hem along the base of a bandage; place the wrist on the hem with the fingers towards the point; then bring the point over the wrist, pass the ends round the wrist, cross and tie them; bring the point over the knot and pin it to the bandage on the hand.

For the Foot (Fig. 66). Place the foot on the centre of the bandage with the toes towards the point; draw up the point over the instep, pass the ends round the ankle and cross them in front; now pass the ends round the instep and tie them. Draw the

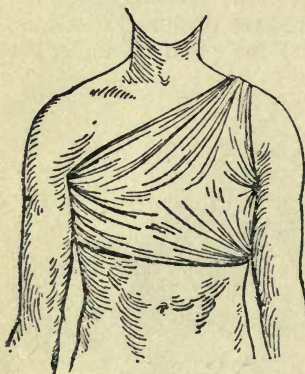


FIG. 67a.

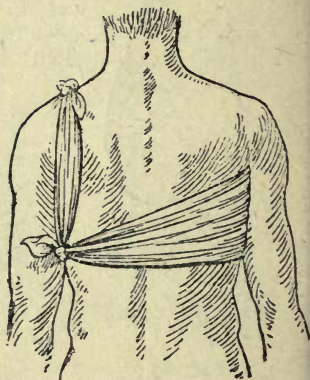


FIG. 67b.

point forward and pin it to the bandage on the instep.

For the Front of the Chest (Figs. 67a and 67b). Place the middle of the bandage over the dressing with the point over the shoulder on the same side; carry the ends round the waist and tie them;

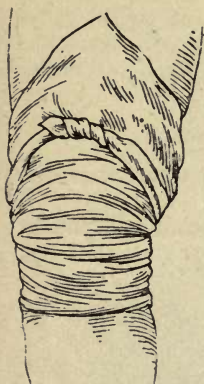


FIG. 68.

then draw the point over the shoulder and tie it to one of the ends.

For the Back. The bandage is applied as the foregoing, except that it is begun at the back.

For the Knee. Fold a narrow hem along the base of a bandage; lay the point on the thigh and the middle of the base just below the knee-cap; cross the ends first behind the knee, then over the thigh and tie them. Bring the point down and pin it to the base (Fig. 68).

For the Elbow. Fold a narrow hem along the base of a bandage; lay the point on the back of the arm and the middle of the base on the back of the forearm; cross the ends first in front of the elbow, then over the arm and tie them in front (Fig. 69).

For the Fingers and Toes wrap a strip of calico or linen round and round the part; split the free end, and secure it round the wrist or ankle.

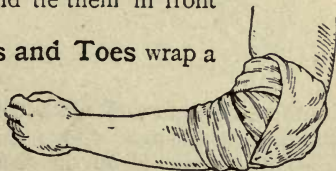


FIG. 69.

CHAPTER VIII.

METHODS OF CARRYING.

THE FOUR-HANDED SEAT.

This seat is used when the patient can assist the bearers and use his arms.

1.—Two bearers face each other behind the patient and grasp their left forearm with their right hands and

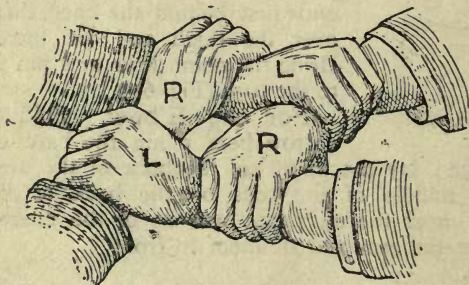


FIG. 70.

each other's right forearm with their left hands (Fig. 70), and stoop down.

2.—The patient sits on the hands and places one arm round the neck of each bearer.

3.—The bearers rise together and step off, the bearer on the right hand side of the patient with the right foot, and the left hand bearer with the left foot.

THE TWO-HANDED SEAT.

This seat may be used to carry a helpless patient.

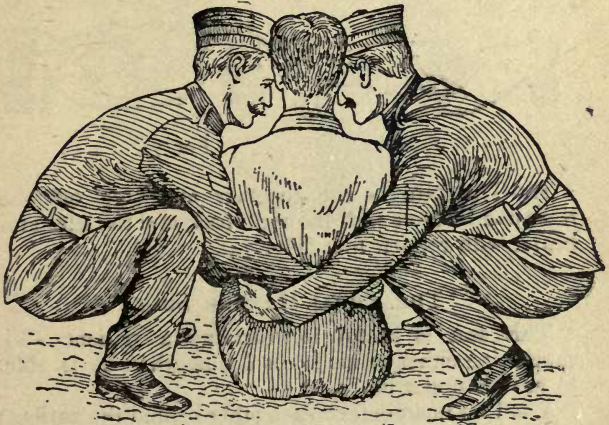


FIG. 71.

1.—Two bearers face each other and stoop, one on each side of the patient. Each bearer passes his forearm nearest to the patient's head under his back just

below the shoulders, and, if possible, takes hold of his clothing. They slightly raise the patient's back, and then pass their other forearms under the middle of his thighs (Fig. 71), and clasp their hands by one of the methods shown in Figs. 72 and 73. A handkerchief should be held in the hands if the first grip is used.



FIG. 72.



FIG. 73.

2.—The bearers rise together and step off, the right-hand bearer with the right foot, and the left-hand bearer with the left foot (Fig. 74).

THE THREE-HANDED SEAT.

This seat is useful for carrying a patient and supporting either of his lower limbs, when he is able to use his upper limbs.

1.—Two bearers face each other behind the patient. For supporting the left limb the bearer to the patient's right grasps his own left wrist with his right hand, and the other bearer's right wrist with his left hand. The bearer to the left grasps the first bearer's right wrist with his right hand (Fig. 75). This leaves his

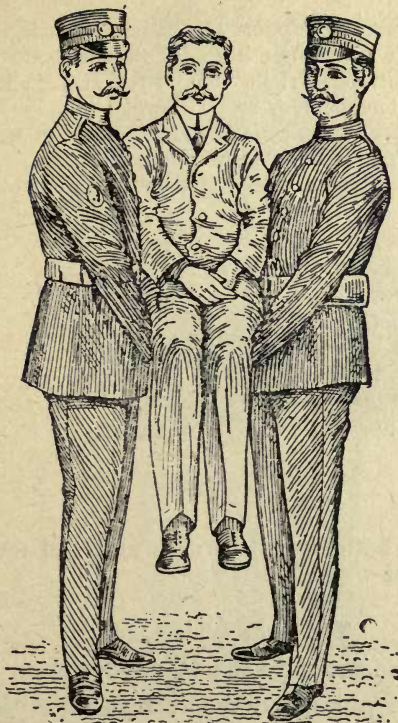


FIG. 74.

left hand free to support the patient's left leg. For the patient's right lower limb follow the same directions, substituting "right" for "left" and "left" for "right." The bearers stoop down.

2.—The patient places one arm round the neck of each bearer and sits on their hands.

3.—The bearers rise together and step off, the



FIG. 75.

right-hand bearer with the right foot, and the left-hand bearer with the left foot.

THE FIREMAN'S LIFT.

(To be attempted only by a strong man).

Turn the patient face downwards; place yourself at his head, stoop down, slightly raise his head and

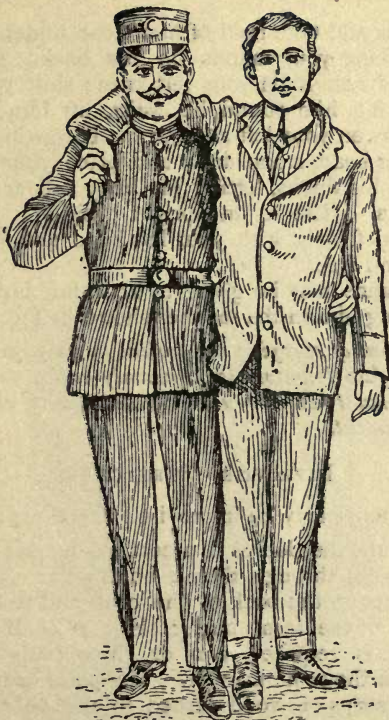


FIG. 76.

shoulders and take hold of him close under his arm-pits, locking your hands on his back. Raise his body and rest it on your left knee; shift your arms and, taking him round his waist, lift him until his head rests on your left shoulder. Throw his left arm over your head, stoop down and place your left arm between his thighs, letting his body fall across your shoulders. Rise to an upright position; hold the patient's left wrist with your left hand and leave your right hand free.

Assistance may be given to an injured person by supporting him in the manner shown in Fig. 76.

The plan of carrying the patient by the arms and legs with the face downwards, commonly called the "frog's march," must never be used, as death may ensue from this treatment.

IMPROVISED STRETCHERS.

A stretcher may be improvised as follows:—

1.—Turn the sleeves of a coat inside out; pass two strong poles through them; button the coat. The patient sits on the back of the coat and rests against the back of the front bearer (Fig. 78). If a longer stretcher is required two or three coats must be treated in the same manner. The poles may be kept apart by strips of wood lashed to the poles at both ends of the bed formed by the coats (Fig. 79).



FIG. 77.

THE FORE AND AFT METHOD.

This plan of carrying is useful when space does not permit of a hand seat.

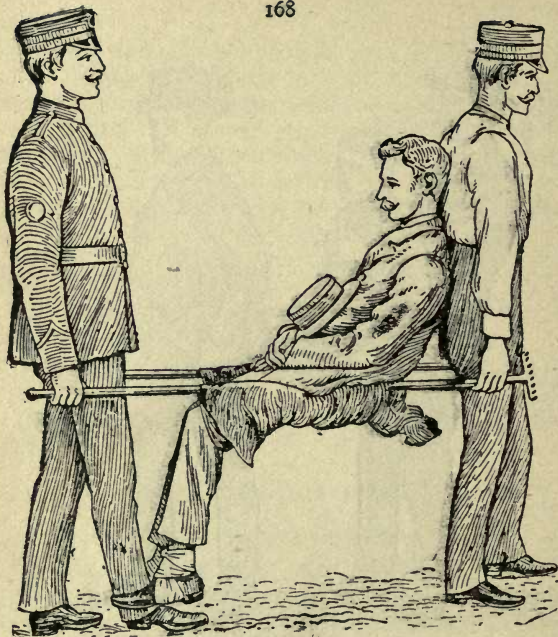


FIG. 78.



FIG. 79.

2.—Make holes in the bottom corners of one or two sacks and pass stout poles through them.

3.—Spread out a large piece of carpet, sacking, tarpaulin, or a strong blanket, and roll two stout poles up in the sides. Two bearers stand on each side and grasp the middle of the pole with one hand, and near the end with the other. They walk sideways.

4.—A hurdle, broad piece of wood, or shutter may be used as a stretcher; some straw, hay, or clothing should be placed on it, and covered with a piece of stout cloth or sacking; the latter is useful in taking the patient off the stretcher.

Always test an improvised stretcher before use.

Stretchers must be carried, and the patient placed on them, as laid down in the "Stretcher Exercises."

As a general rule carry the patient feet foremost.

The exceptions are:—

(a) When going up hill with a patient whose lower limbs are not injured.

(b) When going down hill with a patient whose lower limbs are injured.

Avoid lifting the stretcher over ditches or walls, but where these cannot be avoided the stretcher must be carried in the following ways:—

TO CROSS A DITCH.

In crossing a ditch, the stretcher should be lowered with its foot one pace from the edge of the ditch

Nos. 1 and 2* bearers then descend. The stretcher, with the patient upon it, is afterwards advanced, Nos. 1 and 2 in the ditch supporting the front end while its other end rests on the edge of the ground above. No. 3 now descends. All the Nos. now carry the stretcher to the opposite side, and the foot of the stretcher is made to rest on the edge of the ground, while the head is supported by No. 3 in the ditch. No. 1 climbs out, No. 2 remaining in the ditch to assist No. 3. The stretcher is lifted forward on the ground above, and rests there while Nos. 2 and 3 climb up.

TO CROSS A WALL.

The stretcher is lowered with the foot about one pace from the wall. Nos. 1 and 2 bearers then take hold of the foot of the stretcher, and No. 3 of the head; the stretcher is raised till the foot is placed on the wall. No. 1 then climbs over the wall and takes hold of the foot of the stretcher, while Nos. 2 and 3 support the head; the stretcher is then carried forward till the head rests on the wall, No. 1 supporting the foot. Nos. 2 and 3 then climb over the wall and take hold of the head of the stretcher, which is then slowly lifted off the wall on to the ground, and the bearers take their usual places.

* These numbers are explained later in the detailed "Stretcher Exercises."

TO LOAD A WAGON.

The stretcher is lowered with the foot one pace from the end of the wagon. Nos. 1 and 2 take hold of the foot of the stretcher, No. 3 the head. The stretcher is then raised and carried forward till the front wheels rest on the floor of the wagon. No. 1 then jumps into the wagon, while No. 2 goes to the head of the stretcher and helps No. 3. The stretcher is then pushed slowly into the wagon. If the tail-board cannot be shut, the stretcher must be lashed firmly to the sides of the wagon.

TO UNLOAD A WAGON.

Nos. 2 and 3 take hold of the head of the stretcher, while No. 1 gets into the wagon; the stretcher is then gradually drawn out till the foot-wheels rest on the edge of the wagon. No. 1 jumps out of the wagon, and with No. 2 takes hold of the foot of the stretcher, No. 3 supporting the head. The stretcher is now gently drawn away one pace and lowered.

With four bearers Nos. 1 and 2 would lift the foot of the stretcher, while Nos. 3 and 4 lift the head. This applies to crossing a ditch or wall, as well as to loading and unloading a wagon.

CHAPTER IX.

STRETCHER TRANSPORT.

The "Furley" Stretchers (Model 1899) are of three patterns, viz., "Ordinary," "Telescopic-handled," and "Police." In general principle they are alike, the component parts being designated the poles,



FIG. 80.—ORDINARY STRETCHER—CLOSED.

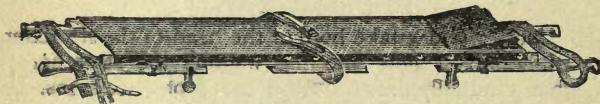


FIG. 81.—TELESCOPIC-HANDLED STRETCHER—OPEN.

handles, jointed traverse bars, foot wheels, bed, pillow sack and slings.

The Ordinary Stretcher (Fig. 80) is 7 feet 9 inches in length, and 1 foot 10 inches wide. The bed is 6 feet in length, and the handles 10½ inches. The height is 5¾ inches. At the head of the stretcher is a canvas overlay (the pillow sack) which can be filled with straw, hay, clothing, etc., to form a pillow. The jointed traverse bars are provided with joints,

for opening or closing the stretcher. The Telescopic-handled pattern (Fig. 81) is very similar, but the handles can be slid underneath the poles, thus reducing the length to 6 feet. This arrangement is of great value when working in confined spaces, or when a patient has to be taken up or down a narrow staircase with sharp turns. The Police stretcher is similar to the Ordinary pattern, but is more strongly made, and has, in addition, straps for securing a refractory patient.

When closed, the poles of the stretcher lie close together, the traverse bars being bent inwards, the canvas bed neatly folded on the top of the poles and held in position by the slings which are laid along the canvas, and secured by a strap, placed transversely at the end of each sling, being passed through the large loop of the other, and round the poles and bed.

In closing a stretcher care should be taken to raise the centre of the canvas when pushing in the traverse bar, as it is otherwise liable to get caught.

To prepare, or open a stretcher, unbuckle the transverse straps of each sling; remove the slings from the stretcher; separate the poles; take hold of each traverse bar and draw it forward. The slings will then be folded to half their length, one being laid neatly over the handles at each end of the stretcher.

As a general rule, the stretcher will be prepared by Nos. 1 and 3 bearers in Exercises I, II., and III.;

and by No. 2 in Exercise IV. These bearers will, however, if required, assist the other bearers in attending to the patient's injuries.

Note.—The various movements detailed in the following Exercises should be carried out steadily, the bearers working in unison, hurrying being carefully avoided and every attention being paid to the bearer who gives the words of command.

STRETCHER EXERCISES,

Originally drawn up by Sir John Furley, and revised in 1904 to accord with the drills adopted by the Royal Army Medical Corps:—

EXERCISE No. I.

FOR FOUR BEARERS.

1.—The Instructor selects the bearers and numbers them 1, 2, 3, 4 at his discretion. Should one man be taller and stronger than the others, he should be styled No. 3, as he will have to bear the heavier part of the burden.* All orders will be given by No. 4.

2.—“**Fall in.**”—Nos. 1, 2, and 3 take position on the left side of and facing the patient. No. 1 places himself at the patient's knees, No. 2 at the hips, No. 3 at the patient's shoulders. At the same

* Bearers should, however, be taught to take any of the positions named in the following exercises, whether that of No. 1, 2, 3, or 4 bearer.

time No. 4 places the prepared stretcher on the ground by the right side of the patient about two

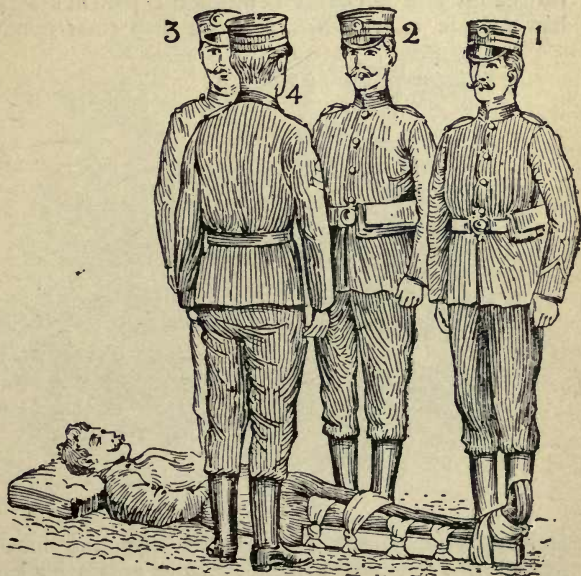


FIG. 82.

paces away from him, and then takes position opposite to and facing No. 2. (Fig. 82).

3. - "Ready."—The bearers kneel down on the left knee and take hold of the patient; No. 1 passing his hands and fore-arms beneath the patient's legs, hands wide apart. Nos. 2 and 4 pass their hands



FIG. 83.

and forearms beneath the patient's hips and loins, and grasp each other's hands. No. 3 passes his left hand across the patient's chest and under the right shoulder, and his right hand beneath the left shoulder (Fig. 83)

4.—“Lift.”—On the word “Lift,” the bearers raise the patient gently and rest him on the knees of Nos. 1, 2, and 3 bearers (Fig. 84) ; as soon as he

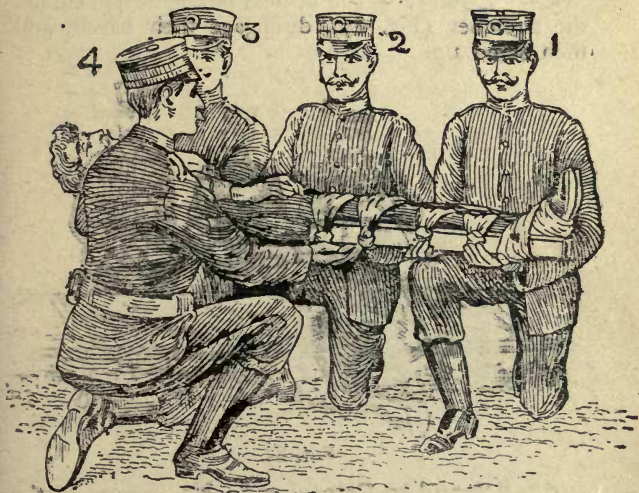


FIG. 84.

is securely rested, No. 4 disengages hands with No. 2, runs round by the head of the stretcher and places it under the patient, close to the other bearers' feet,

being careful that the pillow is immediately under the patient's head (Fig. 85); he then kneels down and locks his hands with those of No. 2 (Fig. 86).

5.—“**Lower.**”—The bearers place the patient on the stretcher (Fig. 87), disengage their hands, and then stand up.

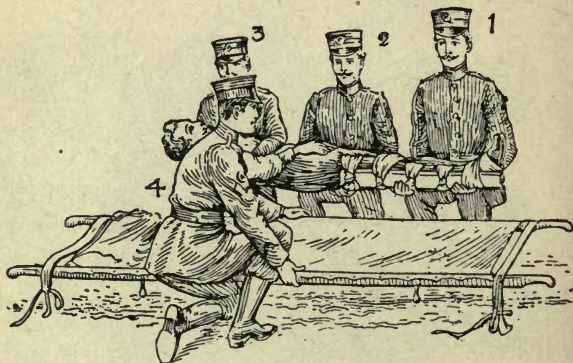


FIG. 85.

6.—“**Stand to Stretcher.**”—No. 1 goes to the foot of the stretcher, with his back to the patient; No. 3 to the head with his face to the patient; Nos. 2 and 4 remain on each side of the stretcher.

7.—“**Ready.**”—Nos. 1 and 3 place the slings (if used) over their shoulders, stoop down, and slip the

loops of the slings on to the handles of the stretcher, which they then grasp.

As soon as all is right the word is given :—

8.—“**Lift Stretcher.**”—Nos. 1 and 3 bearers raise the stretcher steadily together and stand up.

Note.—Nos. 2 and 4 will now adjust the slings on the shoulders of Nos. 1 and 3, taking care that each is well below the level of the collar and lies accurately in the hollow of the shoulder in front. They will also lengthen or shorten the slings, having regard to the patient's injuries and the relative heights of the bearers.

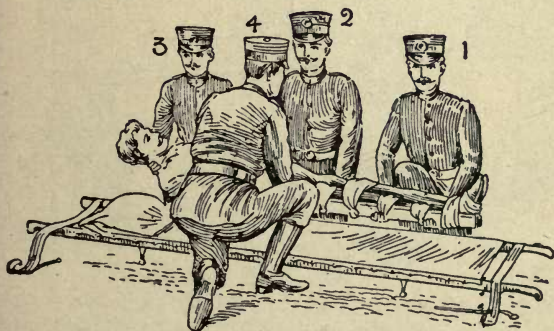


FIG. 86.

9.—“**March.**”—The bearers move off :—Nos. 1, 2, and 4 stepping off with their left foot, and No. 3

12.—“Unload Stretcher — Ready.”—The bearers prepare to take the patient off the stretcher, as at Orders 2 and 3.

13.—“Lift.”—The bearers raise the patient as at Order 4 (Fig. 86); No. 4, in this case, disengages hands from No. 2, removes the stretcher (Fig. 85), and resumes his former position. If necessary, the bearers will then steadily rise together, and carefully carry the patient to the bed, or other place to which it has been arranged to convey him.

14.—“Lower.”—The patient is carefully lowered.

EXERCISE No. II.

FOR THREE BEARERS.

1.—Number the bearers 1, 2, 3.

All orders will be given by No. 2, who will look after the injured part of the patient's body or limbs, to see that no bandages or splints become displaced, and also that No. 1 bearer, in lifting or carrying the stretcher, does not touch the patient's feet.

2.—“Place the Stretcher.”—No. 3 places the stretcher in a line with the patient's body, the foot of the stretcher being close to his head.

3.—“Fall In.”—No. 1 places himself on the left side of the patient in a line with his knees, No. 2 on the left side just below the patient's shoulders, and No. 3 at the right side, and faces No. 2.

4.—“**Ready.**”—All kneel on the left knee. No. 1 places his hands, well apart, underneath the lower limbs, always taking care, in case of a fracture, to have one hand on each side of the seat of injury. Nos. 2 and 3 grasp each other's hands under the shoulders and thighs of the patient (Fig. 88).

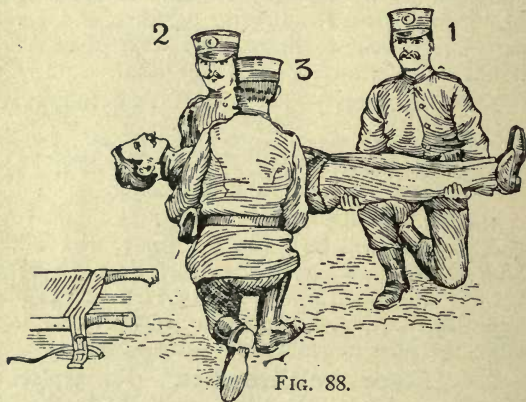


FIG. 88.

5.—“**Lift.**”—The bearers rise together, keeping the patient in a horizontal position (Fig. 89).

6.—“**March.**”—All take short side-paces, carrying the patient over the stretcher until his head is immediately above the pillow.

7.—“**Halt.**—The bearers remain steady.

8.—“**Lower.**”—The bearers stoop down, gently place the patient on the stretcher, disengage their hands, and then stand up.

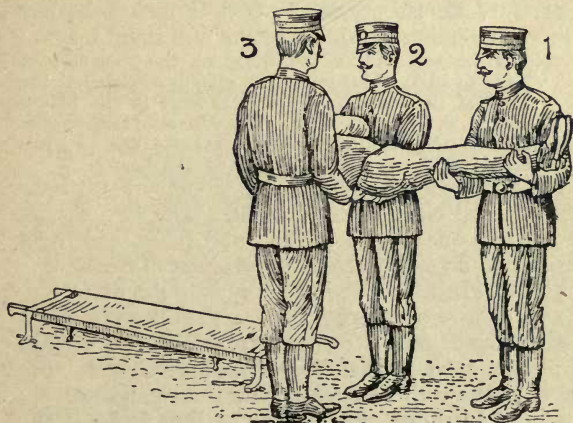


FIG. 89.

9.—“**Fall In.**”—No. 1 places himself at the foot of the stretcher with his back to the patient, No. 2 places himself at the left side of the patient, and No. 3 at the head, with his face towards the patient.

10.—“Ready.”—Nos. 1 and 3 place the slings (if used) over their shoulders, stoop down, and slip the loops of the slings on to the handles of the stretcher, which they then grasp.

As soon as all is right the word is given—

11.—“Lift Stretcher.”—Nos. 1 and 3 bearers raise the stretcher steadily together and stand up.

No. 2 will now adjust the slings on the shoulders of Nos. 1 and 3, taking care that each is well below the level of the collar, and lies accurately in the hollow of the shoulder in front. He will also lengthen or shorten the slings, having regard to the patient's injuries and the relative heights of the bearers.

12.—“March.”—Nos. 1 and 2 step off with the left foot, and No. 3 with the right. The step should be a short one of 20 inches, and taken with bent knees, and no spring from the fore part of the foot.

13.—“Halt.”—The bearers remain steady.

14.—“Lower Stretcher.”—The bearers place the stretcher gently on the ground, slip the loops of the slings off the handles of the stretcher, remove the slings from the shoulders, and then stand up.

15.—“Unload Stretcher — Ready.”—The bearers prepare to take the patient off the stretcher, as at Orders 3 and 4 (Fig. 88).

16.—“Lift.”—The bearers raise the patient, as at Order 5, and carry him by short side steps, clear of the stretcher, to the bed, or other place to which it has been arranged to convey him (Fig. 89).

17.—“**Lower.**”—The patient is carefully lowered.

EXERCISE No. III.

WHEN ONLY THREE BEARERS ARE AVAILABLE AND
THE STRETCHER CANNOT BE PLACED AS IN

EXERCISE II.

1.—The Instructor numbers the bearers—1, 2, 3.
All orders will be given by No. 2.

2.—“**Place the Stretcher.**”—No. 1 taking the foot of the stretcher, and No. 3 the head, place it on the ground by the side of the patient, and as close to him as practicable.

3.—“**Fall In.**”—The three bearers take the same positions on one side of the patient, as laid down in Exercise No. 1.

4.—“**Ready.**”—Nos. 1, 2, and 3 kneel down on the left knee, placing themselves as close to the patient as they conveniently can, and then take hold of him as directed in Exercise No. 1.

5.—“**Lift.**”—Nos. 1, 2, and 3 raise the patient as directed in Exercise No. 1, and then move in a kneeling position up to the stretcher.

6.—“**Lower.**”—The bearers bend forward, carefully lower the patient on to the stretcher, and disengage hands.

7.—“Stand to Stretcher.”—All the bearers stand up; No. 1 goes to the foot, No. 2 remains in position at the side, and No. 3 goes to the head of the stretcher.

8.—“Ready.”—Nos. 1 and 3 place the slings (if used) over their shoulders, stoop down, and slip the loops of the slings on to the handles of the stretcher, which they then grasp.

9.—“Lift Stretcher.”—Nos. 1 and 3 bearers raise the stretcher steadily together and stand up.

No. 2 will now adjust the slings on the shoulders of Nos. 1 and 3, taking care that each is well below the level of the collar, and lies accurately in the hollow of the shoulder in front. He will also lengthen or shorten the slings, having regard to the patient's injuries and the relative heights of the bearers.

10.—“March.”—Nos. 1 and 2 step off with the left foot, and No. 3 with the right. The step should be a short one of 20 inches, and taken with bent knees, and no spring from the fore part of the foot.

11.—“Halt.”—The bearers remain steady.

12.—“Lower Stretcher.”—The bearers place the stretcher gently on the ground, slip the loops of the slings off the handles of the stretcher, remove the slings from the shoulders, and then stand up.

13.—“Unload Stretcher—Ready.”—No. 1 places himself on the left side of the patient, and in a line with his knees, No. 2 on the left side just below the patient's shoulders, and No. 3 at the right

side, and faces No. 2. All kneel on the left knee. No. 1 places his hands, well apart, underneath the lower limbs, always taking care, in case of a fracture, to have one hand on each side of the seat of injury. Nos. 2 and 3 grasp each other's hands under the shoulders and thighs of the patient.

14.—“Lift.”—The bearers rise together to their feet, keeping the patient in a horizontal position, and carry him by short side steps, clear of the stretcher, to the bed, or other place to which it has been arranged to convey him.

15.—“Lower.”—The patient is carefully lowered.

EXERCISE No. IV.

FOR USE IN MINES AND NARROW CUTTINGS WHERE
TWO MEN ONLY CAN BE ENGAGED.

Nos. 1 and 2 will carefully place the stretcher in a line with the injured man's body, the foot of the stretcher being, if possible,* close to his head.

No. 1 straddles across the patient's legs, placing his right foot, with the toe turned outwards, a little below the patient's knees, and with the toe of the left foot close to the heel of No. 2; he then stoops down, passes the left hand under the patient's thighs and

* It is not advisable to be too particular as to the head or foot of a stretcher in a mine, as it would probably be quite impossible to reverse it.

the right hand across and under the patient's calves. No. 2 places his feet one on each side of the patient between his body and arms, the toe of each foot as near the armpits as possible. He then stoops down and passes his hands between the sides of the chest and the arms underneath the shoulders, and locks

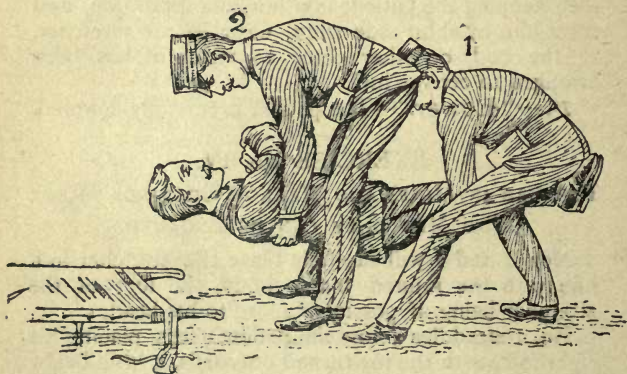


FIG. 90.

the fingers (Fig. 90). If the patient's arms are uninjured he may put them round the neck of No. 2, and by this means greatly assist him in lifting.

When both are ready, No. 1 will give the order "**Lift and move forward.**" The patient is then to be slowly lifted, just sufficient to allow his body to clear the stretcher. Both bearers will slowly and gradually move the patient forward, No. 2 by very short steps, No. 1 by bending his body forward as much as he can *without moving his feet* (Fig. 91). No. 1 now gives the order "**Halt,**" whereupon No. 2 remains steady, and No. 1 advances his right foot to his left, and

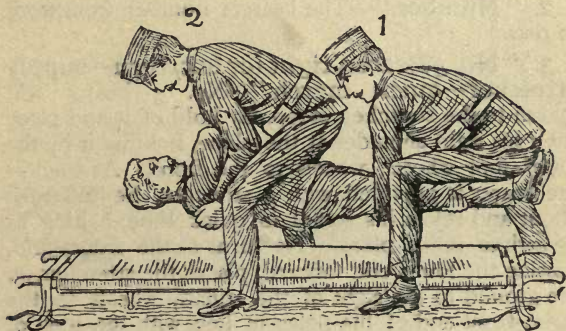


FIG. 91.

again advances his left foot till the toe touches the heel of No. 2. No. 1 then gives the order "**Advance,**" when the patient will again be moved forward. These movements are to be repeated until

the patient is over the stretcher, when he is to be gently lowered.

The following Stretcher Exercise is adapted by permission from the Royal Army Medical Corps Manual, 1908.

All orders will be given by No. 4.

1. **"Fall in."**—Six bearers fall in behind each other.

2. **"Number."**—The bearers number from front to rear.

3. **"No. 3 Bearer, right (or left) turn—supply stretcher—quick march."**—No. 3 bearer will march to the stretcher, stoop, lay hold of it and place it on his right shoulder at the slope, holding it by the lower foot wheels, wheels to the front. As soon as the bearer is provided with a stretcher, he will turn about and rejoin his squad in quick time, halting as he arrives in his place. He turns to the front, and, passing the lower end forward, places the stretcher on the ground to the right of the squad, wheels to the right, front end of the poles in line with the toes of No. 1 and rises.

4. **"Stand to Stretcher."**—No. 1 places himself with his toes in line with the front ends of the poles. No. 3 with his heels in line with the rear ends of the poles, close to and touching the stretcher with

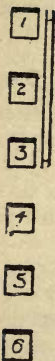


Fig. 92.

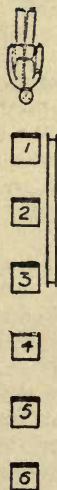


FIG. 93.

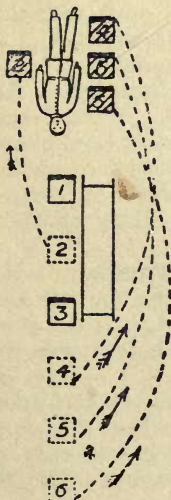


FIG. 94.



FIG. 95

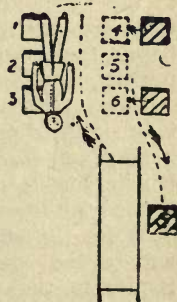


FIG. 96.

his right foot. Nos. 2, 4, 5 and 6 take up their positions one pace behind and covering off the bearer in front of them (Fig. 92).

5. "**Lift Stretcher.**"—Nos. 1 and 3 stoop, grasp both handles of the poles with the right hand, rise together, holding the stretcher at the full extent of the arm, wheel to the right.

6. "**Collect Wounded — Advance.**" — The squad doubles by the shortest route to the patient, and halts without further word of command one pace from the head of and in a line with the patient (Fig. 93).

7. "**Lower Stretcher.**"—Nos. 1 and 3 stoop, place the stretcher quietly on the ground, and rise smartly together.

8. "**Prepare Stretcher.**"—Nos. 1 and 3 turn to the right, kneel on the left knee, unbuckle the transverse straps, and place the slings on the ground beside them, separate the poles, and straighten the traverses.

Two. On the word two each takes a sling, doubles it on itself, slips the loop thus formed on the near handle, and places the free ends over the opposite handle, buckle uppermost. They then rise and turn to their left together.

While the stretcher is being prepared by Nos. 1 and 3, the disengaged bearers will advance and render to the patient such assistance as may be required (Fig. 94).

The necessary assistance having been rendered, No. 4 will give the command—

9. "**Load Stretcher.**"—The bearers place themselves as follows:—Nos. 1, 2 and 3 on the left, Nos. 4, 5 and 6 on the right of the patient; Nos. 1 and 4 at the knees, 2 and 5 at the hips, 3 and 6 at the shoulders, the whole kneeling on the left knee. Nos. 1 and 4 pass their hands beneath the patient's knees, 2 and 5 beneath the hips, 3 and 6 beneath the shoulders, care being taken of the injured part, one of the bearers being detailed for this purpose (Fig. 95).

10. "**Lift.**"—The whole will carefully lift the patient on to the knees of Nos. 1, 2 and 3.

Two. Nos. 4, 5 and 6 will then disengage, rise; Nos. 4 and 6 step back one pace. No. 5 turns to his left, doubles to the stretcher, takes hold of and raises it, left hand across, the near pole resting on the left hip; carrying the stretcher, he returns to his place between 4 and 6, and places it beneath the patient.

Three. Nos. 4 and 6 step forward one pace, and together with No. 5 kneel down on the left knee, and prepare to assist in lowering the patient (Fig. 96).

11. "**Lower**"—The patient is lowered slowly and gently on to the centre of the canvas (special care being taken of the injured part).

Two. The bearers disengage, rise; Nos. 1, 2, 3 and 6 turn to the left; Nos. 4 and 5 to the right;

No. 4 places himself three paces in front of the stretcher. No. 6, having collected the kit and arms of the patient, places himself three paces in rear of the stretcher, Nos. 2 and 5 opposite the centre of the stretcher. The whole are now ready to lift stretcher and move off (Fig. 97).

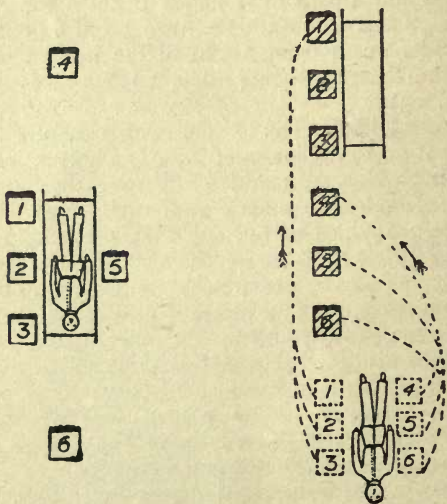


FIG. 97.

FIG. 98.

12. "Lift Stretcher."—Nos. 1 and 3 stoop, grasp the doubled sling midway between the poles with the forefinger and thumb of the right hand, sweep it off the handles, rise, holding the sling at the full extent of the arm, buckle to the front, take a side pace to the front between the handles, and place the sling over the shoulders dividing it equally, buckle to the right. The slings should be placed so that they lie well below the collar of the coat behind and in the hollow of the shoulders in front. In the event of the slings requiring to be adjusted, either as regards length or for the greater comfort of the bearers, No. 4 will detail a bearer to carry this out, the length of the slings being adjusted, when necessary, by means of the buckles.

Two. Nos. 1 and 3 stoop, slip the loops over the handles, commencing with the left, and grasp the handles firmly.

Three. Nos. 1 and 3 rise slowly together, No. 3 conforming closely to the movements of No. 1.

13. "Advance."—Nos. 1, 2, 4, 5 and 6 step off with the left foot, No. 3 with the right, stepping short, knees bent, feet raised as little as possible.

14. "Halt."—The whole halt.

15. "Unload Stretcher."—The bearers place themselves in the same position at the stretcher as described for Loading (Order 9).

16. "Lift."—As described for Loading (Order 10),

except that the stretcher is carried forward three paces clear of the patient's feet.

17. "Lower."—The patient is gently lowered to the ground. The bearers disengage, rise; Nos. 1, 2 and 3 turn to the left, 4, 5 and 6 to the right, and the whole step off to their places at the stretcher, as at Order "Stand to Stretcher" (Fig. 98).

The Ashford Litter is made up of either of the Furley stretchers mentioned on pages 172 and 173, a wheeled under-carriage and a waterproof hood and apron, or, if preferred, a light wet-resisting canvas cover. The stretcher is kept in position on the under-carriage by the foot-wheels, which fit into slots in the sides of the under-carriage, and it can be removed at pleasure. The under-carriage is fitted with a cranked axle, which allows the bearers to pass with the stretcher between the wheels instead of lifting it over them. At both ends are two legs which may be turned up as handles when wheeling the litter. The hood and apron fit into sockets screwed to the stretcher. In wheeling the litter, care should be taken to keep the patient in a horizontal position. Should it be necessary, two bearers can easily lift the litter and patient.

The Rea-Edwards Litter, introduced in 1904 is used in a similar manner, and one model of it is fitted with pneumatic tyres, which add immensely to the comfort of the patient and to the ease of propulsion.

CHAPTER X.

(Being the Fifth Lecture for Females only, in accordance with Syllabus 58.)

BY E. MACDOWELL COSGRAVE, M.D., F.R.C.P.I.

PREPARATION FOR RECEPTION OF ACCIDENT CASES.

WHEN news of an accident comes, preparations should at once be made so as to have everything ready before the injured person is brought in. Of course the preparations needful will vary according to the nature and extent of the injury, but the following are the chief things which may have to be done.

CHOICE AND PREPARATION OF ROOM.

A room must be chosen. In a bad case this should be one easily reached, as it is difficult to carry an injured person through narrow passages and up-stairs. Unless there is some such reason against it, the injured person's own room is best.

The way to the room must be cleared, projecting furniture and loose mats in the hall or in lobbies should be removed. If the injured person is carried on a door, shutter, or stretcher, two strong chairs should be placed ready to support it wherever the bearers would be likely to require rest.

Useless furniture should be removed from the bedroom. The bed should be drawn out from the wall

so that both sides can be approached, and the clothes turned back to one side to their full length. A hot bottle should be got ready. If there is much collapse several hot bottles and hot blankets may be required ; cover the hot bottles with flannel.

If the injury is very severe, if mud-stained clothes have to be removed, or if extensive dressings have to be applied, it may be necessary to have another bed, a couch or a table placed near the bed to lay the sufferer on in the first instance. This should be so arranged that soiling may do no harm ; old sheets, waterproof materials, thin oilcloths, or even newspaper, may be used as a protection.

LIFTING AND CARRYING.

If present at the place where the accident occurred, it will be necessary to see that the patient is carefully lifted after proper "First Aid" has been rendered.

The following rules should be remembered :—Select the proper number of persons to assist, and do not let them lift the patient until they thoroughly understand how they are to do it.

For ordinary cases, where the injured person has to be lifted a very short distance, three helpers are sufficient. Two (who should be as far as possible of equal height) are to bear the weight, the third is to support and take charge of the injured part. This is

best done by a person who has been through a "First Aid" course. If the injured person is insensible, another helper should support his head.

The lifters, one at each side, should kneel on one knee, and pass their hands under the patient's back at the lower part of the shoulder blades, and under the hips, clasping each his right hand in the other's left. The injured patient should, if practicable, place his arms round the necks of the bearers.

The third helper should attend to the seat of injury; if this is a fractured limb, he should support it by placing the palms of his hands under the limb, one above and one below the seat of the injury, grasping it firmly but avoiding unnecessary pressure.

The helpers should remain thus until the order "Lift" is given, and then they should all lift slowly and steadily, avoiding jars, attempts to change position of hands, etc.

If the injured person is to be placed on a stretcher or shutter, this should be previously placed with the bottom end at his head; the bearers should then move, one at each side of it, until the patient is over it. The word "Lower" should then be given, and the injured person should then be slowly lowered. A pillow or folded-up coat should be ready, and as the sufferer is lowered this should be placed under his head.*

* Full directions are given in Chapter IX.

MEANS OF CARRYING.

Besides a stretcher, and substitutes such as a gate, a shutter, or a door; other means of carrying can be improvised.

In slight injuries, where the injured person is unable to walk, two bearers can carry him by forming a four-handed, three-handed, or two-handed seat.

A four-handed seat is formed as described on page 160.

A three-handed seat is made as described on page 162.

The two-handed seat is made as described on page 161.

A single helper can lift by supporting with one arm the two knees; and with the other the back. The arms must be passed well under before commencing to lift.

A single helper can give support by putting his arm round the waist, grasping the hip and placing the injured person's arm round his own neck, holding the hand with his own hand (Fig. 76, page 165).

A capital stretcher can be improvised out of a strong sheet and two broom handles or other short poles. Each side of the sheet is wound up on a broom handle until there is just room for a person to lie between. This requires four bearers, two at each side, to prevent the sheet slipping.

CARRYING UP STAIRS.

In carrying a stretcher upstairs the head should go first, and an extra helper should assist at the lower end, so as to raise it and keep the stretcher nearly horizontal.

The two, three, or four-handed seat may be used for carrying up stairs; or a strong chair, the patient being carried up backwards. In the latter case one helper should walk after the chair and help to support it, and to prevent the injured person slipping out.

LIFTING INTO BED.

If the bed is narrow and there is room the stretcher should be placed on the floor with the head close to the foot of the bed. The injured person should then be lifted over the foot and placed on the bed. If the bed is too wide to admit of this, the stretcher should be placed beside it, and two helpers should stand at the far side of the stretcher. One helper passes one arm beneath the shoulders and one beneath the middle of the back, the other helper placing his under the lower part of the back and under the knees. The injured person is then lifted, another helper pulls away the stretcher, and after a single step forward the burden is placed on the bed.

PREPARATION OF BED.

A firm mattress, not a feather bed, should be selected. If there is much injury, or if dressings have to be applied, a draw-sheet ought to be placed on the bed. It should be of four or more thicknesses, extend across the bed, and reach from the middle of the patient's back to the knees. A piece of waterproof sheeting or of thin oil-cloth should be placed under the draw-sheet. As the draw-sheet becomes soiled, the soiled portion should be rolled and a clean part drawn smoothly under the patient.

In fracture of the leg or thigh, sprained ankle and some other cases, a "cradle" (Fig. 99) should be improvised. The use of a "cradle" is to support the bed-clothes and keep them from pressing on the limb. A band-box (Fig. 100), three-legged stool (Fig. 101), or hoop sawn across and the two halves secured together (Fig. 102), may be used. A corkscrew passed through the bed-clothes, with its point guarded by a cork, and tied by string to the bed or a nail in the wall, will relieve the pressure of the bed-clothes effectually.

REMOVING THE CLOTHES.

In taking clothes off an injured person a few rules should be borne in mind.

In serious cases it is much better to sacrifice the clothes than to run any risk of increasing the injury.

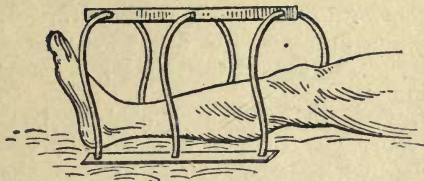


FIG. 99.



FIG. 100.



FIG. 101.

In removing a coat, etc., in a case of fractured arm the uninjured arm should be drawn out first.

In putting on a coat or shirt the injured arm should be put in first.

In burns and scalds nothing should ever be dragged off. A *sharp* pair of scissors should be used, and everything not adhering should be cut away. If anything adheres it should be left until medical aid

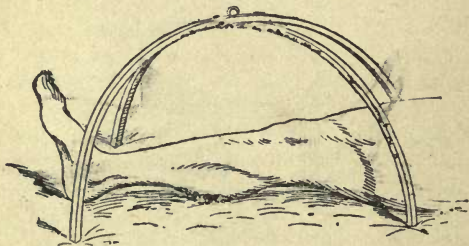


FIG. 102.

can be obtained. The clothing adhering may, with advantage, be soaked with oil. To remove the trousers from a severely injured limb, the *outside* seam should be ripped up.

PREPARATIONS FOR SURGEON.

As soon as the injured person has been attended to, preparation should be made for the surgeon's visit.

The preparations needful will depend upon the nature of the case. The following hints may be of use:—

A fire in the room helps ventilation, even in summer. There should be plenty of water, hot, cold, and also boiling, also several basins, plenty of clean towels and soap. There should be something to empty water into; a foot-bath does well. The basins should be placed on a table, covered with a clean white cloth; a large towel makes a suitable cloth; the towels, folded up, should be placed on the same table, and the hot and cold water should be within easy reach. The foot-bath should be under the table or close at hand.

In the case of a burn, absorbent cotton wool, soft cloths, old linen, oil, and baking soda, should be ready, and materials should be torn up for bandages.

In the case of hæmorrhage, plenty of water should be boiled and allowed to cool, and pads of absorbent cotton wool should be baked in a tin box in the oven, and at least two basins should be ready.

In the case of a person rescued from drowning the sheets should be taken off the bed, plenty of blankets should be heated before the fire, and several hot bottles should be ready.

If poultices are likely to be required, boiling water, linseed meal, mustard, a loaf of stale bread, a small basin, a large spoon, sweet oil, and tow, flannel or handkerchiefs may be required.

For fomentation, have boiling water, flannel, a kitchen roller, and two sticks, or a large towel.

When summoning a medical man to an accident always let him know by a written message what kind of case he is required to treat, so that he may bring whatever is needful. By this means valuable time may be saved.

QUESTIONS ON CHAPTER X.

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The St. John Ambulance Association.

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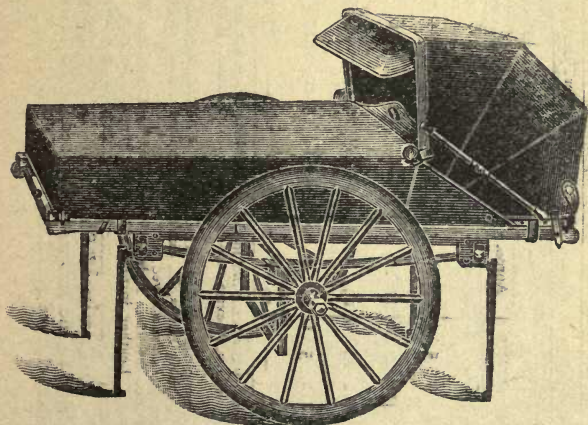
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Owing to fluctuations in market prices it is impossible to guarantee that the quotations herein can be adhered to.

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Orders and correspondence should be addressed to the St. John Ambulance Association, St. John's Gate, Clerkenwell, London, E.C.

Remittances should be made payable to the St. John Ambulance Association, and crossed "London County and Westminster Bank, Lothbury."

"ASHFORD" LITTER.

The "Ashford" Litter (1899 model) consists of a two-wheeled under-carriage fitted with elliptical springs, and either of the "Furley" stretchers, with a cover so arranged on a jointed frame that it can be folded up inside the stretcher, or with a hood and apron (as shown above). The under-carriage, having a cranked axle, the bearers can pass between the wheels with the stretcher, and thus avoid lifting it over them. When travelling, the legs of the under-carriage are raised, and thus form the handles by which to propel it. Should it be necessary to pass over rough ground, two bearers can easily lift the litter and patient. The "Clemetson" stretcher can be used instead of the "Furley" pattern.

PRICES OF THE IMPROVED ASHFORD LITTER, 1899 MODEL.

| | With Iron Tyres to Wheels. | | | With India Rubber Tyres to Wheels | | |
|--|----------------------------------|---------|----------------------|-----------------------------------|---------|--------------------------------------|
| | Without Cover or Hood and Apron. | | With Hood and Apron. | Without Cover or Hood and Apron. | | With Hood and Apron, as illustrated. |
| | £ s. d. | £ s. d. | | £ s. d. | £ s. d. | £ s. d. |
| Under-carriage (no Stretcher) ... | 8 | 10 0 | 9 5 0 | 11 0 0 | 11 15 0 | 14 5 0 |
| Litter complete with Ordinary Stretcher* | — | 11 2 6 | 12 17 6 | — | — | 14 7 6 |
| Ditto with Telescopic handled Stretcher† | — | 11 10 0 | 13 5 0 | — | — | 14 15 0 |
| Ditto with Police Stretcher‡ ... | — | 12 5 0 | 14 0 0 | — | — | 15 10 0 |
| Do. with "Clemetson" Stretcher ... | — | — | 14 8 0 | — | — | 17 13 0 |

* Prices quoted for Litter with Ordinary Stretcher include Wide Webbing Slings but no Chest Strap. Leather, instead of Webbing Slings, 8s. extra; Chest Strap, 1s. 6d. extra. If supplied without any Slings, 4s. allowed.

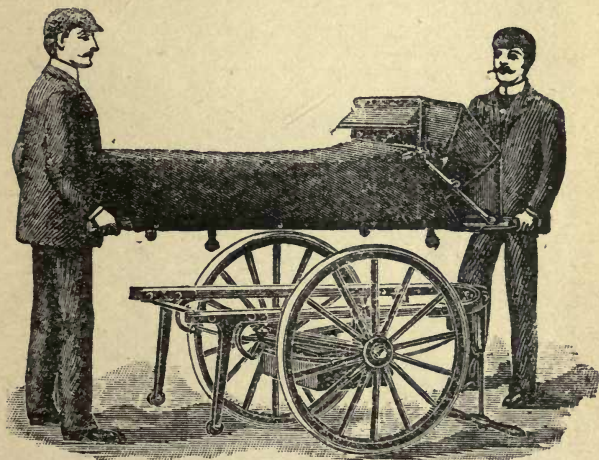
† Prices quoted for Litter with Telescopic-handled Stretcher include Wide Webbing Slings and Chest Strap. Leather, instead of Webbing Slings, 8s. extra. If supplied without any Slings, 4s. allowed; and if without Chest Strap, 1s. 6d. allowed.

‡ Prices quoted for Litter with Police Stretcher include Wide Webbing Slings and Leather Straps for securing a refractory patient. Leather, instead of Webbing Slings, 8s. extra.

Hood and Apron, complete ("Furley" pattern Stretcher) £2 10 0
Do. do. ("Clemetson" Stretcher) ... 2 15 0

Waterproof Sheet (washable) to be laid on the stretcher bed... 0 12 6
Crates (returnable) charged 4s. 6d. for each Litter.

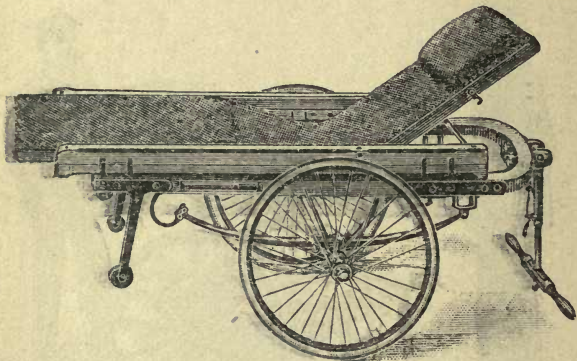
THE "REA-EDWARDS" LITTER.



THE "REA-EDWARDS" LITTER, with wooden wheels, showing method of loading ; also first aid box fitted to axle.

The under-carriage or wheeled portion of this Litter is of an entirely new design, and is adapted to carry either of the "Furley" or "Clemetson" Pattern Stretchers in precisely the same manner as the "Ashford" Litter. It is fitted either with bicycle wheels and extra strong pneumatic tyres, or with light but strong wooden wheels, either with solid india-rubber or iron tyres. Owing to the reduction in the height of the wheels it is easy to lift a loaded stretcher

over them, and the cranked axle has, therefore, been replaced by a straight one constructed of tubular steel.



"REA-EDWARDS" LITTER, fitted with pneumatic tyred wheels, showing the "Clemetson" Stretcher.

Ball bearings are fitted to the wheels, both cycle pattern and wooden, and the hubs are so arranged that the wheels can be removed from the axle without disturbing the bearings. In place of the four legs made to raise as handles, two fixed legs fitted with small india-rubber wheels or rollers are placed at the foot end, while a combined leg and handle fitted with a crossbar and capable of being raised or lowered is used at the head end. When raised as a handle it may be locked in one of two positions, and when lowered it is locked in a vertical position. The advantages claimed for this arrangement are simplicity, ease and rapidity of manipulation and

the facility afforded by the two fixed legs for raising the litter, if necessary, on to the pavement. The question of balance has been carefully studied, and the stretcher is shifted forward so that the middle of it is several inches in front of the axle, a perfect balance when the stretcher is loaded and in a horizontal position being thus obtained, and consequently there is no weight on the hands of the person propelling the litter.

The pneumatic tyred wheels are strongly recommended in cases where the small amount of care necessary to keep them inflated can be given, as the comfort to the patient and ease in propulsion are increased beyond all comparison with any litter yet produced. It will be noted that the prices are considerably lower than those of the "Ashford" Litter, and the following are given as examples, but owing to the vast number of combinations that can be made with the different stretchers and coverings, it is impossible within reasonable limits to set out quotations for the whole of them, but these may be calculated by adding together the prices of the under-carriage, stretcher selected, and hood and apron or cover, see pages 4 to 10.

SPECIMEN PRICES.

Under-carriage only, either with pneumatic tyred cycle wheels or solid rubber tyred wooden wheels, £10.

Litter complete with ordinary stretcher (no slings or chest strap) and hood and apron, as illustrated, £14 3s. 6d.

Ditto with Telescopic Handled Stretcher (with chest strap) and hood and apron, £14 11s.

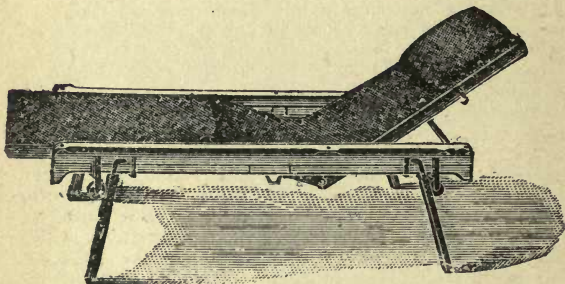
Ditto with "Clemetson" Stretcher and ventilated hood and apron, £15 18s.

If with iron tyred wheels prices are £2 less.

Hand brake, which acts automatically when the litter is at rest, extra £1 10s.

When ordering please state which wheels are required

THE "CLEMETSON" STRETCHER.



"CLEMETSON" STRETCHER, with back raised, also showing extending legs.

On this stretcher the patient can be moved as desired, from the recumbent to the sitting position. There is no complicated mechanism to get out of order, and the adjustment depends simply on the balance of the patient's body. The stretcher will fit either the "Ashford" or the "Rea-Edwards" Under-Carriage. Price £3 3s. ; with extending legs, £4 3s.

Hood and Apron, Ventilated, £2 15s.

ADJUSTABLE LEGS FOR STRETCHERS.

Primarily these legs, which are independent of and additional to the ordinary foot wheels, are intended to facilitate the carriage of a stretcher in a railway compartment, in which case two on one side would be lowered and adjusted by a telescopic arrangement to the proper height, so that the foot wheels on one side would rest on the seat, and the adjustable legs on the other side would rest on the floor. The four legs may be used to raise the stretcher as required. When not in use they are folded up immediately under the poles of the stretcher.

Price per set of four, £1.

FIRST AID BOX.

To be carried below the axle of the "Rea-Edwards" Litter, from which it is easily detachable.

Contents:—Set of Splints, 12 Triangular Bandages, 12 Roller Bandages, 2 $\frac{1}{4}$ lb. packets each Cotton Wool and Boric Lint, Adhesive Plaster, Pair of Scissors, Knife, 2 oz. each Olive Oil, Tinct. Iodine B.P.C., Sal Volatile, and Spirits Ether Comp., Graduated Measure Glass, Kidney-shaped Dressing Basin, 6 Tampons for washing wounds, Tourniquet Pins, Safety Pins, Needles, Thread and Tape.

Price £2.

"FURLEY" STRETCHERS WITH THE LATEST IMPROVEMENTS, 1899 MODELS.



TELESCOPIC HANDLED STRETCHER—OPEN.



ORDINARY STRETCHER—CLOSED.

The improvements in all patterns of the "Furley" Stretcher, 1899 Model, are numerous. The comfort to the patient is increased; the stretcher is stronger, more rigid, and lighter, it folds up more closely, and its handles are more comfortable to hold and afford greater protection to the hands of the bearers in passing through narrow doorways or passages. Should it be necessary to reduce the width of a loaded stretcher in order, for example, to carry it into a railway carriage, this can be done, either when it is resting on the ground or supported by the bearers, without trouble and without the slightest jar to the patient. The price of the stretchers is lowered. All minor points have been most carefully considered, and the stretchers are confidently recommended as thoroughly efficient in every way.

These stretchers are adapted for use alone or as part of the "Ashford" or "Rea-Edwards" Litter, and the cover, hood and apron, army rag, and waterproof sheet described in this list are suitable for use with them.

PRICES OF THE "FURLEY" STRETCHERS, WITH THE LATEST IMPROVEMENTS (1899 MODELS).

N.B.—The prices of the Standard Models are shown in heavy type.

| | Without Slings or Chest Strap. | With Wide Webbing Slings (no Chest Strap). | With Wide Webbing Slings and Chest Strap. | With Leather Slings and Webbing Chest Strap. |
|--|---|--|---|--|
| | £ s. d. | £ s. d. | £ s. d. | £ s. d. |
| Ordinary Stretcher, for General and Brigade use, taking the place of both the old ordinary and military patterns | 1 13 6 | 1 17 6 | 1 19 0 | 2 5 6 |
| Telescopic-handled Stretcher for working in confined spaces | 1 19 6 | 2 3 6 | 2 5 0 | 2 11 6 |
| Police Stretcher, very strong, with Ash Poles, and provided with Leather Straps to secure a refractory patient— Complete, with Wide Webbing Slings | ... | ... | ... | ... |
| Slings, "Wide Webbing" Do. Leather | ... | ... | ... | ... |
| Superior Hood and Apron (<i>see illustration, page 2</i>) | ... | ... | ... | ... |
| Awning Cover for Stretcher (when ordering please state pattern of Stretcher) | ... | ... | ... | ... |
| Sockets and Studs for fitting Hood and Apron or Awning Cover, per set | ... | ... | ... | ... |
| Spare Bed for Stretcher | ... | ... | ... | ... |
| Army Rug to cover Patient on Stretcher | ... | ... | ... | ... |
| Pillow for Stretcher, stuffed hair | ... | ... | ... | ... |
| Chest Strap, Wide Webbing | ... | ... | ... | ... |
| | £ s. d. | £ s. d. | £ s. d. | £ s. d. |
| | 3 0 0 | 3 8 0 | 0 4 0 | 0 12 0 |
| | 2 10 0 | 0 15 0 | 0 1 6 | 0 8 6 |
| | 0 12 0 | 0 7 6 | 0 1 6 | 0 1 6 |

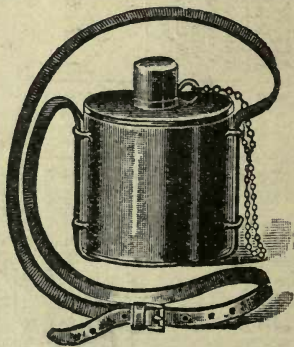
Carriage Paid on all Orders in the United Kingdom.

"LOWMOOR JACKET."

For use in mines, ships' holds, etc., to secure a patient on a stretcher (see illustration), which can then be placed in an upright position. Price £1 5s.

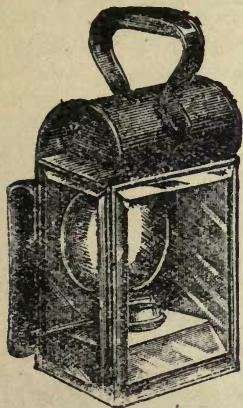


WATER BOTTLE.



Copper tinned, with carrying strap.

Price 12s. 6d.



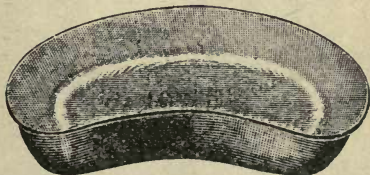
LAMP.

This is fitted with a socket, by which to fix it to a Litter, or it can be conveniently carried by hand, or attached to a belt or the clothing.

Price complete, 5s. 6d.

Dressing Basin
kidney shaped, made
of enamelled iron.

Price 2s. 3d.



Ambulance Station Plate, Enamelled Iron, 3s. 6d. each.

Stretcher Depot Plate, Enamelled Iron, 3s. 6d. each.

Carrying Sheet for carrying patients up and down stairs or otherwise about a house. Designed by the late J. C. Derham, Esq., Blackpool, and Mrs. Alfred Paine, Bedford. The sheet is fitted with rope handles and detachable bamboo poles, and may be placed on a stretcher without disturbing the patient. Price complete, 15s.

REGULATION POUCH FITTINGS

for the St. John Ambulance Brigade,

consisting of:—

- 1 Triangular Bandage, sealed up in waxed paper.
 - 2 Grey Calico Roller Bandages (2 in. and 1 in.).
 - 1 Packet of Surgeon's Lint.
 - 1 Packet of Absorbent Cotton Wool.
 - 1 Pair Scissors.
 - 6 Safety Pins.
 - 1 Box of 3 Phials "Vaporole" Iodine Tincture
 - 1 Piece of Strong Cane, for tightening improvised Tourniquets.
- List Price, 2s. 8d. each ; 6 doz. or more, 2s. 7d. each.
- Box of 3 Phials "Vaporole" Iodine Tincture, packed for post,
each rod. ; per doz., 8s. 6d.

SAFETY PINS.

All fasten or unfasten on either side.

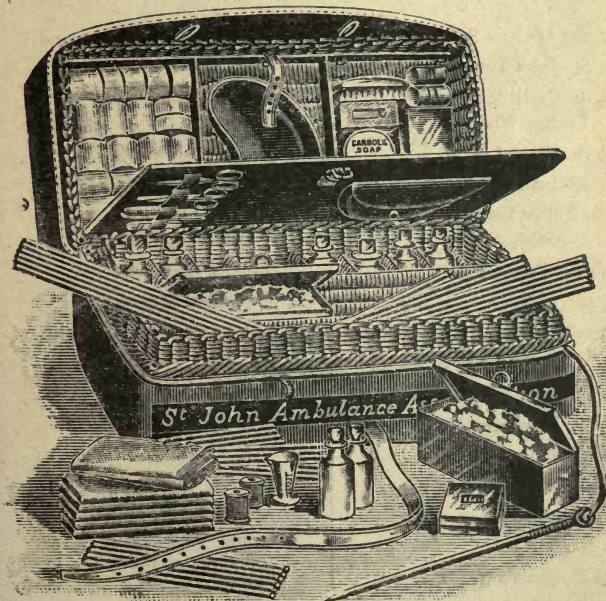
| | | | | s. | d. |
|------------------------------------|-----|-----|------------|----|----|
| Facile No. S 600 or S 602 | ... | ... | per 3 doz. | 0 | 6 |
| " " S 603 | ... | ... | " | 0 | 8 |
| Duchess Duplex, No. 2 | ... | ... | per doz. | 0 | 2 |
| " " Assorted | ... | ... | " | 0 | 3 |
| Special Blanket Safety Pins, 3 in. | ... | ... | " | 1 | 0 |
| " " " " 3½ in. | ... | ... | " | 1 | 6 |

Pocket Cork Line and Drag, with 80 feet of line, in case ; for recovering a drowning person from the water. Price complete, with instructions for use, 6s. 6d.

Pocket Reel and Ice Line for use in ice accidents, with 80 feet of line in case. Price complete, with instructions for use, 6s. 6d.

Carriage Paid on all Orders in the United Kingdom

**LARGE HAMPER FOR AMBULANCE
STATION AND RAILWAY PURPOSES.**



For contents see next page.

THE HAMPER CONTAINS

1 Set of Cane Splints.
 1 St. John Tourniquet.
 $\frac{1}{2}$ lb. Carbolic
 Cotton Wool ... } In Tin
 $\frac{1}{2}$ lb. Boric Lint ... } Cases.
 1 Roll Adhesive Plaster.
 20 Roller Bandages,
 assorted.
 1 doz. Triangular Bandages.
 3 pieces Tape.
 4 oz. Sal Volatile.
 4 oz. Bicarbonate of Soda.
 1 Dredger for Boric Acid.
 $\frac{1}{2}$ lb. Powdered Boric Acid.
 8 oz. Tincture Iodine.
 1 pair Pean's Forceps.
 1 pair Scissors.
 1 Knife.
 12 Surgeon's Needles.

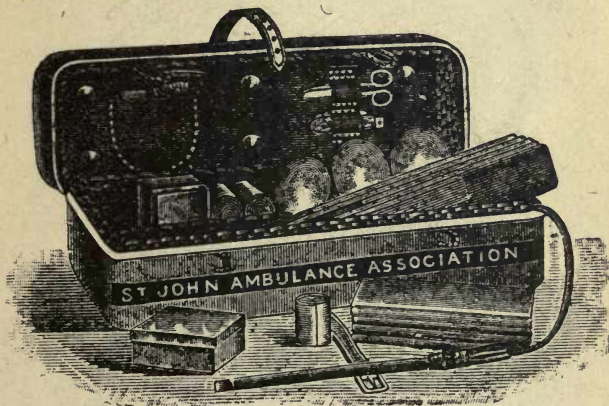
1 packet each Safety and
 Plain Pins.
 $\frac{1}{2}$ oz. Carbolised Chinese
 Twist.
 $\frac{1}{2}$ oz. Silkworm Gut.
 1 reel each Black and White
 Sewing Thread.
 1 Kidney-shaped Basin.
 1 Stopper Loosener.
 1 Graduated Measure.
 1 cake 20 per cent. Carbolic
 Soap.
 1 Nail Brush.
 2 Empty 8 oz. Bottles.
 2 " 4 oz. "
 3 Saucers for applying
 Tincture of Iodine.
 3 Camel Hair Brushes for
 applying Tincture of
 Iodine.

Price complete, £4

Carriage Paid on all Orders in the United Kingdom. 11

SMALL AMBULANCE HAMPER.

With waterproof cover and strap, for use in factories, collieries, stations, and large works, as well as for parochial and domestic use.



CONTAINING

Set Splints, 1 St. John Tourniquet. 3 Tampons, for washing wounds. 2 Packets Lint. 4 Roller Bandages (wide and narrow). 4 Triangular Bandages.

Cotton Wool ... } In Tin Cases.
Boric Wool ... }

Spool of Adhesive Plaster.

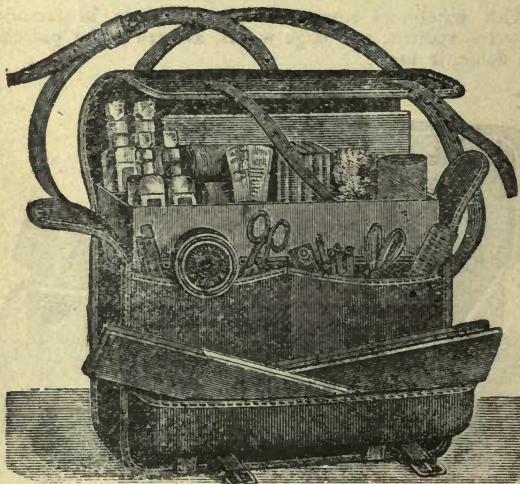
Knife, Scissors, Thread, Tape, Needles, and Pins.

Weight complete, 6½ lbs.

Length, 1 ft. 6 in. Depth, 5 in. Width, 7 in. Price £1 11s. 6d.

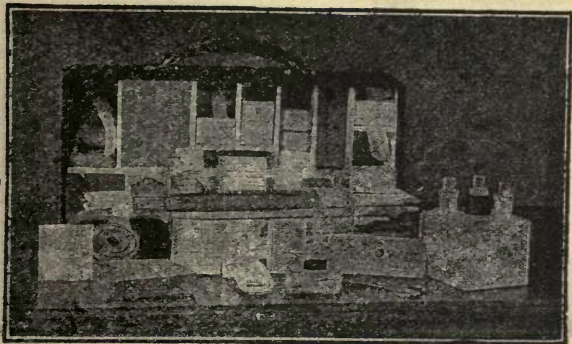
Carriage Paid on all Orders in the United Kingdom.

SURGICAL HAVERSAC.



IMPROVED PATTERN, fitted with a tin, so arranged that any article can be taken out without disturbing the rest of the contents.

Contents: 1 Set of Splints, 6 Triangular Bandages, 6 Roller Bandages (wide and narrow), Cotton Wool, Boric Lint, in tin cases, 1 Roll Adhesive Plaster, 1 Pair Scissors, 1 Knife, 2 oz. Boric Acid Powder, 2 oz. Tinct. Iodine, 2 oz. Sal Volatile, 1 Dredger for Boric Acid, 1 Graduated Glass Measure, 1 St. John Tourniquet, Pins, Needles, Thread, 3 Saucers and 3 Camel Hair Brushes (for applying Tincture of Iodine).
 Price £1 11s. 6d. **White Ration Haversacs**, 2s. each.



FIRST AID COMPRESSED KIT.

The box is made of wood covered with damp-resisting material, and is fitted with a lock and key. It contains a number of practical ambulance appliances arranged so that any article can be withdrawn or replaced without disturbing the remainder. Being fitted with a handle it is portable, and the lid, when let down, can be used as a table. All bandages and dressings are compressed. Size—Length, $16\frac{3}{4}$ in.; width, $4\frac{1}{2}$ in.; height, 8 in., without handle.

Contents: 4 Triangular Bandages, 6 Roller Bandages, 4 First Aid Dressings, 6 Small Packets of Cotton Wool, 6 Small Packets of Boric Lint, 1 St. John Tourniquet, 1 Measure Glass, 1 tin box containing a Roll of Plaster, Boric Lint Patches, Scissors and Pins, 1 tray containing 3 Bottles (Sal Volatile, Tincture of Iodine and Boric Acid Powder), and a Dredger for Boric Acid, 1 set of improved Splints, with angle piece, 8 Splint Straps (sufficient for a fractured thigh), 2 Saucers and 3 Camel Hair Brushes (for applying Tincture of Iodine):

Price £1 11s. 6d.



Size, $4\frac{1}{2}$ by $3\frac{1}{4}$ by $1\frac{1}{4}$ inches. Suitable for the pocket.

CONTENTS.

1. Triangular Bandage. 2. First Aid Dressing. 3. Cotton Wool. 4. Two Splint Straps. 5. Adhesive Plaster. 6. Permanganate of Potash. 7. Lanoline. 8. Boric Lint Patches. 9. Safety and Plain Pins.

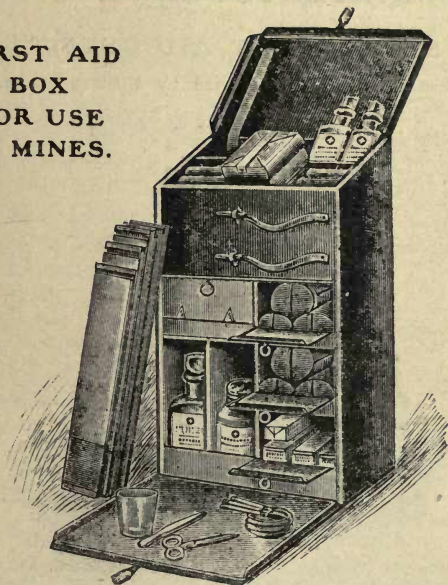
Price, each 1s. 6d. Packed for Post 1s. 8d. Per doz. 17s. 6d.

SEPARATE ARTICLES.

| No. | | No. | |
|-----|--------------------------|-----|------------------------------|
| 1 | 4d. each or 3/9 per doz. | 6 | 1d. per box or 10d. per doz. |
| 2 | 2d. " " 2/0 " " | 7 | 1½d. per tin or 1/4 " " |
| 3 | 1d. " " 10d. " " | 8 | 1d. per packet or 10d. " " |
| 4 | 2d. per strap or 1/9 " " | 9 | 1d. " " 10d. " " |
| 5 | 1d. per box or 10d. " " | | |

Not less than one dozen supplied at dozen prices.

**FIRST AID
BOX
FOR USE
IN MINES.**



CONTENTS.

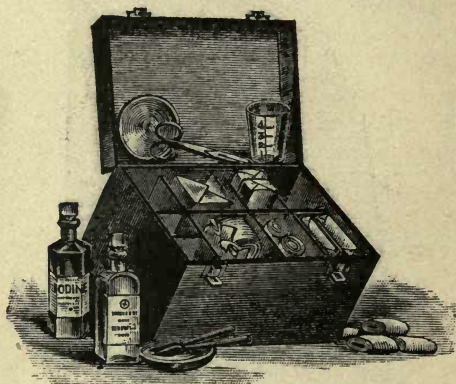
Set of Improved Wooden Splints; St. John Tourniquet; Cotton Wool; Lint; 12 Compressed Roller Bandages, assorted; 6 Triangular Bandages in waxed paper; Adhesive Plaster; Pair Scissors; Spatula; Graduated Measure; 2 oz. Sal Volatile; 8 oz. Boric Acid Powder; 8 oz. Tinct. Iodine; Pins; Safety Pins; Dredger for Boric Acid Powder; 3 Saucers and 3 Camel Hair Brushes (for applying Tinct. of Iodine). **PRICE COMPLETE, £2 10S.** This First Aid Equipment is also very suitable for use in factories and other large works, and can be fitted for carrying on the "Ashford" Litter.

Carriage Paid on all Orders in the United Kingdom.

SMALL FIRST AID OUTFIT

When closed can be carried by a Strap-handle.

Dimensions— $9\frac{3}{4}$ by $7\frac{3}{4}$ by $6\frac{1}{2}$ inches.



CONTENTS: 2 Triangular Bandages, 1 St. John Tourniquet, 8 Splint Straps (for securing Splints in lieu of Bandages), 2 oz. Cotton Wool, 1 Pair of Scissors, 4 1-in. Roller Bandages, 2 2-in. Roller Bandages, 1 2-oz. Bottle Sal Volatile, 1 2-oz. Bottle Tincture Iodine, B.P.C., 2 oz. Plain Lint, 1 2-oz. Measure Glass, 2 China Saucers, and 2 Camel Hair Brushes to be used when applying Tincture of Iodine.

Price:

Wooden Box, covered with Damp Resisting Material, 15s.

Stout Cardboard Box, Cloth Covered, 10s. 6d.

Carriage Paid on all Orders in the United Kingdom.

22

s. d.

| | | |
|--|------------------------------|---|
| The St. John Tourniquet, as supplied to the Admiralty with directions for use ... | 0 | 9 |
| (Special quotations for large quantities.) | | |
| Splints, Wooden, per set, 2/6 ; Cane ... | 7 | 6 |
| Greatly improved Wooden Splints, with grooved joints and angle piece, strongly recommended ... | 4 | 6 |
| Tow, for splint padding ... | 0 | 6 |
| First Field Dressing (Army Pattern) ... | 0 | 9 |
| Jaconette, 44 inches wide ... | 2 | 3 |
| Tow, Carbolized or Styptic ... | 0 | 9 |
| First Aid Dressing, consisting of a small compressed packet of boric lint, a compressed roller bandage, and a safety pin ... | 0 | 2 |
| Dredger, containing boric acid powder ... | 1 | 4 |
| Measure Glass ... | 0 | 5 |
| Knife with strong blade ... | each 1s. ; per doz. 10s. 6d. | |
| Pair of Scissors ... | each 1s. ; per doz. 10s. 6d. | |

Small Bottles strong Smelling Salts, per doz., 5s. 6d.

Splint Straps, Webbing, and suitable Buckles. Per set of 12 yards of strong 2-inch Webbing and 15 Buckles, 3s.

These make very compact Straps for carrying in the Pouch. The Webbing should be cut to meet local requirements.

Buckles only, 1s. 3d. per dozen.

Webbing only, 1s. 9d. per dozen yards.

It is unnecessary to sew the Buckles. The spikes should be passed through the webbing, and the short end of the webbing should lie outwards.

Carriage Paid on all Orders in the United Kingdom

PLASTERS.

Leicester Adhesive Plaster on Cambric, in tins of $\frac{1}{2}$ yard,
6 inches wide 6d.



The Leicester Adhesive
Ribbons, in tin boxes, 6
yards long.

$\frac{1}{2}$ inch wide 6d.

1 inch wide 8d.

National Rubber Adhesive
Plaster (Antiseptic)
on spools.

| | | |
|-------------------------|---------|---------|
| | 5 yds. | 10 yds. |
| $\frac{1}{2}$ inch wide | 9d. | 1s. 0d. |
| 1 „ „ | 1s. 0d. | 1s. 6d. |
| 2 „ „ | 1s. 9d. | 2s. 3d. |



| | | | | |
|--|-------------------------|-----|-----|-----|
| Ditto in card box, $\frac{1}{2}$ in. wide, | $\frac{3}{4}$ yds. long | ... | ... | 1d. |
| „ tin „ 1 | $\frac{3}{4}$ „ | ... | ... | 3d. |
| „ „ „ 2 | 2 „ | ... | ... | 3d. |
| „ „ „ 5 | 5 „ | ... | ... | 6d. |
| „ „ „ 5 | 5 „ | ... | ... | 9d. |

COURT PLASTER, TRICOLOR.

Large Size, 9d. ; Medium, 5d. ; Small, 3d.

NURSES' WALLETTS.

ORDINARY PADLOCK SHAPE.

Without instruments, 4s. 6l.

Fitted complete, containing Spring Dressing Forceps, Spatula, Probe, 2 pairs Scissors (round and sharp pointed), Clinical Thermometer, and Knife.

Price 12s. 6d.

ST. JOHN'S PATTERN, as illustrated, but improved by the addition of flaps to protect the instruments.

Without instruments, 8s. 6d.

Fitted complete, containing Spring Dressing Forceps, Artery Forceps (also useful for dressing), Spatula, Probe, Director with Ear Scoop, 2 pairs Scissors (round and sharp pointed), Clinical Thermometer (minute, round), Knife, Pencil, and Safety Pins.

Price £1 3s



ROLLER BANDAGES.

(6 yards long.)

| Per doz. | Grey Calico. | | Grey Open Wove. | | Superior White Open Wove. | | Best quality, White, with Woven Edges. | | Superior White Open Wove Compressed. | |
|-------------|-----------------|----|-----------------------|-----|------------------------------------|-----|---|-----|---|-----|
| | s. | d. | s. | d. | s. | d. | s. | d. | s. | d. |
| 1 in. ... | 1 | 0 | ... | 0 9 | ... | 1 0 | ... | 2 3 | ... | 1 3 |
| 1½ in. ... | 1 | 5 | ... | — | ... | 1 3 | ... | 2 9 | ... | 1 6 |
| 2 in. ... | 1 | 9 | ... | 1 3 | ... | 1 6 | ... | 3 3 | ... | 1 9 |
| 2½ in. ... | 2 | 3 | ... | 1 8 | ... | 2 0 | ... | 3 9 | ... | 2 3 |
| 3 in. ... | 2 | 9 | ... | 2 0 | ... | 2 6 | ... | 4 9 | ... | 2 9 |
| 4 in. ... | 3 | 6 | ... | — | ... | 3 6 | ... | 6 0 | ... | 3 9 |
| 6 in. ... | 5 | 3 | ... | — | ... | 4 6 | ... | — | ... | — |

ROLLER BANDAGES in Assortment.

Packed in neat Cardboard Box.

RECOMMENDED FOR CLASS PRACTICE.

Two 3 in. ; two 2½ in. ; one 1 in. ; each 6 yards long.

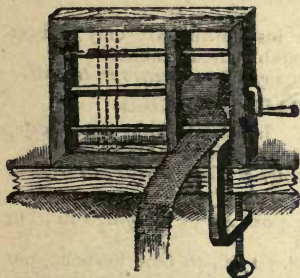
| | | |
|--------------------------------------|----|----|
| | s. | d. |
| Grey Calico | 1 | 0 |
| " " fast edges | 1 | 6 |
| Best quality white, with woven edges | 1 | 6 |

Plain Triangular Bandages, each 3½d. (Special quotations for large quantities.)

Ditto Compressed (thinner quality), each 4d. ; per doz. 3s. 9d.

| | | | | |
|--|-----------------|---------|----|----|
| Illustrated Triangular Bandages | (after Esmarch) | showing | s. | d. |
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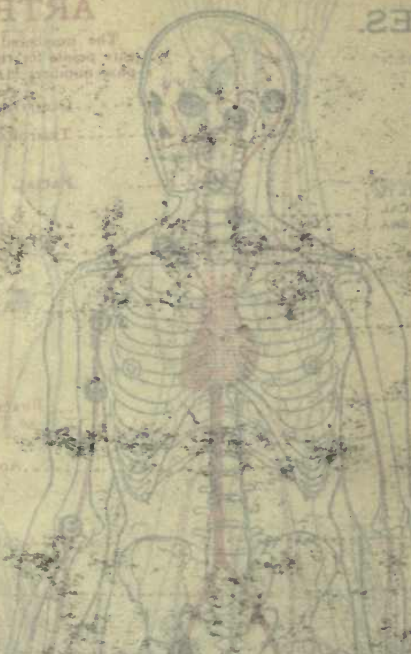
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