British Red Cross Society nursing manual : No. 2 / by James Cantlie.

BRITISH RED CROSS SOCIETY

NURSING MANUAL

No. 2

By

JAMES CANTLIE

M.A., M.B., F.R.C.S., VD.

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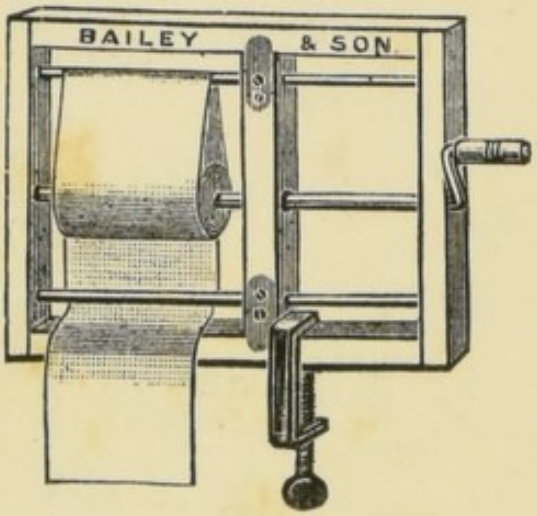

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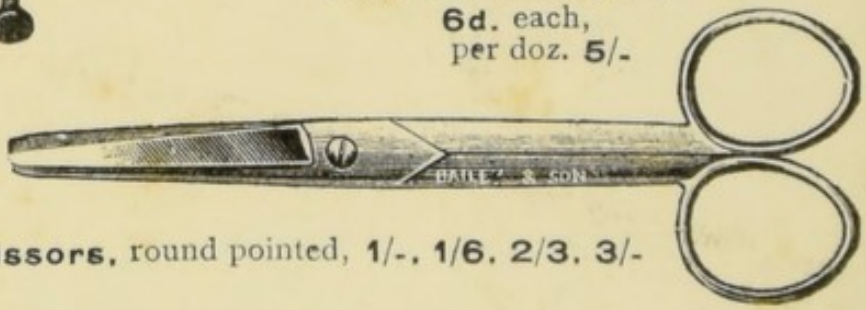

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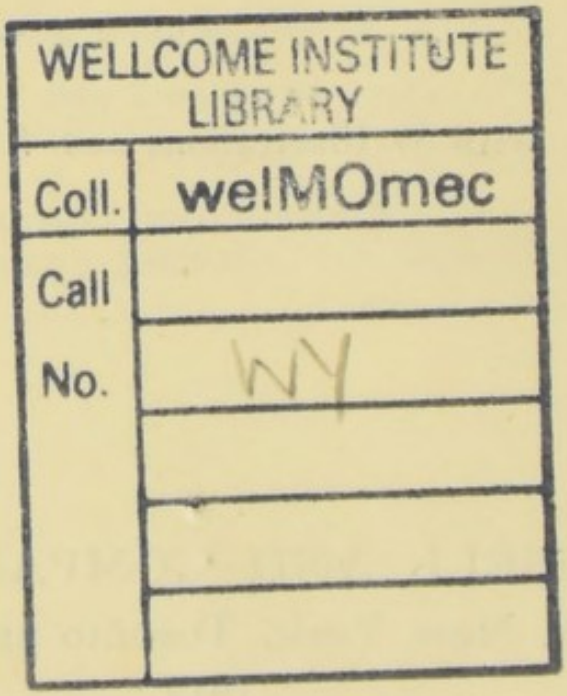

THE

British Red Cross Society

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THE British Red Cross Society is the outcome of the fusion of the late "British National Society for Aid to the Sick and Wounded in War," which was founded by that gallant soldier the late Lord Wantage, V.C., and the "Central British Red Cross Council," his late Majesty King Edward VII. having considered it desirable that the Red Cross Movement in the Empire should be represented by one Society, which should co-ordinate all such associations as are concerned with the succour of the sick and wounded in war.

The Society was inaugurated at a meeting held at Buckingham Palace on the 17th of July, 1905, under the presidency of her Majesty Queen Alexandra.

The Society was granted by his late Majesty a

Royal Charter of Incorporation by Letters Patent under the Great Seal on the 3rd of September, 1908.

The work of the Society in the United Kingdom is organised and carried out mainly through the medium of County Branches, the President of each respective branch being the wife of the Lord Lieutenant, or some person nominated by him. The President of every respective Colonial Branch is the Governor, or some person appointed by him.

The primary object of the Society is to furnish aid to the sick and wounded in time of war. Such aid must necessarily be supplementary to that provided by the Medical Departments of the Navy and Army. It is assumed that upon those two departments rests the responsibility of providing for the casualties of war, and the Society only professes to offer such additional comforts and such general help as may be considered beyond the reasonable scope of the official bodies.

The Admiralty and War Office have accorded their official recognition to the British Red Cross Society as the organisation responsible for the Red Cross movement throughout the Empire, and have agreed that in time of war all voluntary offers of assistance made in Great Britain and Ireland shall reach them only through the channel of the Society, other than those coming from or already arranged with, the Ambulance Department of the Order of St. John and the St. Andrew's Ambulance Association for the supply of certain personnel.

It is a further object, therefore, of the British Red Cross Society to examine, systematise, and co-ordinate all offers of help, and, by preventing waste and overlapping, to render them of the utmost possible value.

Since the inception of the original Society in 1870 to the present year, 1912, a sum of nearly £500,000 has been expended by the Society in assisting the

sick and wounded in war. Of this large sum £162,296 was expended in aid of the sick and wounded during the South African War, 1899–1902.

The Secretary of State for War issued on August 16th, 1909, to Territorial Force Associations in England and Wales, a "Scheme for the Organisation of Voluntary Aid for Sick and Wounded," in the event of war in the Home Territory. Full details of this scheme are contained in the Society's Form D.

In this "scheme" a county system has been adopted because it is the one upon which the Territorial Force is organised, and which the British Red Cross Society has adopted as the basis of its constitution; and the Society is the body recommended by the War Office to the Territorial Force Associations for the carrying out of this important work.

The Medical Service of the Territorial Force has no establishment for carrying out the duties in connection with (*a*) Clearing Hospitals, (*b*) Stationary Hospitals, (*c*) Ambulance Trains, and (*d*) other formations, viz. Entraining and Rest Stations, Private Hospitals, and Convalescent Homes.

In order to provide a personnel that will be available for any or all of the duties indicated, Voluntary Aid Detachments are organised in each county, consisting respectively of men and women, as follows:—

MEN'S DETACHMENT

1	Commandant.
1	Medical Officer.
1	Quartermaster.
1	Pharmacist.
4	Section Leaders.
48	Men (divisible into four sections of 12 men each).
Total 56	

WOMEN'S DETACHMENT

1 Commandant (man or woman, and not necessarily a Doctor).
1 Quartermaster (man or woman).
1 Trained Nurse as Lady Superintendent.
20 Women, of whom 4 should be qualified as cooks.

Total 23

Each detachment as it is formed and approved is registered by the Council of the British Red Cross Society, is given a consecutive number by the War Office, and forms part of the Technical Reserve, and is inspected annually by an Inspecting Officer detailed by the War Office.

The Society's uniform may be optionally worn by members of detachments, and the regulations in regard thereto are included in the Society's Form D (7).

The War Office having approved the certificates granted by the Society in First Aid and Nursing, the Red Cross Branches are empowered to form classes and hold examinations in these subjects, in order to qualify candidates who do not already possess such certificates for admission to detachments. (For details, *see* Form D (4).)

The **Men's Detachments** must be thoroughly trained as stretcher bearers, and to some extent as male nurses. A certain proportion of clerks, carpenters and mechanics would be especially useful. The principal duties of the personnel would consist in carrying sick and wounded by stretchers, and, when necessary, in preparing means of transport by road or rail, in converting local buildings or whole villages into temporary hospitals, and in disinfecting buildings, etc.

The **Women's Detachments** would be employed chiefly in forming Railway Rest Stations for preparing and serving meals and refreshments to sick and wounded during transit by railway, and in taking temporary charge, in the evacuation stations or temporary hospitals, of severe cases unable to continue the journey. They should, therefore, be trained not only in cooking and the preparation of invalid diets, but also in the method of arranging small wards for patients in suitable buildings, preferably near a railway station, and in such nursing as is necessary for the temporary care of patients until they can be transferred to the general hospitals. Detachments, or a certain portion of a detachment, may be employed for duty in ambulance trains.

Each member of a detachment when called up for service will be provided with an identity certificate and a "brassard" or arm badge bearing the Geneva Cross. The identity certificate and brassard will be issued by a responsible officer of the Army. The wearer of the brassard so issued is "protected" under the articles of the Geneva Convention.

It may be mentioned that enrolment as a member of a Red Cross Voluntary Aid Detachment does not render such individual a member or associate of the British Red Cross Society. The conditions for admission as such are detailed in Form A, copies of which may be obtained from the Society's offices.

Since the publication of the above "Scheme" the British Red Cross Society has been very active in the organisation of Voluntary Aid Detachments, and by the 20th of September, 1912, the Society had raised, and registered at the War Office, 1,453 Red Cross detachments with the total personnel of 42,671.

By the Geneva Convention Act, 1911, "it shall not be lawful for any person to use for the purposes of

his trade or business, or for any other purpose whatsoever, without the authority of the Army Council, the heraldic emblem of the red cross on a white ground formed by reversing the Federal colours of Switzerland, or the words 'Red Cross' or 'Geneva Cross.'"

The British Red Cross Society has the authority of the Army Council to use the heraldic emblem of the red cross and the words "Red Cross."

The official badge of the Society, with the emblem of the Society as a circular pendant attached to an ornamental bar lettered with the name of the respective county, may be worn on the left side by those who belong to any branch of the Society or its Voluntary Aid Detachments so long as a connection with the branch is maintained. This badge is only issued, in accordance with the Society's regulations, on the nomination of its branches.

Detailed information of the organisation and objects of the Society may be obtained on application to the Secretary,

FRANK HASTINGS,

9, Victoria Street, London, S.W.,

to whom all communications should be addressed.

PREFACE

THIS Manual is not a systematic work on Nursing; it is written as a guide to suit the requirements of the members of the Voluntary Aid Detachments of the British Red Cross Society. It must be remembered that in the term "nurse," as used in the text, male nurses are included, for the service to be rendered by the male members of the Voluntary Aid Detachments in the field, during transport, and in camp, necessitates a knowledge of practical nursing, and no male member of the Detachments can be considered fully qualified unless he has had a training in the elements of Nursing.

The author is indebted to Professor W. R. Simpson, C.M.G., M.D., F.R.C.P., for kindly revising the parts of this Manual which deal with hygiene, infection, etc. He has also to thank Miss Eleanor Barton, Matron of the Chelsea Infirmary, and Miss N. H. Parke for valuable suggestions and help.

JAMES CANTLIE.

October, 1912.

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NURSING MANUAL

CHAPTER I

THE NURSE

Theory and Practice.—No man or woman can become an efficient hospital orderly or nurse merely by listening to a course of lectures or by reading a textbook on nursing. On the other hand, without instruction by lectures and reading, experience is but ill-founded and is calculated to develop a mere "hospital hand" in contradistinction to an intelligent assistant to the physician or surgeon in dealing with disease. Doctors have to serve a long and arduous course of training before they are allowed to treat disease, and, similarly, those intending to nurse the sick must have the science of their calling taught them before they are qualified to practise the art. The members of Voluntary Aid Detachments are therefore required to attain an exact knowledge of the principles of nursing the sick as a preliminary to the important work which they may be called upon to do.

Nurses, in their training, are instructed, on going as private nurses into a household, to look after their own health. Sufficient time for rest and sleep must be allowed for, and a reasonable amount of out-of-door exercise must be taken. In the same manner, when a member of the family takes up attendance upon a sick relative during a long-continued illness, times for sleep and exercise must be planned out and adhered to, otherwise the nurse's health will suffer, her efficiency will be impaired, and the patient's state will, in consequence, be detrimentally affected.

The nurse should have a bath daily, if at all possible; her meals must be arranged for at regular hours.

The health of the nurse is a more important hygienic asset than almost any other item in the sick-room

régime, and it cannot be maintained except by following well-recognised hygienic rules.

The Nurse's Dress.—The dress of a nurse in a sick room should be of a material, texture, and colour suitable to the comfort of the patient and to the hygienic necessities of the occasion. The chief points to be considered are :—

1. The dress must be of a material that can be washed or readily cleaned.

2. The texture should be as little absorbent as possible, otherwise infective germs, discharges from wounds, mouth, nose, lungs, &c., will be readily harboured.

3. As the nurse has frequently to move the patient, dress his wounds, &c., the texture of the dress should be such that it does not irritate the patient, and is not unpleasant to touch.

4. The material should be such that the dress makes no noise as the nurse walks about the room.

Unsuitable Materials.—(*a*) Woollen stuff or winsey material is irritating for the patient to touch, readily absorbs germs or discharges, and is not easily washed.

(*b*) Silk rustles as the nurse moves about, is uncomfortable to touch, and is not easily cleansed.

(*c*) A stiffly-starched cotton or "print" dress makes a noise as the nurse walks about.

Suitable Materials.—Drill, alpaca, and gingham are the most serviceable materials. All can be washed, their surface is not unpleasant to the touch, they are not noisy, and they do not readily absorb or retain germs or discharges. Alpaca is, perhaps, the material most frequently used.

Jewellery is forbidden in hospitals for the reason that it may be detrimental to the patient's comfort. Should the nurse wear a brooch, a buckle to fix a belt, or a watch pinned on the breast, and the patient, to be moved, has to put his arms round her neck or waist, he may be scratched by the pin of the brooch, the teeth of the belt, or the fastening of the watch. Again, a loose watch chain worn round the neck and attached to a watch tucked into the belt may dangle over the patient's face as the nurse bends over to move him in bed; or if

he has to pass his hands round her neck when being moved, his fingers may become entangled in the chain, or the watch pulled from the pocket and fall on the patient's face. Ear-rings are not allowable for anyone engaged in serious nursing, for, as the patient lets go his hands from the nurse's neck after being moved, the buttoned sleeve of the nightdress may drag upon an ear-ring and cause the nurse considerable pain, and the patient annoyance at the accident. Pins about the nurse's dresses are forbidden; if there is a pin at the back of the collar, or in the front of the dress, the patient's hands may be scratched as he is being moved, to the vexation of both nurse and patient.

These may seem to be mere trifles, but practically they are important. Little matters such as these may not seriously affect the physical state of the patient, but subsequently, when the nurse approaches the patient for the purpose of moving him, sitting him up in bed, &c., the remark, "Now, you haven't any pins about you, have you?" is only natural; but when it is repeated time after time the nurse resents it, and a strained relationship is set up. It can thus be seen that the prescription of a certain uniform for trained nurses and the prohibition of jewellery are not founded upon quasi-religious ideas, but are necessary for the welfare and comfort of the sick under their care.

When women, untrained in the art of nursing, take up attendance upon the sick in their own homes, they should approach in dress, &c., as nearly as possible to the model of the hospital nurse.

Visitors to the Sick-Room.—When a patient is suffering from an infectious disease that is readily communicable, all visitors must be forbidden entrance to the sick-room or ward; but when an illness is not infectious, or when relations wish to see the patient after a serious surgical operation, or when the patient is very seriously ill from any cause, the nurse may have a trying and annoying time with relatives. She must then fall back upon instructions from the doctor to guard the patient from visits which are as often as not inspired by mere inquisitiveness. When a fatal issue seems probable, the relatives ought, of course, to be

sent for, and in the absence of the doctor the nurse may have to decide and act upon her own initiative. If a patient is seriously ill the nurse should not leave the room when visitors are present. Moreover, she must watch that the visitors give nothing to the patient, and slip no food, sweetmeat, or fruit beneath his pillow. The hint, "Nurse, you may leave the room" should be tactfully evaded if the patient is seriously ill, or during convalescence in typhoid fever. Of course, much depends upon who the visitor is, but few relatives are proof against the fervent appeals which patients are apt to make for this or that form of something to eat. A visitor should be given a chair to sit upon, placed in such a position that the patient and the visitor can see each other. If no chair is provided the visitor may want to sit on the bed, or stand at the end of it, and "drum" with the fingers on the metal at the foot of it. Again, a visitor may be ill-advised enough to stand over the patient, having no time to sit down owing to "an engagement that can't be put off," etc. The patient thereby becomes flustered and excited, and the visit does harm instead of good. Visitors usually bring flowers for the patient; this is a harmless proceeding provided the flowers have not too "heavy" an odour, and that they are removed from the room at night. The visitor also may be allowed to bring a bottle of scent of a kind desired by the patient, or such fruit as may be permitted; at times, also, beef tea, chicken tea, etc., may be accepted if it is really beef tea, not beef essence, that is brought, and if the chicken jelly, etc., are home-made, not bought at the store or shop, at which it is "ever so reliable." Beef tea, chicken jelly, calf's-foot jelly, etc., should always be home-made when given to invalids; the bought preparations are not "just as good," and should have no place in a sick-room unless the home-made products cannot be obtained, as during war.

CHAPTER II

CHOICE OF THE SICK-ROOM—VENTILATION, ETC.

WHEN a person falls ill in a private house, the room selected for his accommodation should possess certain qualities which are necessary if the patient is to be given the best chances of recovery.

1. **Aspect.**—The room selected should have a southerly aspect, so that the air entering by the window may possess the advantage of being sun-penetrated. A room with a northerly aspect not only lacks the cheerfulness sunshine brings, but the air entering by the window is destitute of the salubrious properties belonging to sun-penetrated air.

2. **Position.**—The sick-room should be in such a position that the patient is segregated as much as possible from the other occupants of the house. In cases of infectious disease this is imperative, but in any ailment rest and quietness can be best obtained by placing the patient in a room as far removed as possible from the noises and activities incidental to every dwelling, whether within the house or without as in the street. In an ordinary house the top floor affords the best chance of these requirements being complied with, and in a flat the room farthest away from the front door should be chosen for the same reason.

In very hot weather, especially if no attic intervenes, the temperature of the top floor may be unbearable, and the patient must be removed to a cooler room on a floor below. On the other hand, in cold weather it may be impossible to keep sufficiently warm a room of which the ceiling is formed by the roof of the house. Bathroom and lavatory requirements must also be taken into consideration.

3. **Fireplace.**—It is essential for both warmth and ventilation that the sick-room have a suitable fireplace, and that the chimney be clear of soot.

4. **Window.**—It is necessary that windows open readily both top and bottom; the sash lines should be inspected as to their soundness; and it should be seen, too, that the blind cord and fixings work smoothly.

5. **Size.**—A sleeping-room, whether for the healthy or for the sick, must be of a size sufficient to allow of free ventilation without draught. A draught or swift current of air when it passes over the body carries off the heat so rapidly that the body temperature is quickly lowered, and a chill or cold is occasioned. The loss of heat is greatest when the surface of the body is bathed in perspiration, as the evaporation of moisture from the skin still further hastens the reduction of temperature. It is evident, therefore, that the circulation of air in a room must be tempered to the extent the body can tolerate, without the temperature being unduly lessened. Persons who "enjoy a draught" are either unwell at the time, or they shortly will become so in consequence of their "enjoyment." The chill causes contraction of the blood-vessels of the skin and a reduction in temperature of the blood. which is driven inwards to the lungs, the liver, or the intestines, causing congestion or inflammation of these organs.

A person in bed, whether healthy or sick, should never be subjected to a current of air travelling at a rate greater than three miles an hour. The practical interpretation of this fact will be best illustrated as follows: It is found by scientific experiment that 1,000 cubic ft. is the smallest amount of air space which a person in a sleeping apartment should be allowed if health is to be preserved or recovery from illness is to be favoured. A room containing 1,000 cubic ft. is one which may conveniently be represented by assuming its breadth, length and height to be 10 ft. Thus $10 \times 10 \times 10 =$ 1,000 cubic ft. of air. Now, it has been proved that 1,000 cubic ft. of air is used up in twenty minutes by a person placed in a chamber in which there is neither entrance nor exit of air. After twenty minutes the air becomes polluted, and on its being re-breathed the deleterious products accumulated in the air of the room owing to respiration and to emanations from the skin are taken into the lungs, with detrimental consequences. Given,

therefore, a room of 1,000 cubic ft., it is plain that as this quantity lasts only twenty minutes, and as there are three times twenty minutes in the hour, the air must be changed three times in the hour; or, in other words, 3,000 cubic ft. of air must be supplied per hour. This can be done without causing a draught. Should, however, the size of the room be below the standard given, the danger of draught is ever present. Supposing the room to contain only 500 cubic ft. of air, the air would be required to be changed six times in the hour —a rate of ventilation wholly inadmissible.

Whether in a private room or in a hospital ward, 1,000 cubic ft. must be allowed to each person; this can be carried out with mathematical precision in a large ward; but in a private room in sickness it will be found that a larger room will be convenient and necessary, seeing that a nurse when present consumes a quantity of the available air. It is, therefore, well to have a room of an air capacity of about 2,000 cubic ft., so that the patient may have a sufficiency of fresh air; this is represented by a room of the following dimensions, viz.: 16 ft. (length) × 12 ft. (breadth) × 10 ft. (height) = 1,920 cubic ft.—the size of an ordinary bedroom.

Ventilation.—The impurities added to the air in a living room are:—

1. *Carbonic-Acid Gas.*—The breath escaping from the lungs during respiration is charged with carbonic-acid gas, the excess of which in the air renders the room "close." Accumulation of this gas in the air of a bedroom may cause sleeplessness, or it may produce prolonged drowsiness, waking from which is attended by lassitude, yawning, headache, no appetite for breakfast, or a lack of freshness for the day's work. Wounds do not heal kindly, and may even break down and become septic (putrid). Illnesses of all kinds are apt to be prolonged, and in serious cases fatal consequences may result from this accumulation of carbonic-acid gas and other products due to want of ventilation.

To test the "closeness" of a room it is only necessary to go into the open air for, say, ten minutes, when, on returning to the room, the indefinable but very evident sensation of "closeness" is perceptible.

2. *Organic Material.*—In the breath exhaled from the lungs and in the emanations from the skin particles of tainted matter are constantly being given off; the presence of these materials causes the foul odour which is noticed in a room that is insufficiently ventilated, or in public buildings when a large number of persons are present.

3. *Heat.*—The heat of the body and the warmth of the breath increase the temperature of a room and render the excess of carbonic-acid gas and organic material more evident and more deleterious.

4. *Moisture.*—The moisture contained in the breath adds yet another agent whereby germ life is favoured in an ill-ventilated apartment.

Principles of Ventilation.—There are certain definite principles affecting the entrance of air to an apartment which have to be mastered in order to understand aright the meaning and the methods of ventilation. These are:

1. The air must have an upward direction.
2. The current of air entering must be broken in its course.
3. The entering air must be warmed before reaching the occupants.

These principles can be carried out for our English windows by the ingenious device known as the Hinckes-Bird plan of ventilation.

Hinckes-Bird Plan (Fig 1).—Throw up the lower sash, fit a board some 3 to 6 in. deep and of a width corresponding to the width of the window into the lower part of the window frame. Shut the lower sash down upon the board thus inserted. The aperture for entrance is now in the middle part of the window, and the air as it enters between the two sashes receives from the overlapping of the lower over the upper sash an upward direction towards the ceiling. Striking the ceiling, the current of air is broken, and as it passes through the stratum of air immediately below the ceiling where the air in the room is warmest, the cold air is itself warmed and descends into the room in a gentle, diffused and warm volume.

The Hopper Sash-Light.—In hospital wards and

other dwellings, windows, instead of consisting of an upper and lower sash, are made up of a series—4 or 5, usually—of sashes of glass fixed in frames stretching the whole width of the window. The sashes are jointed

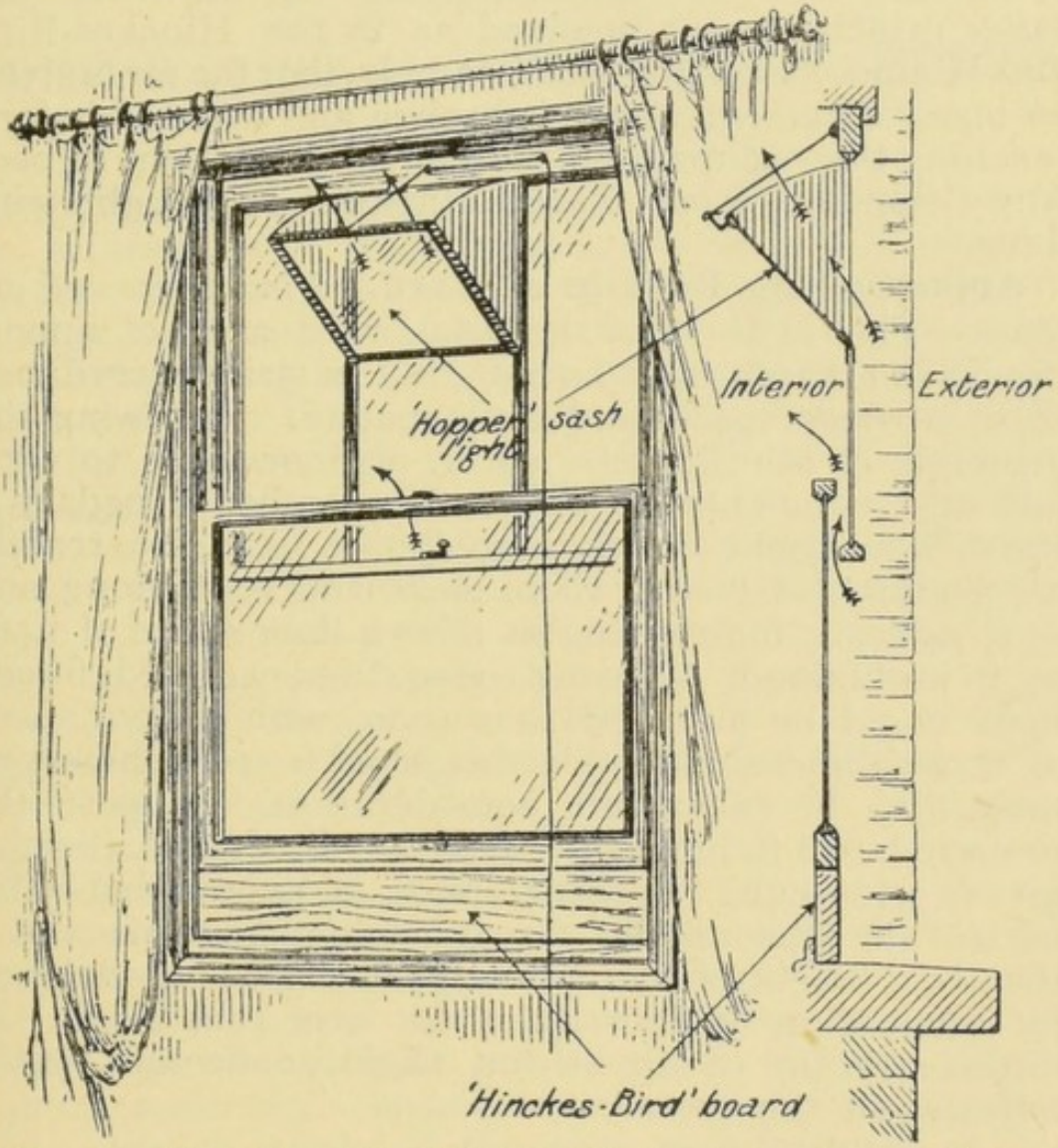


Fig. 1.—Showing (1) Hinckes-Bird plan of ventilation in front and side views; (2) Hopper sash-light ventilator in front and side views.

below, and they can be severally opened and closed by means of an apparatus fitted with a convenient handle. A modification of this plan is seen in large wards, lecture-rooms, etc., high up on the wall, and sometimes above the ordinary window a large sheet of glass, fitted in a frame and jointed at its lower part, is made to open at its upper part inwards (Fig. 1). At each end of the

frame, a piece of metal precludes the air escaping around the sides of the hopper, so that the proper upward direction is given to the incoming air.

Other forms of ventilation in everyday use are Tobin's shaft and the louvred ventilator. In all these the same principles are involved as in the Hinckes-Bird and Hopper sash-light plans, namely, that the air is given an upward current, and it is broken and warmed before reaching the occupants in a room or the patient in bed. Any departure from these principles is fraught with danger.

Apportioning Beds in a Ward. *Floor space and air space.*—The beds in a hospital ward are not apportioned in a haphazard fashion, but in strict accordance with its floor space and air capacity. Following the principle of allowing 100 sq. ft. of floor space to each bed and 1,000 cubic ft. of air, the number of beds in a ward, apartment, barn, schoolhouse, etc., is readily ascertained. Given a room measuring 60 ft. long and 25 ft. wide, by multiplying 60 × 25 a floor space of 1,500 sq. ft. is obtained. Allowing 100 sq. ft. to each bed, fifteen beds could be assigned to a room with a floor space of these dimensions. The height of a room, however, must also be taken into consideration. Suppose the room to be 10 ft. high, then 1,500 sq. ft. × 10 ft. (height) gives 15,000 cubic ft. of air space, or 1,000 cubic ft. for each of the fifteen beds. Great height of an apartment—that is, a height of more than 14 ft.—does not make up for diminution of floor space, for over that height the lower stratum of air is but slightly affected by the loftiness of the room.

CHAPTER III

PREPARATION OF ROOM FOR RECEPTION OF PATIENTS

Emptying the Room.—When an apartment is to be utilised for a case of sickness at home, or for a number of cases, as in the event of a railway accident, or when accommodation has to be found for the wounded in battle, everything that is unnecessary should be taken away, so that practically nothing but bare walls, a bed and accessories, is left. All articles of furniture in the form of chests of drawers, boxes, etc., in a dwelling-room, or sacks of corn, straw, etc., in a barn, are but so much air space cut off from the cubic capacity of the room. In a hall or public assembly room the contents, such as desks and forms, have to be removed so as to clear the floor, and practically nothing is wanted in the emptied apartment but beds, a few chairs, some movable tables, and wash-hand stands. Carpets, curtains, and all clothing not wanted are to be removed; wardrobes and chests of drawers, if not removed from the room, must be emptied, as not only does all clothing occupy space, but it serves to harbour germs and retain infection; in fact, every apartment to be used for the sick or injured should resemble a hospital ward as nearly as possible. In a private house, if the case is infectious, or if a serious surgical operation is contemplated, the pictures should be removed from the walls, as every picture frame serves but to store dust, and dust means germs and infection.

Dusting the Room.—For any case of serious illness, especially surgical cases with open wounds, it is necessary to dust the walls to begin with. This must be done by tying a damp cloth over a broom head, and wiping the walls downwards from ceiling to floor. The work is to be done deliberately and slowly, taking

especial care to wipe the dust from the crevices and corners, from behind the shutters, from the cornice, from below and from the top of immovable furniture, and indeed from the shelves of cupboards and all drawers. The drawers of wardrobes, chests of drawers, wash-hand stands, etc., must all be taken out, each set on its side, and freely wiped with a damp cloth. The floor should be sprinkled with water or wet tea leaves, and the dust that accumulates on the floor from the walls, etc., is gathered into a shovel, which, if the room is unoccupied, may be emptied on to the dust heap; if, however, the room is occupied, especially by an infectious case, no dust should be removed from the room, but as it is gathered from the floor into the shovel it is thrown on the fire in the same room and burnt. To take the dust from a room in which a person is suffering from infectious fever and carry it downstairs serves but to spread the infection to the other occupants of the house.

Washing the Floor.—When a room is being prepared for the admission of a serious case of illness the floor and skirting should be scrubbed in the usual way, and must be thoroughly dried before making up the bed. When a room is occupied the floor should never be drenched with water, but day by day wiped over with a damp cloth tied on a broom; if so desired, the cloth may be dipped in a disinfecting fluid, or the floor may be sprinkled with the disinfectant before using the broom.

The Fire.—The fire in a sick-room serves the purposes of heating and ventilating the apartment, but it must not be used for cooking. The temperature of the sick-room, whatever the nature of the illness, should be maintained at not less than about 60° Fahr., night and day, summer and winter. To estimate the temperature of the room a wall thermometer should be hung as near the patient's head as possible, for it is the temperature of the air as it enters the nostrils that is really the point to be ascertained. It is better, therefore, to hang the thermometer from the head of the bed, or to lay it on the bed by the side of the pillow, than on the wall adjacent. The fire is the chief means by which the foul air

finds exit from a room, and in summer when the fire is not lit, some resort even to putting a lighted oil lamp into the empty grate so that a hot current of air may ascend in the chimney and thereby aid in the ventilation. In hot weather, however, the window may be opened to such an extent that this expedient is seldom necessary.

The management of the fire requires careful attention; to take coals from a coal-scuttle by a shovel in the ordinary way causes a noise, which if the patient is asleep may wake him, while to a nervous person, or one who is very ill, the disturbance is most irritating even when awake. If, instead of shovelling on the coal, the pieces are taken from the coal-scuttle by the hand or by tongs, the noise is not done away with, for in the narrow confines of the coal-scuttle, when one lump of coal is removed the others fall in with a clatter and thereby disturb the patient. A coal-scuttle, whether of wood or of metal, should have no place in a sick-room. Instead, the coal should be placed by the fireside in an open basket, first lined with canvas or brown paper, and the coal should be put on the fire with the hand; an old glove should be kept close by and the hand slipped into it when coals have to be put on. The expedient sometimes recommended of placing the coal in paper bags is a waste of time, and unsatisfactory, as the bag is sure to

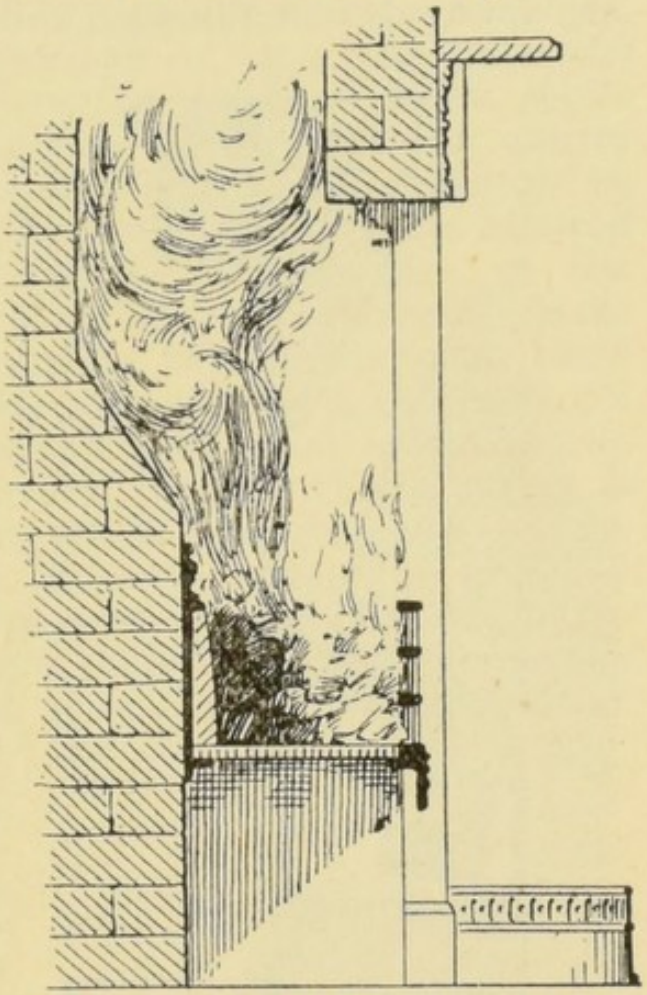


Fig. 2.—A bad grate for the sick-room. Smoke in quantities.

burst at the wrong moment. It is well also not to attempt to lift the coal by tongs, as, should it slip, a piece of coal may alight on the fender or the floor and arouse or alarm the patient. In fact, tongs and other bedroom fire-irons are useless in a sick-room, and should be removed from the fireplace altogether; they are apt to get in the way, and, if knocked over, cause such a noise as to wake the patient from sleep. When coals are put on the fire, if it is a straight-backed grate, they should be distributed equally and in not too thick a layer all over the top of the fire; for if thrown upon the back of the fire only, they cause a great volume of smoke (Fig. 2) which speedily tends to foul the chimney and fill the room with smoke. If the back of the fireplace slopes forward, as in most modern grates, the coals may be placed on the back of the fire with impunity, as the gas escaping from the coal is directed forwards over the flame at the front of the fire, and the smoke is thereby consumed: hence the term "a smokeless grate." (Fig. 3.)

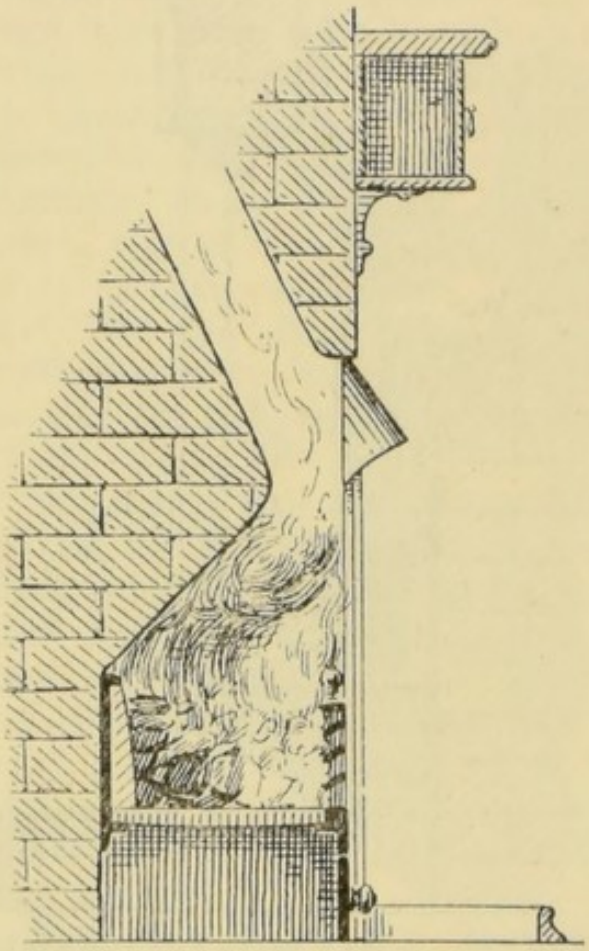


Fig. 3.—Forward-sloping grate. Smoke consumed.

It is well known, but seldom practically considered, that, when a fire burns, it is the gases given off from the coal, not the coal itself, which produce the flame and heat. If therefore the gases are not consumed, the coal is largely wasted, as the unconsumed gases escape up the chimney. If, on the other hand, the gases are directed over the flame, as in a fireplace with

a forward-sloping back, the gases are at once consumed, and a clear fire results, with but little deposit of soot in the chimney. Should the chimney smoke, the cause will probably be that it is foul, and although various expedients may be tried to lessen this evil in a sick-room, such as fixing a board or piece of paper across the upper part of the opening of the fireplace, it becomes necessary, sooner or later, to have the chimney swept. To have the chimney swept while the patient is in the room is not so difficult a matter if it is gone about properly. The real objection is, that the fire has to be taken off and the grate allowed to cool; this means that the temperature of the air of the room falls—it may be to a deleterious extent in cold weather. To obviate this difficulty an extra blanket or two should be put on the bed, the patient's head and shoulders covered, and a hot bottle or two placed in the bed. Further, the fact that a sweep is coming into the room is apt to alarm nervous people, and especially women. However, when the chimney has to be swept, the patient should be brought to see that it must be done, and it depends upon the nurse's skill and tact so to make the communication that the patient will not object.

CHAPTER IV

BEDS AND BEDDING

The Bed.—A metal bedstead is invariably used in hospitals, from the fact that it can be more readily wiped over and taken to pieces when required than a wooden one. The length of the bed should be 6 ft. and its width not more than 3 ft. 3 in. or 3 ft. 6 in.; a wide double bed is inconvenient in cases of sickness, as if the patient is in the middle of the bed it is impossible to reach him satisfactorily when he is being either washed or fed, or a wound is being dressed. The ordinary wire mattress is not suitable for cases of long illness, but, instead, the double wire mattress—or still better, the Lawson Tait wire mattress, being much stronger—serves to keep the bed rigid, and prevents the sagging in the centre which suggests a hammock rather than a bed, Over the wire mattress a piece of canvas should be spread, to prevent the wool or hair mattress from coming in contact with the wire mattress, which is apt to become rusty.

The mattress is usually of wool or hair, or a mixture of these, and the tick should be covered with a loose cover of unbleached cotton, which can be washed from time to time as required. Over the mattress a thin blanket is often spread, although this is frequently objected to, as it is considered that owing to the blanket becoming soaked with perspiration it is apt to act as a poultice to the back and favour bedsores, by rendering the skin soft from moisture. A sheet is placed over all, and this undersheet is to be tucked firmly beneath the mattress all round, so that the undersheet may always be taut. Keeping the undersheet taut is one of the most important of the nurse's duties, for if allowed to become loose or creased it is not only uncomfortable, but is apt to

irritate the patient, or injure the skin and promote formation of bedsores. Making up the bed is completed by an upper sheet and blankets according to the season of the year. For a bed cover, some do not object to the weight of a counterpane; but for those who do, a cover of dimity is preferable, and in hot climates white cashmere or merino is more suitable. "Ventilated" eider-down quilts are occasionally permissible, but only at night in very cold weather.

A couple of pillows are preferable to a bolster and a pillow; they should each be covered with a cotton or linen pillow case.

The bed trappings once in vogue are not seen in a modern bedroom. Curtains, which in our grandparents' times were hung and drawn close at night on four-poster beds, with a canopy, went out of fashion when the wide chimney, which allowed of a free down draught of cold air at nights, was replaced by the narrow chimney of to-day. A relic of this complete enclosure prevailed for a time in a headpiece to the bed with a small canopy and curtains at either side of the head of the bed. Even these have disappeared in the modern "hygienic" bed of to-day. When the bed for any reason is placed between the window or the door and the fireplace, and a draught prevails, or when the sunlight or the light in the bedroom at night prevents the patient from going to sleep, a curtain may be advantageous. If there is no headpiece to the bed from which a curtain can be hung, one may be improvised by tying the handle of a broom to the head of the bed, and suspending from this a sheet which may be pulled to one or other side of the patient as required. This is a useful thing to do also when there are several patients in one room, and one patient is very ill or dying. A valance round the bed is still used in private houses, but it should find no place in a sick-room. A valance was frequently used to screen utensils beneath the bed, and it served also to conceal boxes, boots, &c., things which should never be placed underneath the bed, valance or no valance. A valance also harbours dust, and prevents the free circulation of air underneath

the bed, which is as essential to health as the circulation of air over and around it.

Position of Bed.—In an ordinary bedroom the bed should be placed with its head towards the wall (Fig. 4), and the foot towards the centre of the room; in this way it is possible to reach both sides of the bed, which cannot, of course, be done if one side of the bed is placed parallel to and against the wall. The head of the bed, where possible, should be against an inside (or partition) wall instead of against an outside wall, as thereby the temperature is more likely to be equable, and the possible dampness of an outside wall prevented.

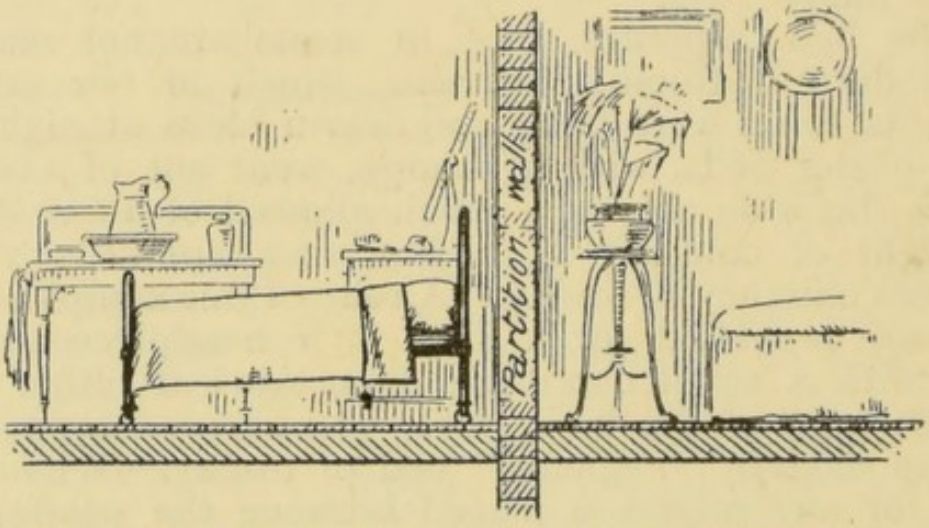


Fig. 4.—Head of bed towards partition wall.

Although in hospitals beds are seen with their heads toward the outside wall, it must be remembered that in modern hospitals the wall is double, and the layer of air between the double wall prevents the variations in temperature and moisture allowed by a single wall (Fig. 5). In a bedroom in a private house the bed should be placed out of the draught which finds its way from the window to the fireplace, or sometimes from the door to the fireplace. It is usual, therefore, to place the bed so that the foot is towards the fireplace and out of the way of the draught from both door and window. One reads in some books that the bed should be placed between the window and the fireplace, or even between the door and the fireplace, so that the current of air may pass over the patient as he lies in bed. The nurse,

moreover, is told to stand to windward of the bed, especially in infectious cases, so that the germs emanating from the patient are not blown over her, as they would do were she to take up her position on the leeward side—that is, the side next the fireplace, towards which the current of air is carrying the infective germs. This may be "stage" nursing, but it is not practical nursing of the sick. The nurse has to approach the patient on whichever side she can best attend to him, and the thought of infection, as far as she is concerned, plays no part in her proceedings. The bed should be placed where the circulation of air is free

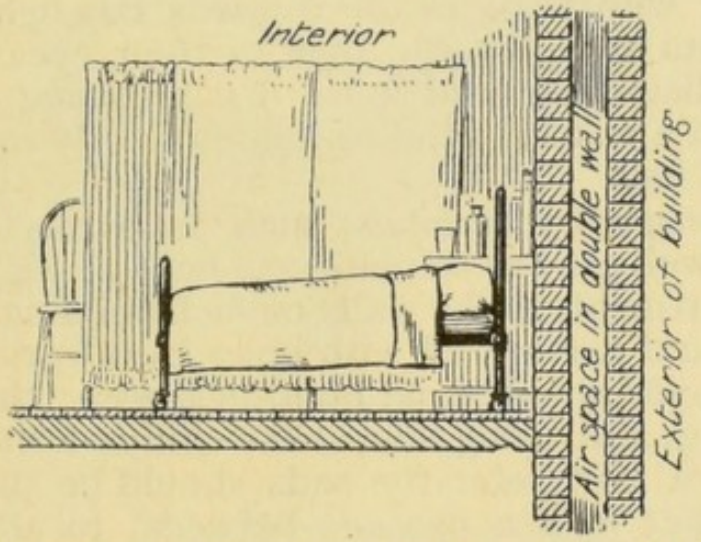


Fig. 5.—Showing air space in wall of building with head of bed against outside wall.

but not in a draught, and all the requisite hygienic requirements are fulfilled by placing the bed between the door, and the window, or, at any rate, out of the direct draught from either. The bed in a sick-room, as in an ordinary bedroom, should never be placed so that, as the door opens, the bed is exposed to view, and the patient to the draught from the door. A screen will, of course, prevent the bed being seen, if placed just inside the door, but it is an inconvenient arrangement, and a screen of ordinary height will not keep off the draught that comes in from the door when it is opened. It will be gathered from the above details that the typical position for a bed in a bedroom (*a*) in *a private house* is:

1. Its head should be towards a partition (inside) wall.

2. The foot should be towards the fire where possible.

3. The bed should so be placed that both sides can be readily reached.

4. It should not be so placed as to be seen when the door is opened.

5. A free circulation of air round the bed, without the patient being in a draught, is to be procured by placing the bed between the door and the window.

(*b*) In *hospitals* specially built with double walls the head of the bed may be, and usually is, placed against the outside wall, as explained above. If one wall is blank, and the beds are in a single row, they should be placed with their heads towards the light, so that the patients have not the light in their eyes. Nothing is more disturbing and more disconcerting than light from even a shaded window being directly in front of a patient in bed.

(*c*) In *temporary hospitals*, such as barns, outhouses, etc., it is well always to place the beds along the centre of the apartment, as the walls of such buildings are often of wood, and perforated with holes from various causes (rats, decayed wood of old buildings, etc.); they are apt to be damp, and, being thin, strike chilly on the patient's head. In a barn, etc., the beds should be placed head to head, but with a passage between, to allow of the nurse passing, and as there are seldom windows in the buildings there is no difficulty from a bright light.

Before the patient enters the room the window should be cleaned, the brass work on the bed, if there is any, should be rubbed up, and everything in the room should be made to look as cheerful as possible. The room is now ready for the patient, and the bed, before being occupied, should be warmed with hot bottles, or still better with a warming-pan.

In some diseases and injuries the bed must be modified. For instance, a patient with rheumatic fever should be placed between blankets, not sheets; in the case of a broken leg, thigh, or pelvis, a *fracture bed* (Fig. 6) should be made up. To prepare a fracture bed, thick wooden boards sawn to the width of the bed should be placed across the wire mattress and in sufficient number to cover the entire length of the bed from

head to foot. Supposing planks 1 ft. wide are available for the purpose, six of these would be required for

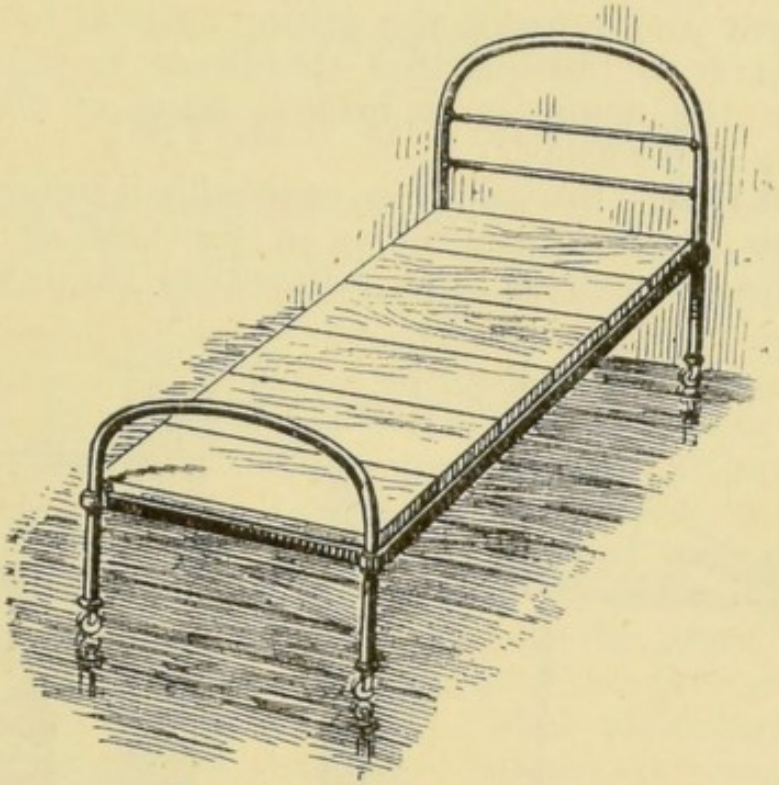


Fig. 6. – Fracture bed.

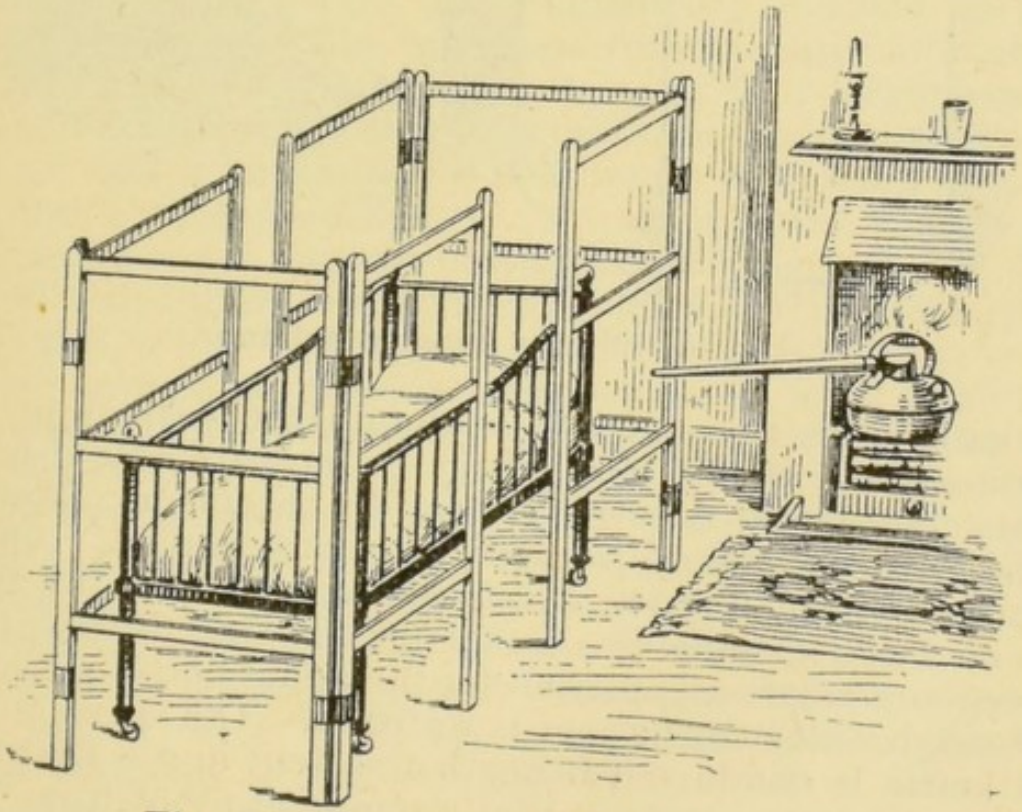


Fig. 7.—Cot prepared for steam tent.

a bed 6 ft. long; and their length would be 3 ft. 3 in. or 3 ft. 6 in., according to the bed. The boards steady the patient and prevent the jolting natural to a spring mattress; it is obvious that steadiness is required to maintain the ends of a broken bone of the lower extremity in position.

A Tent Bed.—For children, especially if suffering from bronchitis, from laryngitis as in the case of scalding of the throat, or from other ailments of the respiratory

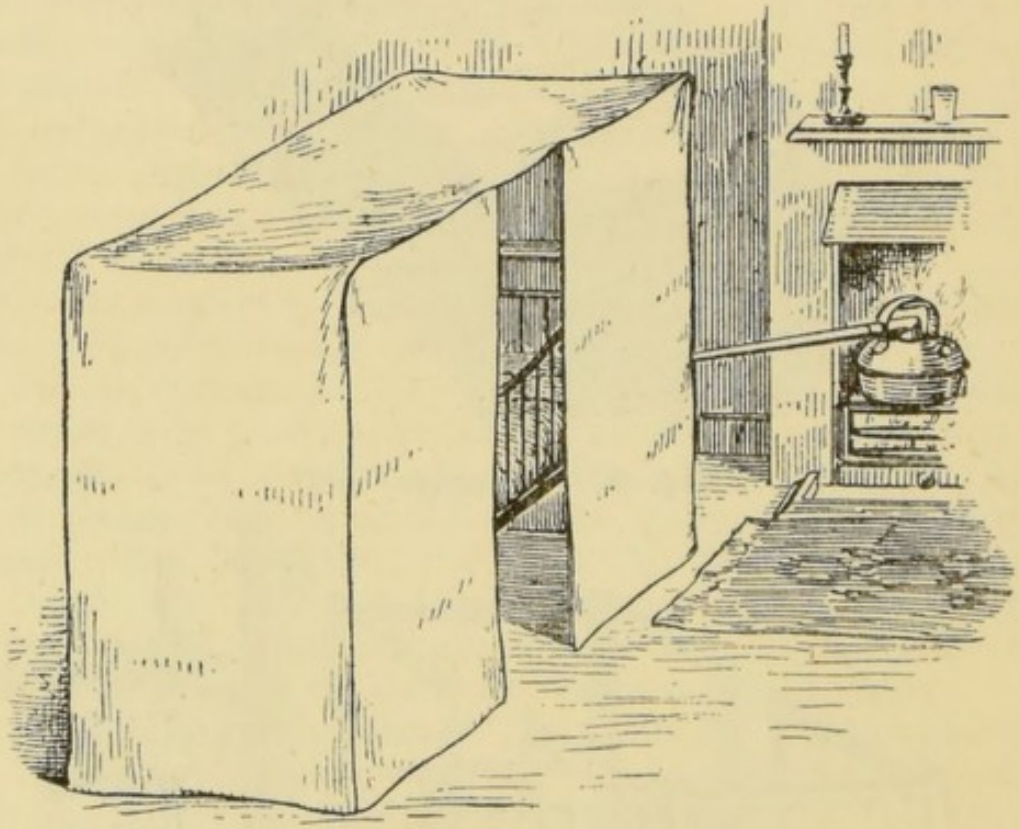


Fig. 8.—Steam tent completed.

organs, it is necessary to maintain the patient in an atmosphere of hot moist air. To prepare a tent bed, the child's crib is brought near the fireplace; around the bed are placed screens or clothes-horses; upon these, to form a roof, sheets are spread, and the bed is enclosed completely except on the side nearest the fireplace, where a gap is left for the admission of air, and through which the patient is watched. The steam from a kettle is conducted beneath this tent and a thermometer is hung inside so that a temperature of from 60° to 70° Fahr. may be maintained. (Figs. 7 and 8.)

CHAPTER V

DETAILS OF NURSING

Washing the Patient.—Not only for the sake of cleanliness, but also on account of the beneficial effects produced by removing dried perspiration from the skin, and thereby allowing deleterious products to escape freely, as well as because of its bearing upon the temperature of the body in fever, it is essential that the patient be washed at least once a day. The best time of the day to wash a patient is usually the early morning. In hospitals it is begun as early as five or six o'clock, and in a private house in which there is both a night and day nurse it is usually the duty of the night nurse to wash a patient before she retires from duty at eight or nine o'clock in the morning. The advantage of the morning wash is that the patient is usually then stronger, and, should it be a case of fever that is being dealt with, as a rule the temperature is lower in the early morning. The materials required are hot water, soap, a piece of flannel, and three or four large towels. The nurse, if hot water cannot be obtained elsewhere, must boil a kettle in the bedroom. A flannel is more suitable than a sponge, for a sponge, if the case is an infectious one, or one of blood-poisoning, will become infected, and as many object to destroying an expensive sponge, while thorough disinfection of a sponge is well-nigh impossible, it should never be used. With a flannel, however, this difficulty is removed, for there will be no hesitation in burning it after a few days' use, and getting a fresh piece. Moreover, the quantity of water in a sponge is difficult to estimate, and if, whilst washing, the sponge is squeezed fairly firmly, it gives forth a goodly quantity of water, when the pillows or sheets are apt to be soaked. The basin of warm water is placed on a small table or chair by the side of the bed, not *on* the bed, and the soap in a soap dish beside it.

To Wash the Head and Neck.—Over the pillow a towel is spread, folded double by preference, and the face, ears, and neck are washed. It must be remembered that some people object to soap being put upon the face, and their idiosyncrasy must be humoured; soap, however, must be used for the ears and neck, but on no account is it to be forced into the ear passage, a custom which many persons in their daily wash follow, with detrimental consequences. The hair, if cut short, may also be washed, if not daily, at least two or three times a week; this is best done with soft soap in a bag of muslin, wetted and rubbed on the hair. Particular care must be taken that the hair is thoroughly dried, and it is safer if a dry towel is wrapped round the head for a short time. In all cases of prolonged illness the hair, unless it has been cut short, should be thoroughly brushed at least once a day. In some cases it is absolutely necessary to shave the head. The beard and moustache must be washed with soap and water, combed and brushed, for the presence of particles of food, especially such glutinous material as beef-tea, in the beard is apt to cause continual worry to the patient.

The question of cutting the hair short is often the cause of bitter dispute between the nurse or doctor and the patient's relatives. In the case of a man there is seldom any trouble; although, even with men, relatives often object on the ground that the patient would catch cold. This is a foolish notion, seeing that the patient is in bed in a constant temperature, and not in a draught, if the bed is in the proper place. With women and children, however, the case is different. The mother often objects to her child losing its curly locks, thinking only of her own feelings, and not at all of the benefit it would be to the child. Women patients, again, often refuse to have their hair cut short, or sometimes even thinned. It is a legend amongst nurses that if a male patient of the age of, say, 20 to 25 contracts typhoid and does not have the hair cut short at the commencement of the illness, he will be bald before he is 30. This, like many similar legends, has much practical truth in it. If the hair of man, woman, or child is not cut short at an early stage in a long feverish illness, as

in typhoid, it will certainly fall out during and after convalescence, and in the case of men the baldness is frequently permanent.

To Wash the Limbs.—The rule is to wash only one limb at a time, by bringing it from below the blanket, whilst the rest of the body is carefully covered up, and in this way catching a chill is avoided. To wash an upper limb, bare it to the shoulder, spread a dry towel under the limb, so as to prevent the bed from getting wet; the limb is then washed and dried, and covered again with the blanket. The lower extremity on the same side is then bared as far as the groin, and the bed-clothes are tucked well in round the upper part of the limb so as to prevent the cold air from reaching the body; a towel is now spread below the limb, and it is washed and dried; particular care must be taken to dry the feet well, especially between the toes. The nurse now moves the table, wash-hand basin, &c., to the other side of the bed, and proceeds to wash the limbs of the other side. It may be necessary to pare the nails, and it must be remembered that the nails of the toes should be cut square across, and not rounded, as in the case of the finger-nails.

To Wash the Body.—To wash the front of the body the nurse may stand on either side of the bed; she bares the chest from the neck to the groin, covers the neck and the upper part of the chest, so as to avoid chill, and tucks a towel on both sides between the patient's body and the under-sheet as he lies on his back, thereby protecting the bed from getting wet; the front and sides of the body are then washed and dried as usual. To wash the back the patient is rolled on one side, and the back exposed, whilst the limbs and the front of the body are carefully covered with the bed-clothes; a towel is then pushed in between the trunk and the sheets, and the back is thoroughly washed and dried. Particular care must be taken with the skin of the back, for in certain ailments, especially when the patient is very weak or suffering from paralysis, the skin of the back becomes irritated and inflamed, or it breaks down and bedsores form. The most frequent site of bedsores is over the sacrum or rump

bone and on either hip, but anywhere on the back the skin may give way. In such cases it is well to wash the back frequently, dry it thoroughly, mop it over with spirits of wine, and subsequently dust it over with a dusting powder.

Changing the Nightclothes.—The best time to put on a clean nightdress or pyjamas is after washing the patient. The garments should be dried at the fire immediately before being put on, for if put on as they come from the wash, or even after being "aired" and stored in wardrobes or drawers, they are always damp and dangerous. To remove the nightdress is simple enough when the patient can move freely, but if for any reason movement on his part is either limited or wholly forbidden or impossible, proceed as follows: The sleeve of one side of the nightdress, before being put on, must be slit up along the seam as far as the shoulder and the slit carried along the seam over the shoulder to the neck; the seam of the body of the nightdress on the same side, from the lower end upwards to the armpit and round the shoulder seam in front, must also be undone. A nightdress thus prepared should have pieces of tape sewn at intervals on the sleeves, shoulders, and down one side, so that when it is put on the tapes can be tied and the dress kept in its place. It is slipped on to the arm of that side on which the dress has not been slit up, when by a little manœuvring it is passed behind the patient and over his chest without moving him, and the tapes are tied. When removing the nightdress it is easy, after untying the tapes, to pull it from beneath the patient and from the front of the chest to one side, when it can be slipped off over the opposite arm. A pyjama jacket, if the patient's arms can be moved, should be unbuttoned and slipped over the head; pyjama trousers, after being unfastened at the waist, can be slipped down and pulled off from the foot of the bed over the patient's feet without removing the bed clothes. The pyjama jacket and trousers may be put on by reversing this process. It is well always to change the nightdress night and morning, and it is necessary to dry them every time before they are put on, not only as they

come from the wash, but even when they have been worn by the patient. Needless to say, in all cases of illness more frequent change of nightgear is necessary than in ordinary circumstances.

To complete the dressing of the patient the hair must be brushed, a fresh handkerchief supplied, and the teeth brushed, or at least the mouth washed out once or twice daily.

Bed-Making.—The bed should be made once a day whenever possible, but in many cases, especially fractures of the lower limb or spine, this may be impossible to do. When there are two beds in the room of the same height and the patient is capable of moving, the beds are to be placed one alongside the other, and the patient may glide from one to the other, with or without help; or a child can be lifted from off one bed to the other, or lifted to a couch and carefully covered up whilst the bed is being "aired." A good plan when there is but one bed in the room is to make a temporary "chair-bed" as follows: On one side of the bed place three or four chairs side by side, with their seats towards and their backs away from the bed; if the level of the seat of the chair is below the level of the mattress, place folded blankets or pillows so as to bring the seats of the chairs up to the level of the mattress; over the seats put a blanket with one side hanging over the backs; the patient may then, with or without the help of the nurse, move gradually towards the side of the bed next the chairs, and, helped by the nurse, glide on to the improvised chair-bed, when the blanket is turned off the top of the chair over the patient. A pillow is placed below the patient's head, and, if necessary, another blanket for warmth laid over him. The blankets and sheets are now removed from the beds; each blanket should be hung up, one over, say, the end of the bed, another on chairs; but they should not be thrown together in a heap, otherwise the "airing" is impeded; if the same sheets have to be used again they should be put in front of the fire, with the under blanket, if there is one; the mattress may then be turned over, or it may be doubled or thrown over the end of the bedstead and allowed to remain to

"air" for a time. When it is desired to make up the bed the mattress is put in place with the under blanket over it, the under sheet tucked tightly all round underneath the edges of the mattress, and the bed clothes and pillows are replaced. To "air" a pillow it must be shaken; seize the pillow at each end, compress it and pull the ends apart rapidly and repeat this process again and again, imitating the action of concertina playing; the pillow is then seized in its centre, again compressed and pulled out rapidly and repeatedly; in this way the hot air is squeezed out of the pillow and the cooler air sucked in, and the pillow is not only "aired" but cooled, a most comforting thing in any case of illness, especially when the patient is feverish.

Changing the Mattress.—If the mattress gets soiled and the patient cannot be moved, as in fractured spine, pelvis, or thigh, undo the under sheet all round from under the mattress; roll the sheet lengthwise on both sides close up to the patient's body; the sheet thus rolled up is grasped by four persons, two on either side of the bed, each with both the hands held $2\frac{1}{2}$ ft. apart, when, all acting together, the patient may be raised a sufficient distance off the mattress to allow of other helpers pulling it away and replacing it by a clean one; the patient is then lowered and the under sheet tucked in all round underneath the mattress.

Changing Sheets.—In some illnesses the sheets, both upper and under, require frequent changing. The *upper sheet*, where it is folded over below the patient's chin, is apt to get stained during feeding, giving of medicine, etc.; this should be avoided as far as possible by placing a dinner napkin beneath the patient's chin whilst food is being administered. An upper sheet stained in this way, but not otherwise soiled, may be used afterwards as an under sheet for economy in regard to laundry, a matter which very often, unfortunately, is neither practised nor taught in the training of nurses, whether for hospital or for private work. To change the upper sheet, do not take off all the blankets and allow the patient to be covered by the sheet only, for thereby a chill may ensue and the patient be placed in danger. Instead, leave one blanket over the upper

sheet; then, after the clean sheet has been dried and warmed, lay it right over the bed on the top of the blanket, and on this place another blanket; the soiled sheet and the blanket on it are pulled down by one hand while with the other the nurse holds the clean sheet and blanket close up below the patient's chin and proceeds to remove the soiled sheet with its blanket from over the patient's feet; the blanket removed with the soiled sheet may then be replaced on the top of the blanket already on the bed. With two nurses acting together, this proceeding may be done rapidly, but one nurse can do it quite satisfactorily—and it should always be an object in training nurses to insist upon their acting by themselves without help. The upper sheet may be changed either lengthwise, as described above, or crosswise on the same principles.

The *under sheet* may be changed from either the top or the bottom of the bed, or lengthwise. Whenever possible—that is, when the patient can be rolled over on one side—the lengthwise plan of removal (Fig. 9) is preferable. To accomplish this, undo the sheet from beneath the mattress, top, bottom and sides; turn the patient on one side, say the left, without removing the bed clothes; proceed to roll up the sheet on the side (right) away from which he has turned, that is, opposite his back, rolling it up firmly towards his back as far as the body will allow. The clean sheet, dried and warmed, is rolled up on one side to slightly more than half its breadth, and laid on the side (right) of the bed where the mattress is uncovered; the edge of the sheet is tucked firmly beneath the mattress and laid parallel to the already rolled-up soiled sheet. The patient is now turned on to his back, and rolled slightly on to his right side, when from the opposite (left) side of the bed the soiled sheet can be removed and the clean sheet spread out over the mattress and tucked in at the top, bottom, and sides of the mattress. If the pillows are removed from beneath the patient's head before the under sheet is rolled up, the whole proceeding is greatly facilitated.

Another method of removing the under sheet is to undo it all round from beneath the mattress, commencing either at the head or the foot of the bed, and pulling

it and partly rolling it from beneath the patient, removing it with as little disturbance of the patient as possible. A clean under sheet may be put on while the under sheet is being removed, or after the latter

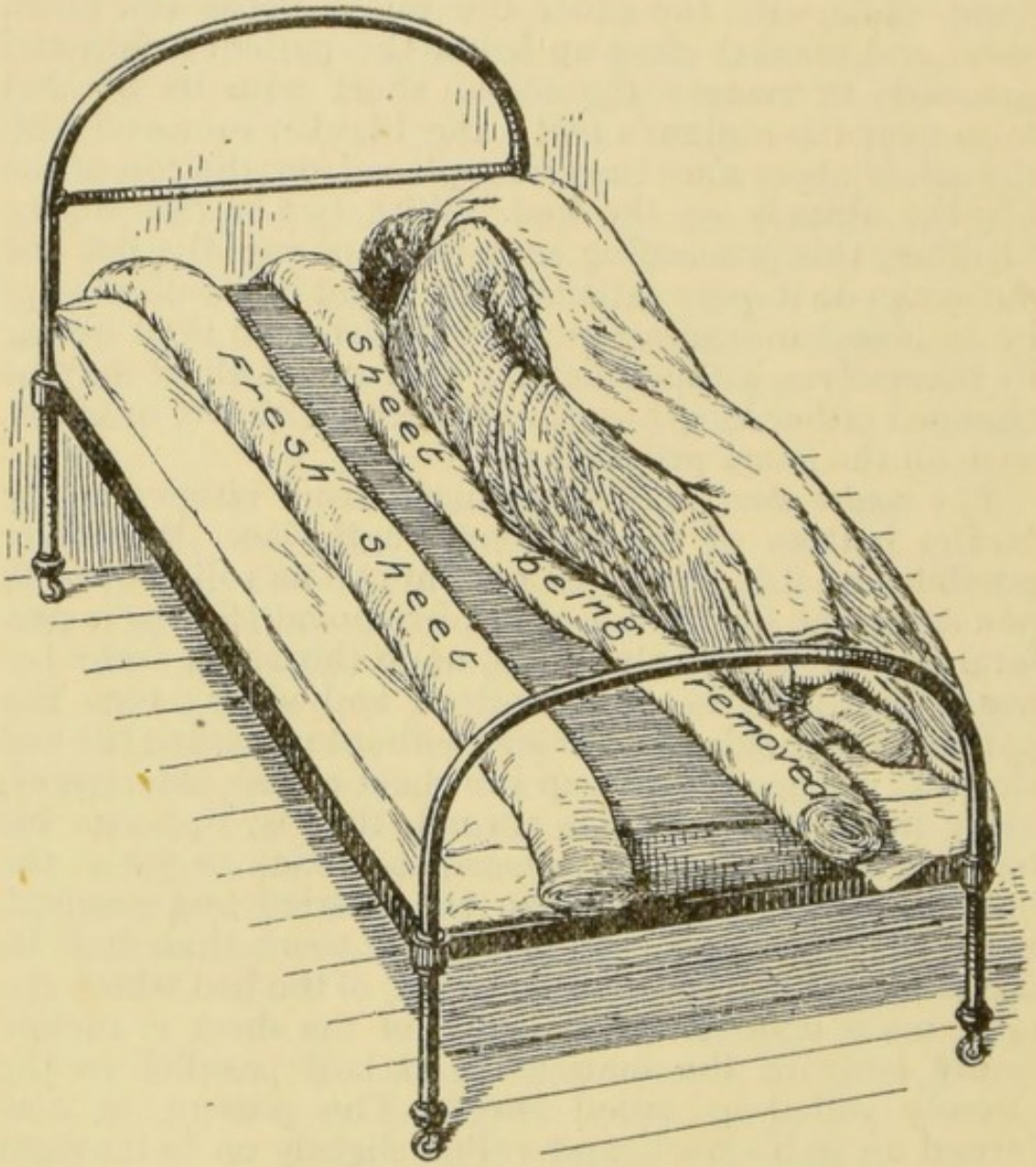


Fig. 9.—Changing the under sheet.

has been completely removed. This is the better method to adopt in the case of a fracture of the lower limb.

Draw Sheet.—When there is much perspiration, or when the under sheet is likely to get stained, as in cases of paralysis, by the impossibility of the patient

retaining his excreta, it is useful to make up a draw sheet and apply as follows: Take an ordinary sheet, double it lengthwise or fold it in three; roll it up from one side, tuck the free end beneath the edge of the mattress on one side of the bed, turn the patient upon the side away from the draw sheet, undo the roll as far as his back, turn him on his back on to the draw sheet and pull the roll through to the opposite side of the bed, where the roll is undone and the surplus sheeting tucked in beneath the mattress. As the draw sheet gets soiled, undo it on both sides, and, standing on the same side of the bed as the short end of the draw sheet, proceed to pull it through beneath the patient until he lies upon a clean part; the draw sheet is then tucked into the sides, and may be again manipulated in the same way according as a clean part is considered necessary for the patient to lie on; the draw sheet should be wide enough to extend from just below the armpit to below the knees. When the discharge is very profuse, as when the bladder has lost control, a piece of mackintosh may be placed between the folds of the draw sheet, thereby protecting the under sheet and mattress from becoming fouled, or a piece of mackintosh may be laid on the under sheet beneath the patient, and the draw sheet spread on the mackintosh. In these cases the draw sheet should be only the width of the bed, should be removed at once when soiled, and replaced by a clean one.

Lighting the Room.—Light and shade during daylight may have to be varied according to the desire of the patient or the ailment from which he is suffering. In many nervous troubles, and in affections of the eye, a darkened room is often required; special blinds of a dark green or dark blue colour may be put up, or sun blinds may prove effacacious. It must be remembered that a darkened room does not mean a room from which the air is excluded, and the necessary means of ventilation must be provided in every case. Venetian blinds of a green colour are useful accessories both for shading light and for ventilation; when the strips of wood of which the blind is composed are placed so that the current of air is directed up-

wards, the window may be opened top and bottom without danger to the patient, and with great advantage to the circulation of the air in the room, at the same time that the light in the room is shaded. In no case should the patient be placed so that the light would shine straight into his face ; the bed should be placed so that either the light shines from the side, or, better still, from behind the patient's head. In the last mentioned position the patient can read in bed with greater comfort. At night, in severe illness, it is generally necessary to have a light in the room. Electric light is not conducive to sleep unless shaded to such a degree that the reflection is directed downwards in some part of the room where the patient cannot see it. Gas light has the advantage that it can be turned low without being extinguished. An oil lamp cannot be turned down low owing to the fact that when it is so the fumes of partly consumed oil are not only disagreeable but unwholesome. A candle light can also be easily shaded, but what is termed the night light is the one in general use. The night light is usually placed in a basin or saucer with water around it, but as the light is reflected on the ceiling, even when covered by a "fairy" shade, this is apt to catch the patient's eye and may prevent sleep. The night light should therefore be so placed that its reflection strikes a part of the room away from the direct vision of the patient, or otherwise protected by improvised shades. There is no doubt that for hygienic purposes the electric light is the best, as it gives off no fumes to pollute the air of the room ; while gas, oil lamps, and candles not only consume the oxygen, but they all add products of combustion of a deleterious nature to the air.

CHAPTER VI

FEEDING THE PATIENT

The diet of the patient is the business of the doctor in charge of the case. The nurse's duty is to see that his instructions are carried out in regard to the kind, the amount, and the quality of the food, and the times at which it should be given, and she should be acquainted with the art of giving food in a manner suitable to the state of the patient. A chart of the diet should be in possession of the nurse, and on the chart the amount of food to be given at one time and the exact hours at which the food is to be administered should be mentioned.

No department of nursing requires more acumen on the part of the nurse than that of feeding. In many illnesses the sameness of the diet is a great stumbling-block, and the cravings of the patient must be withstood with firmness but without aggressiveness. The patient must be humoured, but neither pampered nor yielded to in matters which are vital; in fact, the nurse's resourcefulness and tactfulness are called upon in a superlative degree in the management of the patient as regards feeding. In no illness is the capacity of the nurse better tested than in a case of typhoid fever; this disease has indeed been called "the nurse's fever," from the fact that the welfare of the patient is so largely a question of nursing, of which feeding is the most important item. It may be well, therefore, to take a concrete example of feeding as illustrated in the case of a typhoid fever patient. Owing to the nature of the illness (*see* p. 120) it is essential that a diet yielding little refuse or waste material should be given. Milk and beef tea are usually the articles of diet chosen. As a rule, 3 pints of milk and a pint of beef tea are given during the twenty-four hours in a case of typhoid following a usual course. It is a good rule that all liquid foods

given to a typhoid patient should be strained. Food is administered as a general rule every two hours.

The actual quantity and the hours of feeding are decided by the doctor, who writes out definite instructions to guide the nurse.

The quantity of milk given at a time is usually 6 to 8 oz.; whilst beef tea is administered in quantities of 5 oz. Twice milk to once beef tea is the usual proportion.

A diet chart in typhoid fever is, as a rule, of the following type :—

8 *a.m.*	...	...	...	6 to 8	oz.	of milk.
10 *a.m.*	...	...	...	6 to 8	,,	,,
12 *noon*	...		..	5	,,	beef tea.
2 *p.m.*	...	...	...	6 to 8	,,	milk,
4 *p.m.*	...	...	...	6 to 8	,,	,,
6 *p.m.*	...	...	.	5	,,	beef tea.

These are the times and quantities for twelve hours during the day; for the night the same chart holds good.

It will be seen from the above that the patient has milk eight times and beef tea four times during the twenty-four hours. If 6 oz. of milk are given at a time, then $6 \times 8 = 48$ oz. (2 pints 8 oz.) of milk are required for the twenty-four hours' feeding; but if 8 oz. are given, $8 \times 8 = 64$ oz. (3 pints 4 oz.) are required for the twenty-four hours' feeding (practically 3 pints). Beef tea is administered four times in the twenty-four hours, and in quantities of 5 oz. at a time, therefore $4 \times 5 = 20$ oz. $= 1$ pint has to be prepared daily.

The nurse must see that the proper quantity of milk is ordered from the dairy, and that one pint of beef tea is made at home every day. This simple diet has usually to be kept up for at least four weeks, and its monotony during the fourth week, when the patient is recovering and craving for more food, and food of a different kind, is such that all the resources of the nurse are called into play to resist the patient's desires. It is then, perhaps, more than at any other time that discipline and training justify themselves. Without these the nurse is handicapped, for the desire of the

patient and his prayer for food of a different kind are so persistent and pathetic that sentiment is likely to overcome judgment, especially in the case of a relative, with fatal results; for an error in diet at this stage is calculated to cause a relapse, or even fatal consequences.

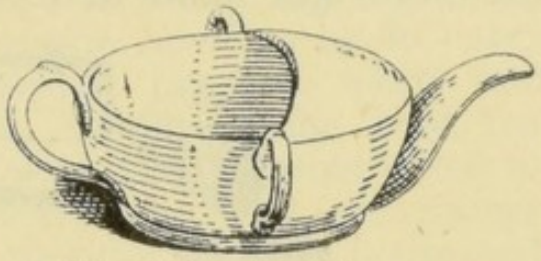


Fig. 10.—Feeding-cup.

The milk and beef tea should be given from a glass, cup, or spoon, in preference to a feeding-cup. At times a feeding-cup is essential, but to drink from the spout of any vessel is not a natural method of taking any fluid, and it is difficult to keep the spout clean. (Fig. 10.) A feeding-cup should therefore be reserved for special occasions, and the more natural method of taking food adhered to as long as possible. In the lying-down position, to drink milk from a cup or tumbler is awkward, inasmuch as the fluid is apt to run down the sides of the patient's mouth and wet the neck and the bedclothes, and, worst of all, the beard. A satisfactory cup to drink from has been prepared in the form of what is called the "Ideal" drinking-cup; the lip of the vessel is narrowed to a point at one side, so that the fluid is directed as a narrow stream into the mouth, instead of being spread out, as in the case of an ordinary cup or tumbler (Fig. 11). For milk and its preparation, *see* p. 41.

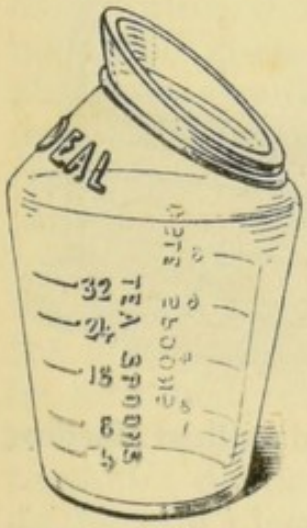


Fig. 11.—The "Ideal" drinking-cup.

To Give Beef Tea.—Beef tea, when the patient is reclining, may be given, when warmed, from a cup such as the "Ideal" drinking-cup, or from a spoon or feeding-cup. As an object lesson of how to administer beef tea the following is instanced: Suppose it is 12 o'clock midnight, the patient is asleep, and the diet chart shows that beef tea has to be given; how would the nurse set about it? The beef tea is warmed in the

room by the nurse, either over the fire or a spirit lamp; it is then poured into a bowl, previously scalded with hot water, which is placed on a table by the side of the bed, usually on the right side, so that the nurse may use her right hand in feeding the patient (Fig. 12).

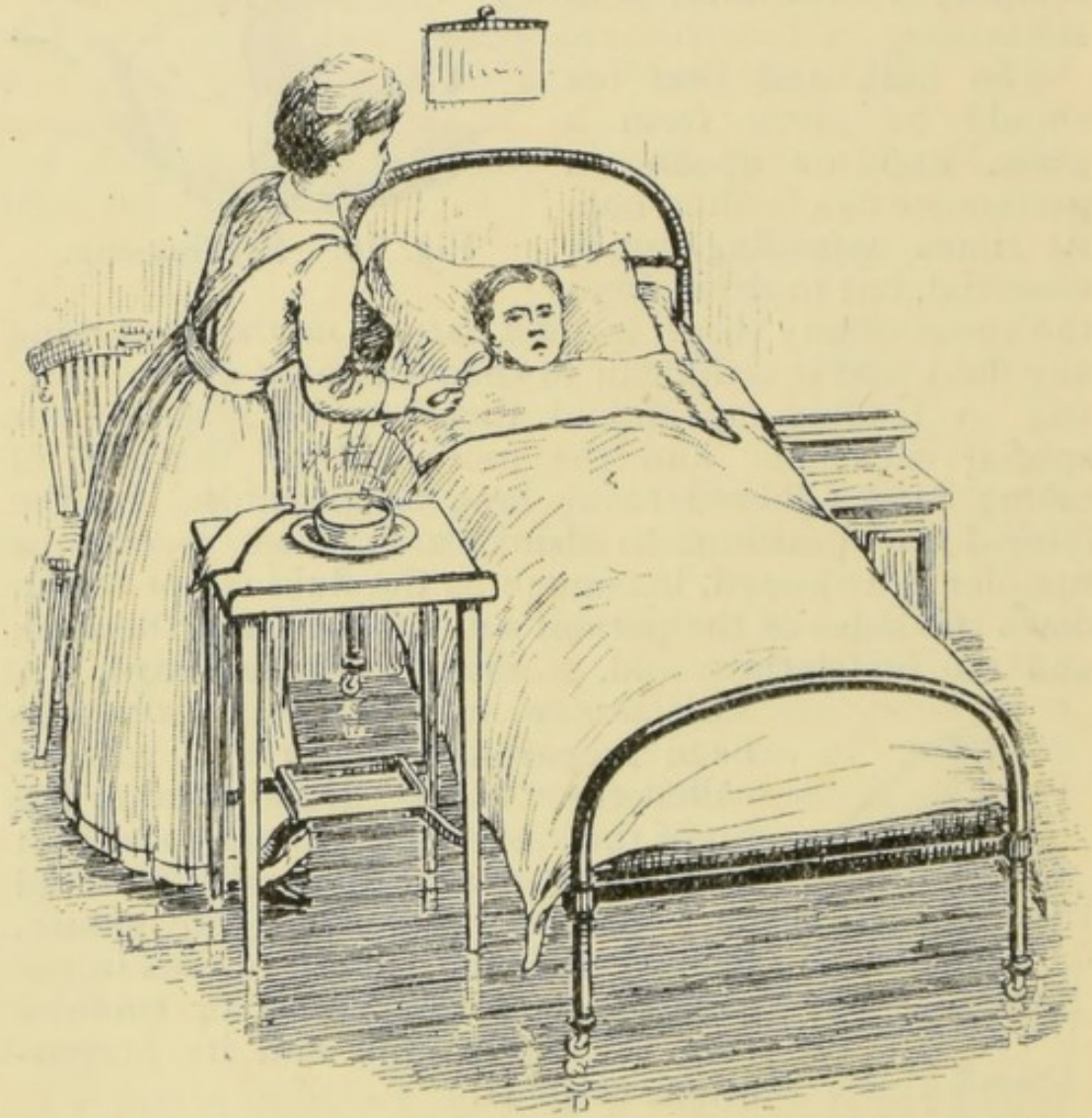


Fig. 12.—Nurse with left forearm behind pillow feeding patient with a spoon.

A tablespoon, not a teaspoon, is to be used for the purpose. The nurse now speaks to the patient in a natural voice—it is not necessary to shout, nor should she speak in whispers; both are objectionable, and whispering, say between nurse and doctor, or nurse and relatives, should never on any pretence be allowed in a sick-room, nor outside the bedroom unless the door is shut. It is

not necessary for the nurse to arouse the patient by shaking him, but by placing a hand on his shoulder and speaking in the natural voice the patient will awake without alarm. After tucking a table napkin below his chin, so as to protect the upper sheet, she half fills a tablespoon with the beef tea, and brings the bottom of the spoon over the edge of the bowl so as to carry off the drop; she then passes her left hand and forearm beneath the pillow, and gives the beef tea from the spoon. It is not necessary nor expedient to raise the patient's head when the hand and forearm are passed below the pillow, for thereby the chin is pressed down upon the chest, and swallowing is rendered difficult; the thickness of the forearm alone suffices to place the patient's head in a suitable position to take the food. The basin on the table should be so placed that the nurse can reach it without withdrawing the forearm from beneath the pillow every time the spoon is filled.

Although milk and beef tea constitute the prescribed food for a patient in typhoid fever, and other illnesses, they are not calculated, nor do they help, to assuage the thirst; this may be done by giving sips of hot or of cold water, but a long draught of cold water should never be given, for, when the temperature is high, a chill may result, and sometimes a cramp of the stomach may be induced, with serious consequences. Ice may be given in small pieces, but never a long ice-cold drink, for the reason mentioned above. Instead of plain water, home-made lemonade, barley water, toast water, rice tea or rice water, or ordinary tea may be allowed. (For the preparation of these, *see* pp. 44, 45.) The milk may be administered after being peptonised, or as curds, or as junket (pp. 40, 41). An excellent plan of giving the patient a drink to assuage the thirst is through a straw, as thereby a lesser amount of fluid will suffice, and since only a small quantity is introduced into the mouth at a time, the fluid, even if cold, is sufficiently warmed in the mouth before being swallowed. When straws are not to be had, an india-rubber tubing thoroughly cleansed or boiled for a few moments may be used. Some patients prefer to suck the food through a teat as does a child.

When the patient is allowed increased diet after, say, the end of the fourth week in typhoid fever, this usually takes the form of custard pudding, coffee with milk, soft boiled eggs, breakfast rusks, fingers of bread and butter, and, later, milk puddings of various kinds. The capable nurse will now turn her talents to stimulating the patient's appetite and favouring his digestion by such expedients as may be at her command. As illustrating the influence she may have in promoting the patient's recovery during convalescence, a single example will suffice. Suppose the doctor has stated that the patient may have a chop on the morrow: the nurse, in communicating the good news to the patient, may say, "I am just going out to the butcher's to get the best chop he has"; when she returns she may tell the patient how interested the butcher was to hear of the patient's recovery, and that he would send the very best chop that it was possible to obtain. On the following morning the nurse would, say, at eleven o'clock, inform the patient that the chop had arrived, and declare how the cook had extolled its excellence; at one o'clock she would draw attention to the fact that she was now going down to the kitchen to bring up the chop. This may seem idle talk, but it really is not so, and the nurse who knows her business has learned by experience the meaning of stimulating the patient's appetite by previously talking about the food. The patient's "teeth" are made "to water," a popular description of the flow of saliva into the mouth, and not only the salivary glands but all the digestive organs are stimulated to action by the mere talk of food; for it is a physiological fact that the stimulation of one part of the alimentary canal leads to the excitation of the whole.

Our knowledge of digestion has been largely gained by observing the changes that take place in the stomach through wounds of the abdominal wall which open directly into the stomach itself. Observations made through this channel show that when food is placed in the mouth the gastric juice begins to flow in the stomach, or, again, if food is introduced into the stomach through the opening in the wall of the abdomen,

not only does the gastric juice flow, but the saliva in the mouth begins also to flow. It is therefore evident that the nurse's talk concerning the chop is a physiological and hygienic factor of the first importance. To take a joint into the room, and cut off a piece and give it to the patient, saying, "You need not eat all that unless you like," or "There is plenty more here, if you want it," is not nursing, but the mechanical act of a "mere hand," who knows nothing of the art of nursing. Tempting food is calculated to promote digestion, and not only the food itself but the plates, spoons, and knife and fork, the napkin spread upon the tray, etc., etc., by their appearance play their part in helping digestion.

Forcible Feeding.—In the event of a patient being delirious or refusing food, it is necessary to enforce feeding, but it should so be done, of course, as not to hurt the patient. When the mouth is firmly closed and the teeth are clenched, if a finger is pushed into the side of the mouth the cheek may be pulled away from the teeth, and into the space thus created beef tea, milk, tea, or other fluids may be poured, a small quantity at a time, and the finger kept in the mouth until the fluid reaches the back of the throat and causes the patient to swallow; this may be repeated again and again. If, even with this expedient, the patient manages to expel the fluid from the mouth, the nose should be held, when the necessity of breathing causes the mouth to be opened and the fluid will find its way down the throat. At times it is necessary to apply a gag between the teeth, and with the mouth thus opened the fluid food can be introduced. When all efforts to feed the patient by a simple expedient fail, or when the condition of the throat from accident or disease prevents swallowing, it may be necessary for the doctor to feed him through a tube introduced into the stomach by way of the nose and gullet. If food cannot be administered by the mouth, owing to vomiting or for other reasons, the patient may have to be fed by introducing nutrient enemata into the bowel.

CHAPTER VII

INVALID DIET

Milk.—Milk is the staple food in most cases of illness. The exact quantity to be given it is the duty of the doctor to prescribe. In such an illness as typhoid fever from two to three pints are required in the 24 hours. In cold weather the milk will keep if placed in a properly ventilated larder, or in a cool room. The jug, bowl or basin in which milk is received and kept should be boiled or cleaned or scalded before use, and covered over to protect it from dust and flies, both before and after the milk is poured into it. Milk should never be placed alongside of strongly smelling substances, otherwise it will taste of them. In hot weather it should be scalded as soon as it comes into the house. Boiled milk is objected to on account of its flavour, and it is sufficient merely to scald it, for this will both prevent it from going sour and sterilise it. Milk may be scalded by placing it in the oven or in a saucepan by the side of the fire, so that the temperature is gradually raised. When it is sufficiently scalded a thin skim or film collects upon the surface. Milk should never be kept in the sick-room, and if the larder is too far away the jug containing it may be placed on the landing outside the bedroom door, or by an open window, where, if it is properly covered, no harm can come to it.

Milk may be given in the form of *curds* or *junket*. Plain curds are made from warm milk by adding a little rennet, which may be obtained in a fluid state ready for use; or a small piece of the dried material, which is made from the stomach of the calf, may be soaked in a cupful of warm water for four hours and strained: the liquid thus obtained is fluid rennet, a teaspoonful of which will suffice to curdle half a pint (tumblerful) of milk. The whey that is left by the curd is useful as an article of diet in many illnesses, especially when milk cannot be digested or is vomited. *Junket* consists of

curdled milk to which various flavouring substances have been added.

White Wine Whey.—When a wineglassful of sherry is added to a tumblerful of boiling milk the curd that forms may be strained off, and the liquid, known as white wine whey, is a good form in which to administer a mild stimulant.

Fresh cow's milk is always to be preferred for all purposes in sickness and in health, but condensed milk, sweetened or unsweetened, may be used in an emergency. Milk is also obtainable in the form of powder, and several preparations on the market are convenient and wholesome.

To Peptonise Milk.—Into a clean (scalded) bottle pour 1 pint of milk, ¼ pint (5 oz. or half a tumblerful) of cold water and a peptonising powder; stand the bottle in water, as hot as the hand can bear, for twenty minutes, shaking the bottle occasionally; the milk is then ready for use. Full directions are given with every variety of peptonising powders, tablet or tabloids sold.

Beef Tea.—Take 1 lb. of beef freed of fat and bone, cut into small squares, but do not mince it, and place it in an earthenware jar with a pint of cold water; secure the lid, and place the jar in a saucepan of hot water; let this stand and simmer by the side of the fire for three or four hours, strain through muslin, and squeeze out all the beef tea from the meat; add a pinch of salt to the beef tea before setting it aside to cool. Beef tea is administered usually in teacupful doses—that is, about 5 oz. at a time.

Beef Essence.—Take a piece of lean beef, say 1 lb., freed of fat and bone, cut into small squares, and put into an earthenware jar with a couple of tablespoonfuls of cold water; put on the lid of the jar, and tie a piece of paper or cloth tightly over it; stand the jar in a hot oven and let it remain for three or four hours, or stand the jar in a saucepan half full of hot water and let it simmer for four hours. On opening the jar three or four tablespoonfuls of deep-brown fluid may be strained off through muslin. Beef essence is given to the patient when only a very small quantity of nourishment can be taken at a time. Only a tea-

spoonful, or at most a tablespoonful of the essence, should be given at once, for it is impossible for a patient during illness to digest a larger quantity of this concentrated fluid if given at one time, as kind friends often wish to be done.

Raw-Meat Juice.—Half a pound of lean rump steak is finely minced and a wineglassful of cold water is poured over it; let this stand for two hours, transfer it to a cloth, and forcibly squeeze the juice from the meat. The juice should be placed on ice; but even then it will not keep longer than about twelve hours.

Scraped Beef.—Take a piece of lean rump steak, say ¼ lb., and with a table-knife scrape the edge of it so that the meat is torn into shreds. A teaspoonful of this along with the juice that escapes from the beef is given from time to time, or between thin wafers of bread.

Raw-Meat Sandwiches.—Scrape or pound in a mortar ¼ lb. of lean meat, add 1 oz. of flour or arrowroot and ½ oz. of castor sugar. Rub through a hair sieve or coarse muslin, preserving the juice; spread on bread, or bread-and-butter, adding a little salt, cover with a thin slice of bread, and cut into small 1-in. squares.

Peptonised Beef Tea.—Take a pint of beef tea slightly warmed, add to this ⅓ teaspoonful (20 grains) of bicarbonate of soda and fill up the teaspoon with Zymine (30 grains); mix with the beef tea and pour the mixture into a covered jar; place this near the fire covered with a piece of flannel or cloth, so that it is kept just warm but no more. After three hours the beef tea is poured into a saucepan and brought to the boil, when it is allowed to cool. Some one of the many similar preparations on the market may be used in an emergency in place of the home-made preparation, but they are never to be continued as a substitute for beef tea.

Nutrient Enemata.—When for any reason (vomiting, ulcer or wound of stomach, etc.) nourishment cannot be administered by the mouth, a crisis may be tided over by injecting stimulating or nutrient materials into the bowel. When the patient is exhausted by loss

of blood, shock after operation, etc., a stimulating enema of the following ingredients may be injected by a Higginson's syringe (p. 136), viz.: 18 oz. of normal saline solution (about 1 teaspoonful of salt to 1 pint of boiled water), 1 oz. of brandy, 1 oz. of peptonised beef tea. Nutrient enemata may consist of beef tea, eggs, gruel or milk. A useful formula is: 2 yolks of eggs beaten up, 2 oz. of peptonised beef tea, and 2 oz. of peptonised milk or gruel—5 oz. in all; this may be given by a glass syringe every four or six hours.

Chicken Tea or Broth.—Cut the chicken into small pieces, breaking all the bones in several places, put into an earthenware jar with a pint of cold water, and about half a teaspoonful of salt, cover the jar tightly and stand in a saucepan half full of boiling water, let simmer for three hours, and strain. Chicken tea is usually given in teacupful (5-oz.) doses.

Beef Jelly.—In preparing ordinary beef tea, if an ounce of isinglass is added to each pint of the tea, the preparation, when allowed to cool, will jelly more readily.

Calf's-Foot Jelly.—Wash clean two calf's feet, cut them up, and place them in a soup pot or saucepan with enough cold water to cover them well; bring to the boil slowly and skim at the boil, and repeat this from time to time. Continue the boiling for three or four hours until the bones are separated from the meat; strain through a hair sieve or coarse muslin, and let stand in a bowl or mould wetted with cold water. When the jelly is wanted for use it can be turned out of the bowl by standing the bowl in warm water, and then inverting the dish over the plate.

Chicken Jelly.—The chicken is skinned, the fat removed, and the whole chicken cut into quite small pieces, chopping up the bones; pour a wineglassful of water into the jar along with the chicken, fix the lid tightly and stand the jar in a saucepan of boiling water, in the oven or by the side of the fire, to simmer for four or five hours; strain through muslin and allow to cool. A tablespoonful at a time is about all the patient can digest. Chicken jelly can either be taken as a jelly, or as a fluid by warming.

Chicken Cream.—Take the breast of a chicken, cut it

up fine and pound in a mortar; place this in a saucepan with a teacupful of milk and heat, stirring all the time; a pinch of salt is added and a tablespoonful of cream; strain, and serve hot. Mutton, beef, or veal can be made into a cream in the same way as chicken by thoroughly pounding it first and skimming off the fat.

Barley Water.—After washing the barley, put 2 oz. (4 tablespoonfuls) in a jug; over this pour a pint of boiling water, and strain when cold. Sugar and lemon may be added to taste, using four lumps of sugar, the rind of one lemon, and the strained juice of half a lemon. When it is desired to make the barley water thick, boil the barley in the water until this is reduced to two-thirds its original quantity. The thickened barley water is useful for diluting milk.

Toast Water.—Take two large or three small slices of stale bread and toast them before a bright fire, brown well without burning until they are crisp; put them into a large jug and pour over them a quart of boiling water; strain when cold, and add a lump or two of sugar and a squeeze of lemon as desired.

Rice Water.—Wash 3 oz. (6 tablespoonfuls) of rice in cold water and pour off the water; place in a saucepan with 1½ pints (3 tumblerfuls) of cold water, put by the side of the fire and allow to simmer until the bulk is reduced to about a pint, then cool, and strain. The rice water may be taken plain, or it may be flavoured with a teaspoonful of lemon juice and two or three lumps of sugar.

Rice Tea.—Put 3 tablespoonfuls of rice in a saucepan, place on the fire and keep moving the rice about until it is browned but not burned; over it pour a pint and a half of boiling water, allow to cool, and strain. The tea may be taken plain, or with a little lemon juice and sugar added. The rice may also be browned by being put upon a plate in a hot oven.

Lemonade.—Put the peel and the juice of a lemon with three or four lumps of sugar in a jug, pour a pint of boiling water over the ingredients, cool, and strain. In making lemon drinks, only the outer part of the rind, which is yellow, must be used, and to obtain the full benefit of the flavour the fruit should be soaked in

water sufficient to cover it for 24 hours; to this is added the lemon juice. The juice may be squeezed out by a patent squeezer, but, if this is not at hand, the white part of the rind, after the thin yellow peel has been removed, should be scraped off by a knife, otherwise, if the white part is allowed to remain, the lemonade will have a bitter taste. The lemon may be squeezed by the hand, or cut into pieces and strained through muslin.

Home-made Effervescent Lemonade.—Squeeze the juice of a lemon into a tumbler, nearly fill the tumbler with cold water, add two lumps of sugar; when the drink is given add a third of a teaspoonful of bicarbonate of soda, and let it be drunk while effervescing.

Effervescent Drinks.—Soda water and lemonade, whether from bottles or from syphons, are not suitable drinks for an invalid; they are apt to increase the thirst, and to cause indigestion and discomfort.

Iced Drinks.—Almost any fluid given to the patient may be iced either by being stood upon ice or by adding ice to it; but no iced fluid, nor even cold drinks, should be drunk, but sipped from the glass or taken with a spoon, or sucked through straw.

Ice may be sucked from time to time, but not *ad libitum*. If the practice of sucking ice is kept up for a long time, stomach troubles such as wind, eructations and indigestion ensue.

Albumin Water.—Break a raw egg in two; allow the white to escape by passing the yolk from one half of the shell to the other, whisk the white for ten minutes to a stiff froth, add half a pint of cold water, and allow to stand for an hour to dissolve. A little salt or lemon juice will serve as flavouring.

Tea.—In making tea for an invalid no teapot should be used; instead, place a dessertspoonful of tea in a strainer, hold the strainer just above the cup to be filled, and slowly pour the boiling water over the tea in the strainer. The tea may be drunk plain, or sweetened with sugar or saccharine to which may be added either a squeeze of lemon juice or a small quantity of cream. Milk with tea is not hygienic.

CHAPTER VIII

MEDICINES AND THEIR ADMINISTRATION

The administration of medicine demands tact from the nurse in a high degree. From the very fact that a substance comes under the denomination of medicine it is apt to cause remonstrance on the part of the patient. Medicines are commonly made up in the form of mixtures, pills, powders, tabloids or tablets, cachets, or they consist of oils, syrups, etc.

Measuring Medicines.—Medicines have to be exactly measured not only by the apothecary who makes up the prescription, but also by the nurse or hospital orderly, who must be thoroughly acquainted with the various measurements.

The chief **weights** in use in medicine are—the grain, the ounce, and the pound.

The *grain* (Latin *granum*) is written in a prescription as gr.; thus, three grains is written gr. iij.

The *ounce* (Latin *uncia*) is indicated in a prescription by the symbol ℥. Thus, one ounce is written ℥j.

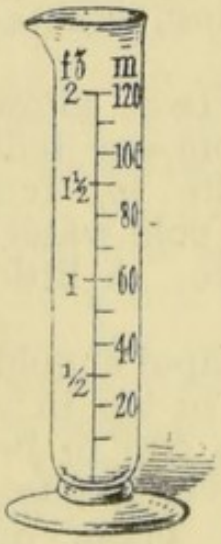


Fig. 13.—Graduated minim measure glass.

The *pound* (Latin *libra*) is written lb. Thus two pounds is written lb.ij.

The **liquid measures,** or measures of capacity, are the minim (drop), the fluid drachm, the fluid ounce, the pint, and the gallon.

The *minim* is the medicinal drop; but a drop varies in size according to the nature of the fluid; thus, a drop of water or of spirits of wine is much smaller than, say, a drop of castor or of olive oil. A "graduated" measure glass (Fig. 13) must therefore be always used when dealing with medicines in small quantities. The fluid drachm, 60 minims, is usually regarded as a teaspoonful, but

the domestic teaspoon varies in size to such an extent that in measuring medicines a teaspoonful should always be a "measured" or medicinal teaspoonful. The same holds good in the case of dessertspoonfuls and tablespoonfuls. These are spoken of as the equivalent of 2 drachms and 4 drachms ($\frac{1}{4}$ or $\frac{1}{2}$ ounce) respectively, but they are not to be regarded as dependable measurements, and the "measured" teaspoonful, dessertspoonful or tablespoonful is always to be used instead. The spoonfuls may be measured in a medicine glass (Fig. 14) or in a porcelain spoon marked off by lines into quantities (Fig. 15). The medicine spoon is made to stand on a table, and possesses thereby an advantage over any of the domestic spoons, which, when they have to be set down on the table, tilt and spill their contents.

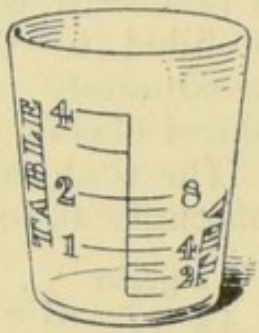


Fig. 14.—Graduated medicine glass.

Table of Liquid Measures.

1 minim	... ...	=	1 drop (medicinal).
60 minims	... ...	=	1 drachm.
8 drachms	... ...	=	1 ounce.
20 ounces	... ...	=	1 pint.
2 pints	... ...	=	1 quart.
4 quarts	... ...	=	1 gallon.

Table of Domestic Measures.

1 teaspoonful	... =	1 drachm (ʒj).	
1 dessertspoonful	... =	2 drachms (ʒij).	
1 tablespoonful	... =	4 drachms =	$\frac{1}{2}$ ounce ($\bar{ʒ}$ss).
2 tablespoonfuls	... =	8 drachms =	1 ounce ($\bar{ʒ}$j)

In the $\frac{1}{2}$-ounce symbol, written $\bar{ʒ}$ss or $\bar{ʒ}$fs, the "fs" or "ss" is contracted from *semis* = half.

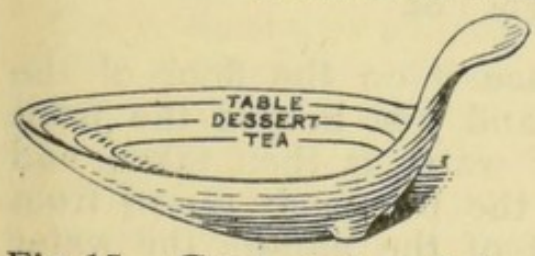


Fig. 15.—Graduated medicine spoon.

The *gill* officially measures 5 oz., so that 4 gills = 1 pint; but the gill measure varies so frequently in different parts of the country that it had better be avoided for medicinal purposes.

A *teacupful* is frequently mentioned in cookery and in feeding patients, but teacups, of course, vary much in

size. The ordinary British or Japanese teacup in every-day use contains when filled to the brim about 6 oz., and a breakfast-cup, 9 oz. As usually filled at meals they contain about 4½ oz. and 7½ oz. respectively. A *tumblerful* is approximately half a pint when the glass is filled to the brim; a sherry glass contains approximately 2½ ounces, a port glass 3 oz., and a claret glass 5 oz.

The scale by which the weight of drugs is calculated officially as follows:

1 grain	written in prescriptions	gr. i;
437·5 grains = 1 ounce ...	,, ,,	℥ j;
16 ounces = 1 pound ...	,, ,,	lb j.

If (during a campaign) scales are not to be had, the following weights will be found approximately correct:—

Coins as Weights.

One halfpenny and one threepennypiece	=	¼ oz. (avoirdupois).
Two halfpennies and one farthing ...	=	½ oz. ,,
Three pennies (or five halfpennies) ..	=	1 oz. ,,
Six pennies (or ten halfpennies) ...	=	2 oz. ,,
One threepenny piece	=	20·8 grains.
One sixpence	=	43·6 grains.
One shilling	=	87·2 grains.
One florin	=	175·4 grains.
One half-crown	=	218·0 grains.

Salt.—A tablespoonful of kitchen salt weighs ½ oz. A pinch of salt is the amount that can be raised between the thumb and fore and middle fingers, and weighs about 8 grains, or as much as will stand heaped up on a sixpence.

Sugar.—A large piece of lump sugar weighs ¼ oz. A tablespoonful of castor sugar weighs 1 oz.

Rice.—A tablespoonful of rice weighs 1 oz.

Pills.—To give a pill, place it on the floor of the mouth beneath the tongue and just behind the front teeth. A large mouthful of water is then taken, and as in the act of swallowing the tongue is raised from tip to root against the roof of the mouth, the water washes the pill with it to the back of the throat. Tablets or tabloids, crushed or whole, can be taken in the same way. Some prefer to put the pill at the back of the tongue.

Powders.—Most powders, if allowed to stand in water for a considerable time, sink and become suspended in the water instead of floating upon it, and in this way may be readily swallowed. The powder —say Gregory's powder, which is especially nauseous to most people—should be placed in a wine or liqueur glass of water for some hours before it has to be taken. When thoroughly soaked it should be transferred from the glass to a tablespoon with the water, when it is readily swallowed. If the powder is exceptionally nauseous it may be placed in a *wafer paper* as follows: Fill a tablespoon two-thirds full with water; lay the wafer paper on the spoon and pour a little water over it; the wafer paper is thus softened and floats upon the water in the spoon; the powder is placed in the centre of the wafer paper, the edges of which are then raised and made to cover the powder completely; the wafer paper with the contained powder now floats on the top of the water in the spoon, when the contents are taken into the mouth, and the wafer paper is floated down the throat upon the water. A *cachet* may be dealt with in the same way; that is, thoroughly soaked on both sides, and floated on the water in the tablespoon, when it is readily taken down. Do not place the dry cachet on the tongue and then attempt to wash it down with water, for it is apt to burst.

Oily Substances.—Castor oil is always looked upon with abhorrence, but as it is an absolutely essential drug in many ailments it is necessary to know how best to give it. Many expedients are tried, but perhaps the simplest is to give it on lemon juice as follows: Cut a lemon in halves, squeeze the juice of one half into a medicine glass, a wine glass, or best of all a liqueur glass. When the juice has been squeezed into the glass, swill it round so that the glass is completely moistened; pour the prescribed quantity of oil on to the centre of the lemon juice, but do not wipe the drop from the bottle against the edge of the glass; the cut surface of the lemon is then mopped round the rim of the glass so that it is wetted both inside and outside. The patient now first sucks the

other half of the lemon, and then gulps down the contents of the glass. It will be found that this is a tasteless method of administering castor oil, for the flavour of the lemon juice covers up the taste of the oil. The old method of giving the oil first and a lump of sugar afterwards was wrong in principle, for as the taste of castor oil was already in the mouth the sugar could not be appreciated, and served rather to increase than to decrease the objectionable flavour. Castor oil is often recommended to be given on hot milk or coffee ; but it is not well to use common articles of food as vehicles for objectionable medicines, as the patients, especially children, are apt to refuse for some time afterwards to take the milk, etc., suspecting that they may again contain medicines. Cod-liver oil may have to be given for a few times in the same way as castor oil ; but it is well known that the taste of cod-liver oil ceases to be objectionable, and the child or older patient, after a few days, looks forward to the dose with indifference or with pleasure.

Dilution of Medicines.—The diluting of medicines with water should be done in accordance with the doctor's directions. These may be communicated to the nurse privately, but it is better that the amount of dilution should be indicated on the label on the bottle. When the nurse adds water to the medicines the water used should have been previously boiled.

The Time to Give Medicines.—There is a right and a wrong time for giving medicines. Some, especially those containing alkaline substances, are given before meals, say a quarter of an hour or ten minutes before the meal. The object of giving medicines of this description before meals is usually to promote digestion by stimulating the flow of the gastric juice. Acid medicines are generally given after meals, at periods of ten minutes, half an hour, an hour, two hours or more after the end of the meal, for the purpose of carrying on the digestion by supplementing the action of the gastric juice, should this prove inadequate to complete the process. Strong drugs, such as arsenic, are given after a meal so that they are thereby incorporated with the food and prevented from injuring

the coat of the stomach and intestines, as would happen were the stomach empty.

Aperient Medicines.—Purgatives may be given in the form of pills or powders, or as fluids with the aperient salt dissolved in them. The drugs given as pills or powders are generally slowly acting medicines and are given at bedtime. The meal that immediately precedes the giving of a purgative should be a light one; thus if a pill is to be taken at bedtime a heavy dinner should be avoided, and only the very lightest of food taken for dinner or supper. Salts, such as Epsom salts, Carlsbad, aperient waters, etc., are as a rule administered in the early morning, either with or without a pill given the night before. Salts are much more speedy in their action than pills or powders, and act better if a glass of hot water or a cup of tea is taken from half an hour to an hour afterwards. It is seldom advisable to give purgatives during the day, as they are apt to upset the patient by interfering with meal times, or affecting him at inconvenient times.

Medicines Administered Hypodermically.— Many drugs and other remedies are introduced beneath the skin with the hypodermic syringe. This procedure is usually carried out by the doctor, but in urgent cases it may under the doctor's directions be done by a thoroughly trained nurse. Members of Voluntary Aid Detachments, when a remedy is to be administered hypodermically, should know how to sterilise the syringe and needle that are to be used (*see* p. 137), to sterilise the skin at and around the spot where the needle is to be introduced, and to have a thoroughly sterile glass or porcelain vessel in which to dissolve the hypodermic tablet. On no account is a hypodermic injection to be given by anyone except by a doctor or a trained nurse.

Suppositories.—Conical-shaped preparations, an inch or two in length, and about ¼ inch in breadth at the base, containing drugs which are incorporated with cacao butter, may be introduced into the lower bowel. The suppository should be smeared with a little olive oil or vaseline before being introduced; the conical point is held against the aperture of the bowel, when

by a gentle push the whole suppository will disappear. In the bowel the suppository melts and the drugs it contains are set free and absorbed.

Ointments and Salves.—Some ointments are merely applied as remedies for skin affections, others, such as mercury (blue ointment), have to be rubbed in so that the drug may find its way through the skin, when it is absorbed into the blood and tissues.

CHAPTER IX

TEMPERATURE OF THE BODY—FEVER

The temperature of the body in health follows a definite course, varying as the day advances. In the early morning, from 4 to 6 a.m., it is normally at its lowest; usually in healthy persons it is about 97·5° F.; that is, about a degree below the normal. As the morning advances the temperature gradually rises, until by the forenoon it reaches the normal of 98·4° F. After noon and towards evening it is in healthy persons at its highest, when it may exceed the normal by a fraction. Late in the evening it again declines, to reach the normal at midnight, and afterwards gradually to fall until it touches its lowest point between 4 and 6 a.m.

A **low or subnormal temperature** of the body is present in cases of shock due to injury and after surgical operations, collapse from alcoholic poisoning, and exposure to cold. In these conditions it is necessary to adopt remedial measures to prevent the fall becoming extreme. Should the thermometer indicate a temperature below 96° F. the patient may collapse: should it fall to 94° F. the condition becomes alarming, and if only 92° F. is registered a fatal issue must be anticipated. It is a duty, therefore, after all accidents and operations, or anything that may cause severe shock, as in scalds or burns, to do everything possible to prevent the temperature from becoming extremely low. (1) Bottles containing hot water must be applied to the feet, the thighs and the sides of the body, or to the abdomen, care being taken that the bottles are carefully wrapped in thick layers of flannel to prevent injury to the skin. They may be of india-rubber, glass, earthenware or metal, or in the absence of any of these hot bricks may be substituted. (2) Hot drinks, especially tea or coffee, are to be given, provided, of course, the patient is conscious. (3) The temperature of the room should be raised to about 70° F. (4) The patient should

be wrapped in blankets. (5) Medicinal stimulants should be left for the doctor to administer.

Increase of Temperature—Fever.—A rise in the temperature of the body is seldom absent in illnesses of any consequence. The technical term for fever and the febrile state is *pyrexia*; absence of fever is termed *apyrexia*. When the temperature is 106° F. and over it is spoken of as *hyperpyrexia*.

A rise in the temperature of the body or a febrile state is met with—

(1) In all "specific" fevers, such as scarlet fever, measles, typhoid, smallpox, etc.

(2) In all inflammatory states, such as pneumonia (inflammation of the lungs), peritonitis (inflammation of the peritoneum, the lining membrane of the abdomen), synovitis (acute inflammation of a joint), etc.

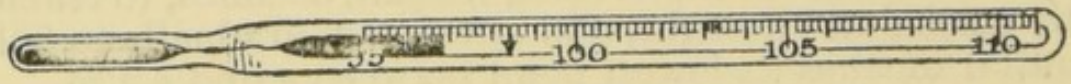


Fig. 16.—Clinical thermometer, indicating a temperature of 96·8° F. The arrow points to the normal, 98·4°.

(3) In apoplexy (rupture of a blood-vessel in the brain), discussed in Manual No. 1.

(4) In sunstroke or heatstroke.

Signs and Symptoms of Fever.—Feverishness is a well-understood term. It is usually ushered in by a "chill" (a "rigor" or shivering fit) during which perspiration is arrested, and the skin becomes pale owing to the contraction of the blood-vessels at the surface of the body. The onset of the febrile condition is attended or followed by loss of appetite, a coated tongue, and it may be vomiting, constipation, or diarrhœa; headache and aching limbs and back; sleeplessness (insomnia) or wakefulness and delirium; increased pulse- and respiration-rate; in certain specific fevers a rash appears on the skin. Other signs and symptoms are referred to in connection with the several fevers dealt with subsequently.

Clinical Thermometer.—The thermometer by which the temperature of the body is taken is termed a clinical (bedside) thermometer (Fig. 16). It differs

from others, such as the wall and bath thermometers, inasmuch as it is self-registering, containing in its tube a small rod of mercury which does not recede into the bulb of the thermometer when removed from the body, but has to be shaken down forcibly. The clinical thermometer is scaled from 95° to 110° and sometimes to 115°, which is usually well beyond the limits of the range of temperature in disease. The figures marked on the thermometer are 95, 100, 105, 110, and it may be 115. The reason the intervening figures are not marked is that there is no room for their insertion, but strong black lines are inserted to indicate intermediate degrees. Between these, again, more minute lines are placed showing the division of a degree into its decimal parts: thus between 96 and 97 there are four black lines inserted indicating the division of the degree, as 96·2, 96·4, 96·6, and 96·8; but the register may lie midway between these decimal points, so that if it registers its highest point between 96 and the first short line on the scale, which stands for 96·2, the temperature is then 96·1; and so when it stands at the interval between the lines indicating ·2 and ·4, the temperature is then 96·3, each degree being divided into decimals ranging from 1 to 10.

The thermometer consists of a bulb containing mercury in a well and a stem containing a fine tube communicating with the well below, along which the mercury rises when it is heated. When cooled, the main part of the mercury recedes into the well, but a portion, the registering rod, remains in the stem and does not move from its place until it is forcibly shaken down. To shake this rod of stationary mercury downwards towards the well, seize the top of the stem of the thermometer (not the bulb end), and knock the hand grasping the thermometer against the other, or, as it were, throw the thermometer from you with a jerk without releasing the top of the stem. Look at the register from time to time, and continue knocking or shaking it down until its top end is well below the normal.

To Take the Temperature.—The temperature of the body may be taken in the mouth, where the bulb is

placed beneath one or other side of the tongue; the lips are closed; the patient must breathe through the nose, and the thermometer must not be taken from the mouth, nor must the patient speak or breathe through the mouth, whilst the temperature is being taken. The temperature may also be taken in the armpit; the bulb of the thermometer is placed deeply in the recess of the armpit next the skin with its stem projecting forward to the front of the axilla; the arm is brought to the side and there held firmly whilst the thermometer is in position. In some cases the temperature is taken in the bowel (rectum), the bulb of the thermometer being pushed up into the bowel for a distance of 2 in. and held there. In infants a convenient place to take the temperature is the groin; the thermometer with its bulb inwards is laid flat on the skin along the groin; the thigh is bent up on the abdomen and held there. There is but slight difference as a rule in whatever part the temperature is taken, whether in the mouth, the armpit or the groin, but in the bowel it is usually higher than elsewhere. The time the thermometer should be kept in place depends on the construction of the instrument. Some thermometers have marked upon them "half minute," others "one minute," and others "two minutes." When a thermometer has no time indicated upon its stem it must be kept in place for four minutes at least.

The temperature, as a rule, is taken in the morning between 8 and 10 a.m., and again in the evening between 5 and 7 p.m. In some illnesses observations are required, four-hourly or two-hourly, and in critical illnesses more frequently still. When the thermometer is removed from the patient it is washed in cold water, or a disinfectant (boric acid) solution, then wiped dry. The temperature is read and recorded in a book kept for the purpose, or on a temperature chart. The reading should be verified before the mercury is shaken down so as to be ready for the next observation. Do not shake the mercury down until the temperature is recorded and verified; for if shaken down before the record is made, a false entry is not impossible, the observer getting confused between, say, 101·2

and 102·1, or between 103·4 and 104·3, and she may be tempted to register the one or other, although in doubt between them. The only way to correct this mistake, if the mercury has been shaken down, is to take the temperature again, a step which the patient may resent.

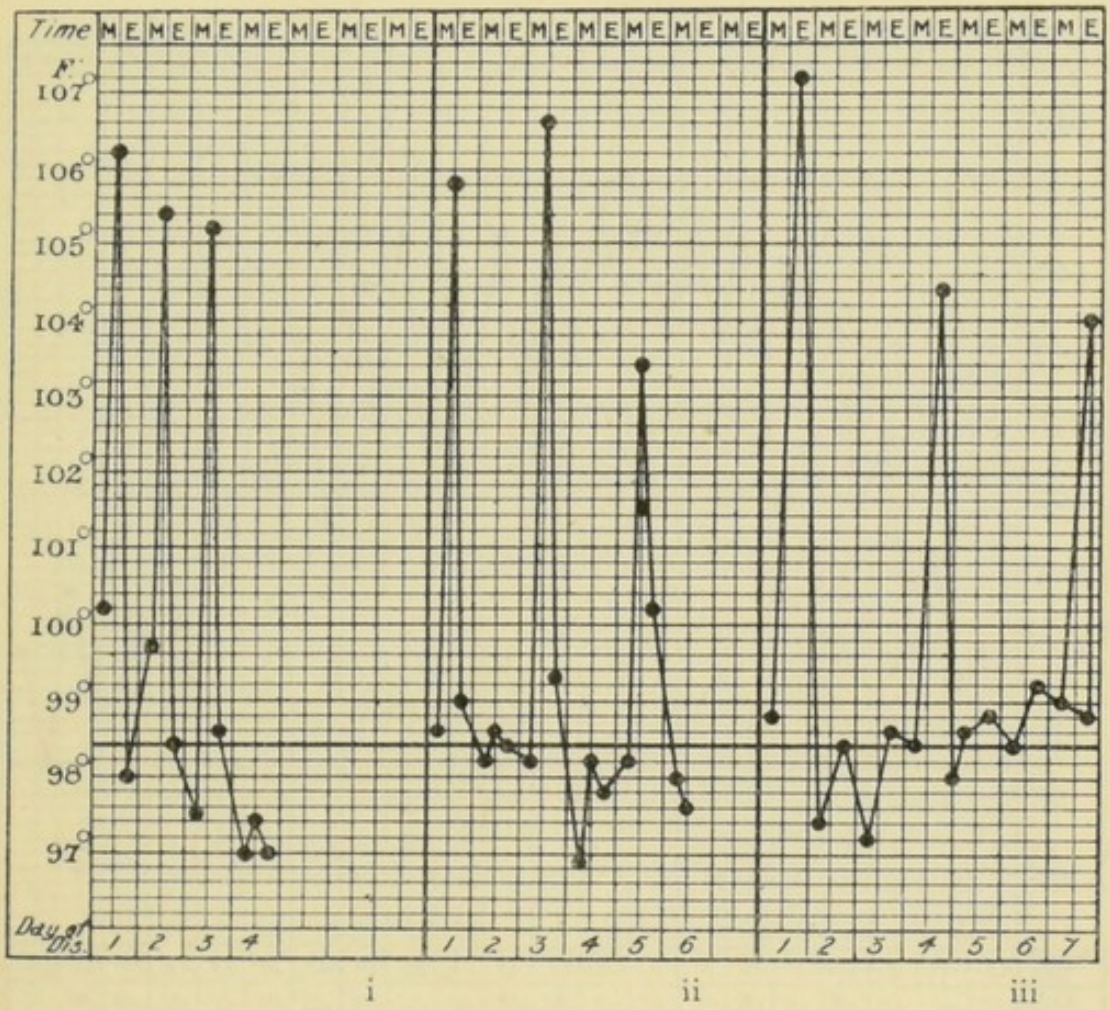


Chart 1.—Charts of malarial fever (ague) showing different types : i. quotidian (daily) fever ; ii. tertian (every third day) fever ; iii. quartan (every fourth day) fever.

Types of Fever.—The recognised types of fever are three in number :—

1. *Continued Fever.*—The temperature may continue for days, weeks, months, above the normal, and with but a slight variation in range, no more than $1\frac{1}{2}^{\circ}$ F. difference occurring between the highest and the lowest reading. The characteristic features of con-

tinued fever are its small range, the fact that the temperature does not fall to the normal, and, as a rule, its long persistence.

2. *Remittent Fever.* When the daily range of temperature exceeds 2° F. the fever is termed remittent. Prolonged remittent fever is present in tuber-

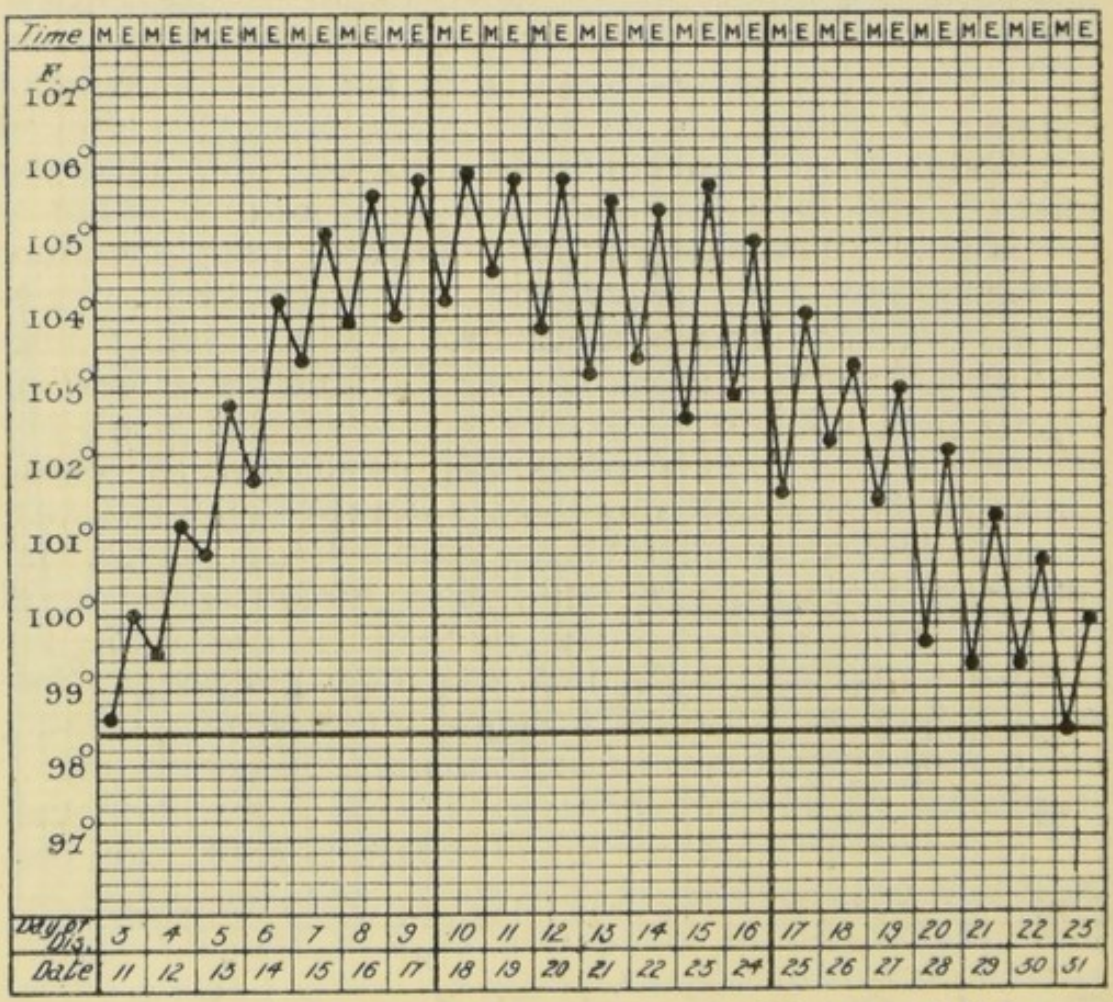


Chart 2.—Three weeks' chart of typhoid (enteric) fever.

culosis of the lung (phthisis, consumption) and other wasting diseases where the range of temperature is considerable. Hectic fever is the term often applied to illnesses of this nature. The temperature may fall to the normal or below it.

3. *Intermittent Fever.*—When fever is present for only some hours during the day, the fever is said to intermit. Malaria (ague) is characterised by febrile attacks of this nature, the temperature falling to or below the normal between the attacks (Chart 1).

Careful taking and recording of the temperature in disease is highly important from several points of view. Not only is the presence of fever thereby indicated, but the very nature of the ailment from which the patient is suffering may be ascertained. Most diseases have a more or less characteristic temperature.

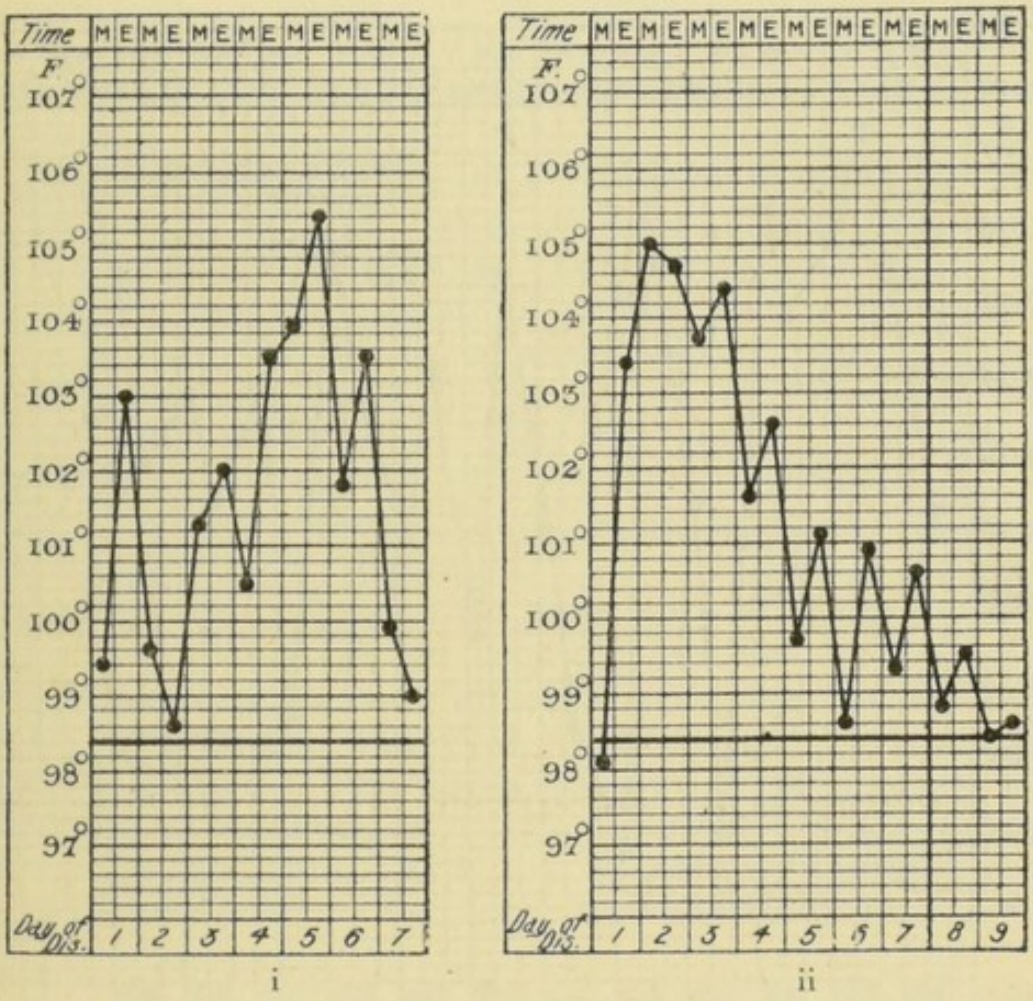


Chart 3.—Chart (i) of measles, (ii) of scarlet fever.

In typhoid fever (Chart 2) the temperature gradually rises, and may take a week before it reaches its highest point. It will be seen that during the first week the evening temperature is, as a rule, about two degrees above the morning temperature; on the following morning it will be found to have dropped about one degree, to rise two degrees again in the evening, and so on until the beginning of the second week. In measles (Chart 3, i.) the temperature will be seen to

rise suddenly on the first day of the illness, to drop during the second and third days, and to become high on the fourth, fifth, and sixth days ; on the seventh day, should the attack prove mild, the temperature approximates the normal. In scarlet fever (Chart 3, ii.) the temperature quickly rises to a high—it may be its highest

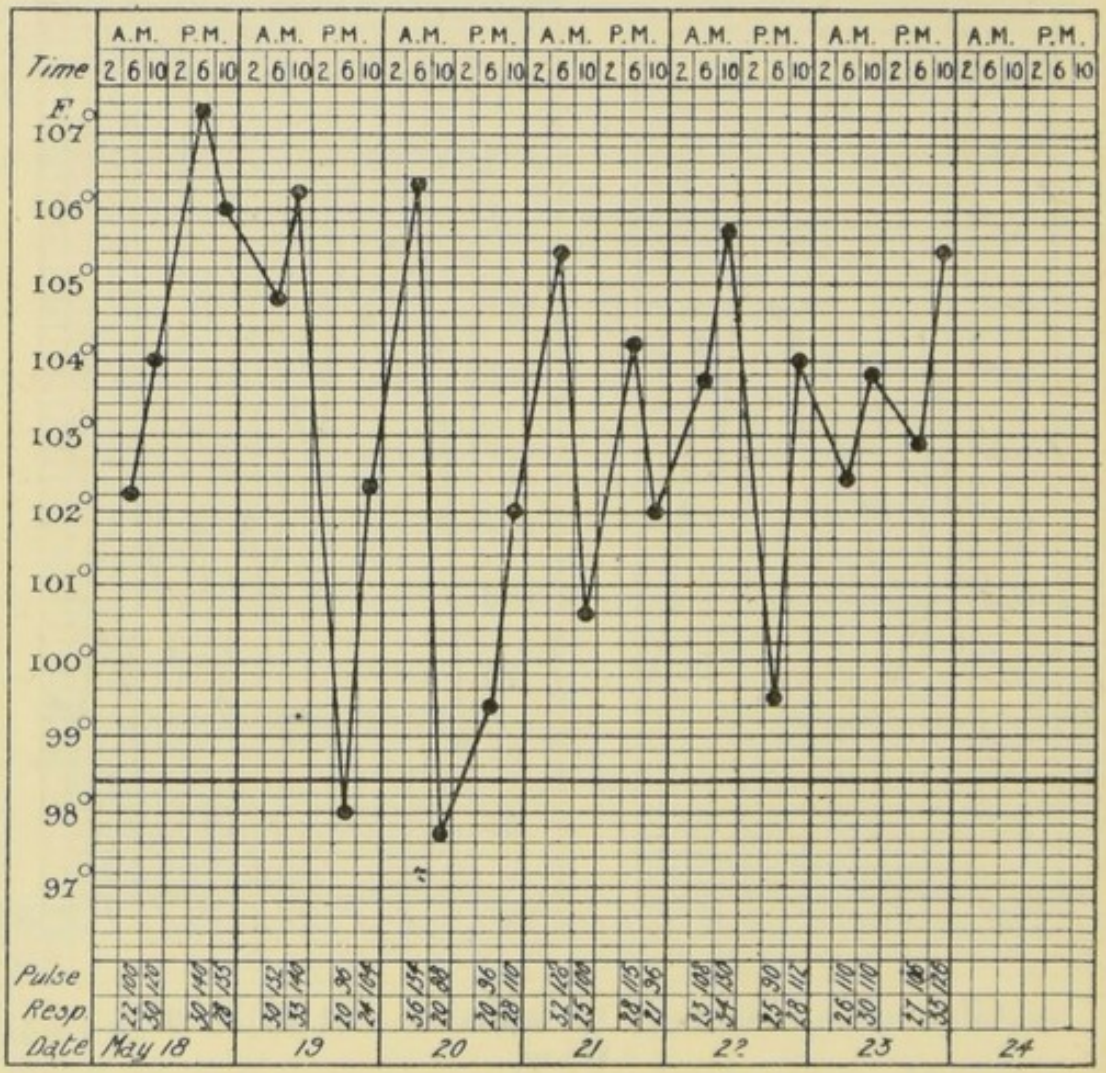


Chart 4.—Chart of a case of septicæmia (blood poisoning).

—point and passes off gradually. In septicæmia (blood poisoning) (Chart 4) the range of temperature is very great, varying as much in the course of a day as 9° F.; the rise and fall are irregular, the highest point being reached sometimes in the morning and forenoon, and at other times towards afternoon or evening ; a temperature of this nature is spoken of as "swinging." In malaria "periodicity" is the charac-

teristic feature of the chart, the fever coming on daily (quotidian) about the same hour, or every other day (tertian) or every fourth day (quartan). (*See* Chart 1.)

In tuberculosis (consumption) the temperature usually rises in the evening and falls in the early morning.

Fall by Lysis.—When the decline in temperature is gradual, as occurs in the third and fourth weeks of typhoid fever when the disease runs a favourable course (*see* Chart 2), the temperature is said to fall by lysis.

Fall by Crisis.—When the temperature falls suddenly, as normally occurs in cases of acute inflammation of the lungs (pneumonia) on the seventh and eighth day of the illness; or when, as in the course of typhoid fever, during the second or third week the temperature falls from, say, 105° F. to 97° F. or below—it may be in half an hour or less—the fall is said to be by crisis. A sudden fall by crisis in typhoid indicates either severe hæmorrhage from an ulcer in the intestine, or perforation of the bowel and the escape of the contents into the cavity of the abdomen.

In the course of an illness a sudden accession of temperature generally indicates that some complication has arisen in the shape of inflammation of some important organ. The development of pneumonia is a common occurrence in many illnesses, and a marked rise of temperature will almost certainly indicate its onset.

CHAPTER X

THE PULSE

THE pulse is due to a momentary distension of an artery with blood caused by the contraction of the heart (left ventricle). The object of feeling the pulse is to ascertain (1) the rate or frequency at which the heart beats; (2) the regularity of the heart's contractions; and (3) the strength (or weakness) of its action.

Frequency.—In **health** the rate of the pulse varies according to (*a*) age, (*b*) the position of the body, (*c*) sex, (*d*) height, (*e*) exercise.

(*a*) *Age.*—In the newly born infant the heart (and therefore the pulse) beats some 130 to 140 times a minute; by the age of 6 the rate has fallen to about 100; in adult years the rate averages about 72; and in old people it may be slightly slower or slightly quicker than in adult years.

(*b*) *Position.*—A healthy adult man has a pulse-rate of about 72 when sitting, of 80 when standing, and of 65 when lying down. A pulse-rate between 60 and 90 is considered to be within the range of health.

(*c*) *Sex.*—Women have, as a rule, a quicker pulse than men.

(*d*) *Height.*—A tall man has generally a slower pulse than a short man.

(*e*) *Exercise* quickens the pulse, the rate of increase varying with the duration and violence of the exercise.

In **disease** the pulse is (1) *slowed* in certain ailments, such as kidney affections, and in certain injuries, such as compression of the brain; (2) *quickened* in (*a*) all specific fevers—scarlet fever, rheumatic fever, etc.; (*b*) in all inflammatory affections, such as pneumonia (inflammation of the lungs) and erysipelas; and (*c*) in debility.

Rhythm.—The rhythm (or evenness of beat) of the pulse depends upon the rhythmic beat of the heart,

a regular heart producing a regular pulse. The variations in rhythm are *intermission* and *irregularity*.

To Take the Pulse.—(*a*) Stand or sit, according to the position of the patient, on the outer side of the right or left upper limb. (*b*) Place three fingers (the fore, the middle and the ring) of the right hand on the radial artery, about half an inch from the outer (radial) or thumb side of the forearm, and with the central of the three fingers one inch above the front of the wrist; at the same time place the thumb of the hand with which the pulse is being felt behind the forearm so as to support it.

If the right hand is used in taking the pulse on both the right and left sides, the forefinger will be nearer the elbow than the other fingers when the right pulse is being felt, and nearer the wrist when the pulse at the left wrist is taken. Should either hand be used in taking a pulse it is usual to feel the right pulse with the left hand and the left pulse with the right, in which case the forefinger is nearer the wrist on both sides. (*c*) Hold a watch (possessing a second-hand) in the unoccupied hand and count the rate of pulse for a full minute, noticing at the same time whether the pulse is intermittent or irregular. A trained nurse will also be able to gather information as to the hardness or softness of the pulse, and whether it is wiry or full or bounding, etc.

The pulse may be felt at many places besides at the wrist, should occasion arise. The trunk of the temporal artery can be felt in front of the lappet (tragus) of the ear; at this point the artery on its way to the temple and scalp crosses over the arch of the cheek-bone (zygomatic arch). A branch of the temporal artery (the anterior temporal) can also be felt as it winds along the edge of the hair between the temple and the brow. It is necessary to be familiar with the method of taking the pulse at the temple, as in several conditions the pulse at the wrist is not available; in rheumatic fever, in scalded hands, etc., when the wrists are enveloped in dressings it would be necessary to undo them to reach the wrist, a proceeding fraught with pain and inconvenience to the patient. Again, if the patient is

in a wet pack the temporal artery is available and the pack is not disturbed by pulse-taking.

In several other parts also it is at times necessary to find the pulse. Should, for instance, the leg bones be fractured and the leg tissues badly damaged, the question whether or not the tibial (leg) arteries are torn is an anxious one, as upon their being wounded or not the life of the parts below the seat of the fracture depends. If both arteries are torn through, the parts will mortify; if only one is damaged the limb may be saved. To feel the pulse at the front of the ankle, place the fingers on the centre of the front of the bone (tibia) immediately above the ankle, where the anterior tibial crosses from the leg to the foot. To feel the pulse on the inner side, place the fingers in the centre of the hollow on the inner side of the ankle midway between the tip ot the tibia (internal malleolus) and the most prominent point of the tip of the heel; here the posterior tibial artery passes from the back of the leg to the sole of the foot. The pulse may be felt also in the neck over the carotid artery; in the groin over the femoral artery; and at the bend of the elbow or inner side of the arm over the brachial artery.

Intermittent Pulse.—When a beat of the pulse is missed the pulse is said to intermit; with the fingers placed on the pulse after, say, three or more beats, there is a halt in pulsation, one beat is dropped, and the pulse again resumes its usual course. After another few beats it intermits again. The intermission may occur at every tenth, fifteenth, or twentieth beat, etc., or there may be no regularity in the intermission. The fact of the pulse intermitting should always be recorded by the nurse; for although it may be due to such simple causes as smoking strong tobacco, drinking strong tea or strong coffee, or to an attack of indigestion during which the distended stomach presses on the heart and interferes with its action, yet it may on the other hand be a sign of heart trouble of a serious nature.

Irregular Pulse.—When a pulse beats very rapidly for a few strokes, then very slowly, and this condition is repeated indefinitely, the pulse is said to be irregular, and the fact must be noted by the nurse and reported

to the doctor. There are many other features of the pulse which to a skilled observer convey meaning, such as its strength, hardness, softness, compressibility, wiriness, etc., but these are states that must be left to the doctor to test and pronounce upon.

Recording the Pulse.—The rate (or frequency) of the pulse is to be noted down at once; on the temperature chart a line will be found in which the rate for the morning and the evening may be filled in. The fact that the pulse intermits, or that it is irregular, may be noted on the back of the chart or in the nurse's case book.

There is usually a marked relation between the rate of the pulse and the rate of breathing, each increasing and decreasing in proportion. In health, four beats of the pulse occur to every breath taken, and as a rule this proportion in disease is fairly well maintained. The rate of the pulse also corresponds in a certain degree with the state of the temperature of the body; thus, in high fever the pulse is usually quickened in proportion as the temperature rises, and vice versa. In some instances, however, the pulse is slower than the increase of the temperature would seem to indicate, as in typhoid fever. It is therefore necessary to record all three—the temperature, the pulse, and the respirations—in every case of serious illness.

CHAPTER XI

RESPIRATION

Breathing in Health.—The rate of breathing in health varies from 15 to 18 or 20 per minute in the adult; it is higher in infants, and in old persons it may be quickened or slowed in harmony with the rate of the heart beat as indicated by the pulse. In all inflammations and fevers the breathing is, as a rule, quickened; and in inflammation of the lung, bronchitis and other affections of the respiratory tract, it may become laboured or a mere gasping. In other ailments the respiration is, as a rule, slower than normal, as in shock, collapse, opium poisoning, concussion and compression of the brain, etc.

To take the rate of the breathing, the nurse, with a watch in hand, counts the number of breaths for a full minute. If the patient is asleep, or unaware that the nurse is counting the respirations, there is no difficulty in ascertaining the rate correctly, either by listening to the breathing or by observing the rise and fall of the chest. If, however, the patient becomes aware of the fact that his breathing is being counted, he involuntarily alters the rate. This difficulty the nurse may overcome by a simple expedient. Placing her hand upon the wrist, she pretends to take the pulse, and while doing so her hand rests on the chest. The patient, thinking the pulse is being taken, breathes naturally, and a proper record can thus be obtained.

Breathing in Disease.—In health the respiratory act is quiet and regular, but in disease many modifications are met with, which will now be considered.

Rate.—The proportion of breaths to pulse-beats is in health about 1 to 4; but in pneumonia and other lung troubles the breathing may be almost as rapid as the pulse. Pain in the chest, as from a broken rib or from pleurisy, etc., prevents sufficiently deep breaths being taken, and the respirations are hastened

to make up for the small amount of air taken in at each act of breathing. In disease and injury of the brain the breathing is often slow and stertorous.

Rhythm.—A single breath consists of two parts, the inspiratory and the expiratory acts; the latter is naturally a little longer in its duration than the former. In disease this proportion may be disturbed—the inspiration being unduly prolonged in affections of the larynx (vocal cords) or windpipe (trachea); whilst on the other hand, in bronchitis and pneumonia (inflammation of the lungs) it is the expiratory act that is lengthened.

Types of Breathing.—(*a*) When breathing is carried on mostly by expansion of the upper part of the chest (thorax), the respiratory act is said to be *thoracic* in type; this form of breathing is more commonly seen in women than in men. (*b*) In men and children the abdomen is seen to rise and fall during breathing, and the name *abdominal* is given to this type of respiration. In neither case, however, is one type of breathing followed to the complete exclusion of the other.

Definitions.—The following terms are in common use in reference to ailments and conditions of the respiratory tract:—

Epistaxis is hæmorrhage from the nose due either to injury, to local diseases of the nostrils, or occurring in the course of general diseases, such as anæmia (bloodlessness) or Bright's disease (kidney affection).

Aphonia, loss of voice.

Laryngitis, inflammation of the larynx.

Stridor, a harsh, high-pitched sound, due to spasm of the vocal cords in the larynx obstructing the passage of air and causing a sound like wind whistling through a narrow aperture, as in whooping-cough.

Laryngismus stridulus, a sudden spasm of the larynx occurring in children, especially in those suffering from rickets. The attack may develop suddenly in the night without previous warning, or it may occur in the course of laryngitis.

Dyspnœa, difficult breathing. It is accompanied, as a rule, by loud noises during either inspiration or expiration, or both.

Asphyxia, suffocation or suspended animation. It is due to an insufficient amount of oxygen reaching the blood, as in choking.

Cyanosis, blueness of the skin. When asphyxia is very deep, the features assume a bluish, congested appearance.

Coma, a state of profound stupor, induced either by injury or by disease.

Bronchitis, inflammation of the bronchial tubes. Bronchitis may be (*a*) acute, when there will be fever, pain on coughing, and some dyspnœa; or (*b*) chronic, a long-continued form of bronchitis, with periods of quiescence; there is cough, little or no fever, usually considerable expectoration, and gradual damage to the lungs.

Pneumonia, inflammation of the lung. There are several varieties; the chief are—(1) catarrhal, sometimes termed bronchial or lobular pneumonia. The disease generally commences as a cold or catarrh, and from the bronchial tubes the inflammation reaches the ultimate recesses of the air-passages—the lobules of the lung; hence the terms catarrhal, bronchial, and lobular, applied to the condition. The whole of both lungs is more or less affected in lobular pneumonia. (2) Lobar pneumonia signifies that one or more lobes of the lungs are attacked. The attack is characterised by high fever, dyspnœa, and bloodstained expectoration. Lobar pneumonia usually ends in a week by a sudden fall of temperature (fall by crisis).

Pleurisy (inflammation of the pleura, the lining membrane of the lung). In the acute form it causes sharp pain (a stitch), fever, and a dry cough. The patient lies, as a rule, on the affected side.

Breath Sounds in Disease.—Obstructions in the respiratory passages cause characteristic noises, according to the part affected:

1. *Sniffling* breathing is due to obstruction in the nose from accumulation of mucus. The nose may be the seat of polypus, or other growths, thickening of membranes, etc., when the breathing will be *stuffy*, and one side may be more markedly blocked than the other.

2. *Snoring.*—The pharynx, the space at the back of the nose and mouth, may, in its upper part, be the seat of *adenoids*, that is, many small growths in the mucous membrane, in children and young adults, which obstruct breathing by interfering with the passage of air through the nostrils. Adenoids are the chief cause of "mouth-breathing," and the attendant deformities of the jaws and chest so common among children nowadays. Adenoids came in with the "comforter"—the solid teat given to children to "keep them quiet." By continuous sucking of the "comforter," the solid rubber of which it is composed is pressed against the roof of the mouth, which at this period of life is soft and cartilaginous; the roof yields to the pressure, causing the "high arch of the palate," and, encroaching on the floor of the nose, interferes with breathing through the nostrils, and necessitates breathing by the mouth. Thus, the air no longer passing over the mucous membrane of the nostrils and pharynx, the membrane becomes unnatural, sodden and thickened, and generates the outgrowths termed adenoids. The commonest cause of snoring and mouth-breathing in children is the presence of obstruction due to this cause, and immediate attention ought to be directed to the affliction, otherwise deformed jaws, enlarged tonsils, bad teeth, deafness, an ill-developed chest, a puny figure, and a vacant, "idiotic" aspect will ensue. Snoring in adults in health is due to a deeply relaxed soft palate; in disease it is mostly a sign of brain trouble, and is met with in apoplexy, compression of the brain, etc.

3. *Stridor, Spasm, or Whoop.*—When the larynx in which the vocal chords are contained is the seat of inflammation or spasm, inspiration is accompanied by "stridor," that is, a loud, musical note, as in the "whoop" in whooping-cough.

4. *Hoarseness.*—A hoarse, husky, or deep brassy voice indicates that the vocal cords are interfered with, owing to swelling of the mucous membrane in the neighbourhood of the larynx or to swelling of the vocal cords themselves. In inflammation of the larynx (laryngitis), scalded throat, diphtheria, or ulcers (often tubercular) in this region, the voice is hoarse or reduced to a whisper.

5. *The "Leopard Growl."*—When the windpipe (trachea) is inflamed or pressed upon by tumours, etc., the breathing causes a noise resembling a leopard's growl. The sound occurs during both inspiration and expiration, but there need be no hoarseness of voice.

6. *Wheezing.*—In asthma and bronchitis, wheezing may be distinctly heard, owing to the difficulty with which the air finds its way through the narrowed passage in the lung.

7. *Mucous Rattle.*—The presence of mucus in the air-passages of the lung and windpipe gives to the breathing a rattle which persists until the obstruction is relieved by coughing. The "death rattle," as it is called, is due to the presence of mucus which it is impossible to expectorate.

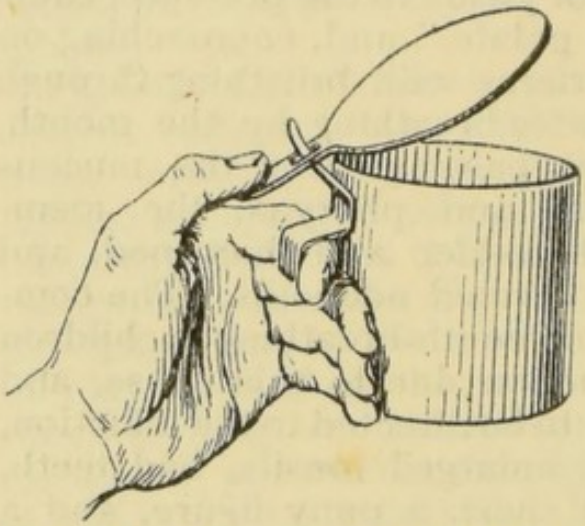


Fig. 17.—Sputum jug with lid.

8. *Cough.*—In all obstructions to the air-passages due to the presence of mucus, spasm, inflammatory swelling, tumours, etc., coughing, varying in nature according to the cause of the disturbance, is present. The act of coughing consists in a sudden explosive expiration after a deep inspiration, with the object of attempting to remove the obstruction. Coughing may come on in paroxysms, as in whooping-cough, or a single cough may recur at frequent intervals. The nurse should observe if the cough induces pain, as in pleurisy; whether it is a "dry" cough as in the early stages of a common cold or simple asthma, when the cough is said to be a "hacking" cough. A cough becomes "moist" when mucus is freely expectorated.

Sputum.—All matters expectorated should be received in a special vessel set aside for the purpose. One kind of receptacle is illustrated in Fig. 17. Another form is a jug with a movable funnel-shaped cover, and an aperture at the bottom of the funnel;

in the jug a disinfectant fluid, such as carbolic acid solution (1 in 40), should be placed, and a piece of cotton-wool soaked in the solution may be laid at the bottom of the funnel. From time to time the jug and cover are to be scalded by pouring boiling water over them, or, better still, they should be boiled for twenty minutes. When no regulation receptacle is at hand, a cup, tumbler or jug may be used and a piece of linen rag dipped in carbolic laid loosely across the top. For cases of consumption various receptacles with the aperture and entrance tightly closed by screw-fitting lids are made, so that they may be carried in the pocket or the muff and used as required. It is imperative that expectoration, especially of consumptive persons, be not deposited in public vehicles or even in the street. The object of the public notices forbidding spitting is to prevent the spread of consumption, for it is found that when the moist mucus dries, the germs (tubercle germs) contained in the sputum of consumptive persons become diffused in the air and may be inhaled by other people. When these germs get into the lungs of susceptible persons they are apt to cause infection, and so consumption is spread.

Expectorated matters vary in their appearance. (*a*) *Frothy mucus* sputum is met with in bronchitis; (*b*) a *purulent* (pus) sputum is seen in cases of phthisis (consumption); (*c*) a *muco-purulent* expectoration consists of a mixture of *a* and *b*; (*d*) *prune-juice* sputum consists of mucus mixed with altered blood: it is common in pneumonia; (*e*) *rusty* sputum is also seen in pneumonia; (*f*) *currant-jelly* sputum occurs in cases of lung cancer; (*g*) *nummular* sputum consists of round masses or lumps of yellowish material coughed up in advanced cases of consumption and certain other complaints; (*h*) when pure blood is coughed up in quantity indicating that there is hæmorrhage taking place within the lung it is termed *hæmoptysis*. Blood from the lung is distinguished by its bright-red colour and its frothy appearance when in moderate quantity. The sputum may have a fetid odour, owing to putrefaction going on within the lung tissues.

The quantity of the sputum got rid of in the twenty-

four hours should be noted by the nurse; for this purpose jugs or cups with measurements of their fluid capacity marked on the inside are used; but any ordinary receptacle the capacity of which is known may be employed.

9. *Hiccough*, or *hiccup*, is caused by a spasm of the diaphragm. It is a common sign in indigestion, owing to the stomach pressing upon and irritating the diaphragm. When it occurs in the course of serious abdominal ailments, its persistence is an unfavourable indication, often presaging a fatal issue.

Sighing and *yawning* are frequently due to intermittent action of the heart, brought about by distension of the stomach, from the gases generated by indigestion, pressing up the diaphragm and interfering with the action of the lungs. The sigh and the yawn are, in these circumstances, endeavours to make up for the deficiency in respiration by a violent effort.

To Relieve Cough.—Many expedients are adopted for this purpose, and their very number shows that there is no "cure." To stop a cough by administering sedatives is wrong in principle and practice, for coughing and the expectoration which accompanies it are nature's method of getting rid of abnormal and deleterious secretions. Children frequently swallow the sputum, and consumptives at times do so, especially when in company, hawking and spitting being offensive to others. Swallowing expectoration, especially in cases of consumption, is, however, provocative of evil consequences, and should be avoided.

When the cough is "dry" or "croupy" moist air may be administered either by a moist air or bronchitis tent in the case of children (*see* p. 22 and Figs. 7, 8), or by inhaling steam from an inhaler. The simplest form of supplying steam or moistened air for inhalation is by putting the head, covered by a towel, over a basin or jug of boiling water; another method is the "poor man's inhaler"; there are also methods of a more elaborate kind. Various medicinal substances may be added to the hot water in an inhaler; one of the commonest is tincture of iodine, a tea-spoonful of the tincture to a pint of boiling water. For

coughs due to affections of the throat and the larynx there are many kinds of spray apparatus; these are generally ordered by the doctor, together with the fluid to be used in the apparatus.

A mouthful of hot water will often allay cough or hiccup; lozenges, jujubes, pastilles, etc., are to be had in plenty at every chemist's, and most of them do good by the fact that their presence in the mouth causes a flow of saliva in a quantity which, when swallowed, tends to alleviate irritation; the medicinal agent contained in them is of quite secondary importance.

Hiccup, if due to indigestion, may be relieved by sips of hot water, held in the mouth for, say, a minute, so as to check the rhythm of the contraction of the diaphragm which causes the hiccup. To the hot water a pinch of bicarbonate of soda may be added; the ever-popular peppermint drops or lozenges also serve to check the spasm. A mustard-plaster applied for ten to fifteen minutes over the "pit of the stomach" just below the lower end of the breast-bone may prove serviceable. For hiccup coming late in a disease, as in peritonitis, little can be done; in such cases treatment must be left to the doctor.

Position.—When a patient in bed is seized with a paroxysm of coughing, relief is usually found by changing from a lying-down to a sitting posture. In asthma, chronic bronchitis and some heart affections, and in convalescence from most ailments, a high pillow, or support by a bed-rest, is essential to comfort and breathing. When pain is present, as in cases of broken ribs, pleurisy, inflammation of the liver, etc., the patient assumes the position in which relief from pain is best obtained, and as a rule this posture should be allowed. But, however enjoyable for a short time, bed-rests soon become irksome, and, if used during a protracted illness for too long a time, the patient gets exhausted, as indicated by pallor, a failing pulse, thirst, and a desire to lie down. This desire should be acceded to. Whilst raised in bed on a bed-rest it is essential that a dressing-jacket or dressing-gown be worn, or that a light shawl be thrown round the neck and shoulders, so as to avoid exposing the upper

part of the body to chill. A covering for the head is also advisable, in the shape of a Shetland or a Cashmere shawl for women, and a smoking-cap or ordinary out-of-door soft cap for men. Bed-rests may be of the regulation patterns sold by instrument makers, or improvised by an inverted chair, by stools, or by a sufficiency of pillows. Whatever the form, it is advisable to place a pillow, a covered stool or box, or any convenient article at the foot of the bed beneath the bedclothes so that the feet may rest against it and thus prevent the patient from slipping down from off

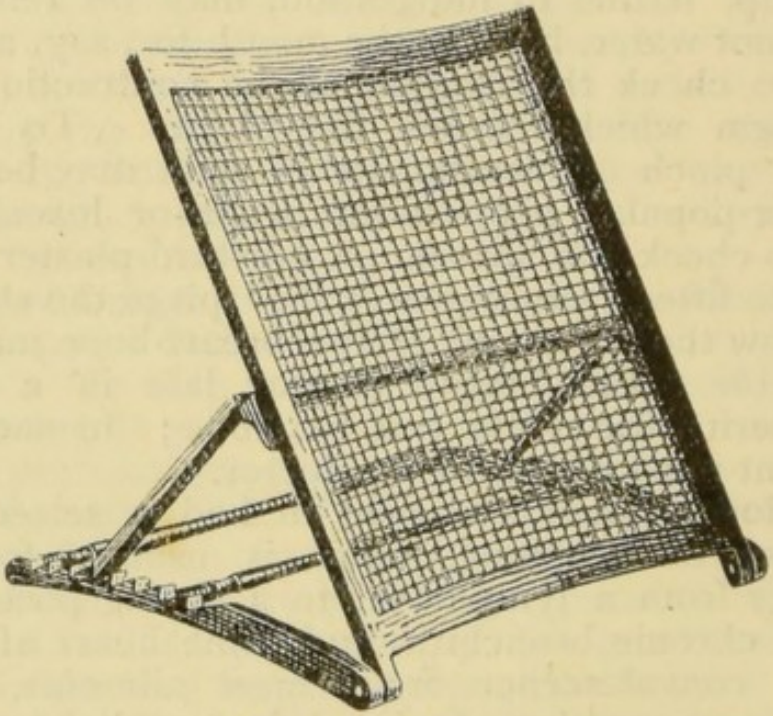


Fig. 18.—Bed-rest.

the bed-rest. Another plan is to raise the end of the bed by placing blocks of wood or bricks beneath the two lower posts of the bedstead. The patient's position can be altered from time to time by varying the elevation of the support for the back by means of the catch and notches on the frame (Fig. 18). If pillows are used instead of a bed-rest, one should be added, or taken away, as occasion arises. From time to time the nurse should ask the patient such questions as, Are you comfortable? Would you like me to alter the bed-rest? Are you too cold, or too hot? — and not wait for the patient to complain.

CHAPTER XII

BATHS AND BATHING

The effects of a hot or of a cold bath upon the system differ widely. Leaving aside the hygienic aspect of cleanliness, a bath produces physiological effects upon the circulation of the blood and the nervous system in proportion to the temperature of the water, the strength of the individual, and the length of time to which the bath is prolonged. The effect of immersion in warm or hot water is to dilate the blood-vessels of the skin and "attract" blood to the surface of the body; the effect of a cold bath upon the body is practically the opposite, inasmuch as the blood-vessels of the skin contract, and the blood is "driven" from the skin to the deeper-seated organs and tissues of the body. A bath of hot or cold water has therefore a marked effect upon the body, which may be good or bad according to circumstances.

When a **warm or hot bath** is taken the skin is flushed with blood, and the internal organs of the body, such as the lungs, liver, spleen, heart, and brain, are temporarily deprived to some extent of the blood which they usually contain; in other words, the blood pressure within them is lessened. In certain diseased conditions this will have a beneficial effect, for the congested organ or organs are thereby relieved if the temperature and duration of the bath are suitable. In both health and disease, however, if the hot bath is too prolonged, detrimental effects may ensue. By many people, and mostly by young women, hot baths are indulged in to a dangerous extent. They are taken not infrequently twice daily, and may be prolonged for half an hour or forty minutes. This form of debauch is fraught with danger. The circulation of the blood is disturbed to such an extent that faintness may ensue, the heart or brain or both being deprived of sufficient blood to carry on their normal functions. In time the blood

itself becomes affected, and an anæmic (bloodless) condition is induced. Sleeplessness adds to the deleterious effects, or, on the other hand, it is found that without a hot bath before going to bed sleep is impossible; but it is a sleep induced by exhaustion, and consequently is in no way refreshing, and the person awakes in the morning feeling weary and "unfit." It is only a question of a few months before even the strongest person becomes a "patient" under these circumstances.

Cold-water bathing has an opposite effect, but it has its dangers also. Immersion in cold water serves to send the blood inwards, flooding the lungs, liver, spleen, etc., with a quantity of blood over and above that which is normally present in them. If the organs are sound the increased circulation and pressure of blood induced within them by the cold bath will probably stimulate them to action, but if any organ is at all delicate, the shock of the cold-water bath tends to affect it deleteriously. In extreme cases the blood may be driven to a weak patch in the lung, when blood may be coughed up (hæmoptysis); should the stomach be the seat of congestion or ulceration, blood may be vomited (hæmatemesis); a weak heart may be severely tried; the kidneys may be congested to the extent that albumin (a temporary form of Bright's disease) appears (not to mere inspection) in the urine. In the case of old people the danger of plunging into cold water is especially great. As age increases the blood-vessels become more brittle, from the fact that lime salts are deposited on the walls of the arteries, rendering them less elastic and less capable of accommodating their channels to a sudden flush of blood. In the First-Aid Manual (No. 1 of the series), the danger of rupture of the arteries of the brain when an elderly person with brittle arteries attempts any severe exercise, such as running, lifting heavy weights, etc., is pointed out. Similarly, plunging into cold water, by driving the blood from the skin, may cause apoplexy in old people, and several other ailments, especially congestion of the kidneys, with the consequence referred to above.

A bath taken with the chill off (cool, temperate or tepid baths) has no pronounced physiological effect.

It is, therefore, useful only for cleansing purposes, and may be taken with impunity by young and old. The daily bath is a recent institution, even in Britain; in our grandfathers' times baths of any kind were very occasionally taken, and it is only since their time that the "morning tub" has become general. This custom was introduced into Britain by residents in the tropics returning to their native land. The exigencies of climate demand frequent bathing in warm countries. But the form of bath in vogue amongst natives in the tropics is totally different from that met with in Britain. Their so-called bath consists in pouring first a bucket of hot and then a bucket of cold water over themselves whilst they stand in the open or in a tiled recess in a room. This proceeding has a totally different physiological effect from that of complete immersion for a considerable time in either hot or cold water. The effect of first a hot and then a cold douche is stimulating and hygienic. A safe rule to follow for young and old alike is a rapid wash down with hot water and then with cold water daily, and in addition a warm bath for not more than five minutes once a week.

Temperature of Baths.—The temperature of different kinds of baths, from hot to cold, is as follows:—

Hot bath	100° to 106° Fahr.
Warm bath	95 ,, 100 ,,
Tepid bath	85 ,, 95 ,,
Temperate bath ...	75 ,, 85 ,,
Cool bath	65 ,, 75 ,,
Cold bath	34 ,, 65 ,,

It will be seen, therefore, that water at, or a degree or two above or below, the normal temperature of the body (98·4° Fahr.) constitutes a warm bath; water a little above the temperature of the body constitutes a hot bath, and water a little below the temperature of the body a tepid bath. In cases of illness the temperature and duration of the bath should be prescribed by the doctor. The temperature is ascertained by means of a bath thermometer (Fig. 19).

Douche.—A douche is a stream of either hot or cold water directed upon a part of the body from a height; as, for example, when a nurse standing upon

a stool pours a stream of water from a jug upon an ankle that is sprained, a knee-joint that is stiff, etc. The douche may be more systematically applied from a hose, as in bathing establishments.

Affusion.—A quantity of hot or cold water thrown over one (as from a bucket) is termed an affusion. Cold affusions are frequently employed in the treatment of sunstroke, heatstroke, and several other affections.

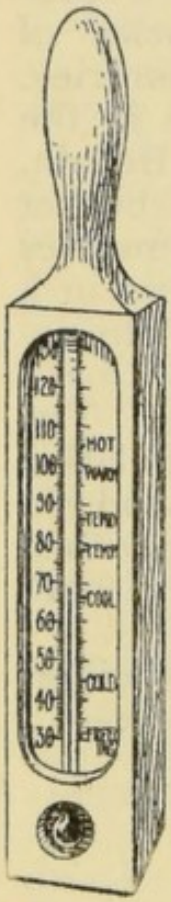


Fig. 19.—Bath thermometer in wooden case.

Shower Bath.—A shower-bath consists of the direct descent of a quantity of water issuing through small apertures from a cistern overhead on to a person standing beneath.

Needle Bath.—This bath consists of fine streams of water issuing through apertures in a coiled pipe so as to play upon the body from head to foot, or upon particular portions of the body. The needle-bath is much in evidence in bathing establishments under medical direction.

Sea Bathing.—Bathing in the sea, while regarded as a recreation or pastime, has distinct physiological effects, and unless taken with judgment may be attended by deleterious results. By the very young and the aged sea bathing should be avoided, and "delicate" persons should only bathe after careful medical inspection. To allow children to paddle in the sea is all very well; to immerse them repeatedly, or allow them to wade up to their waists for a considerable time, is quite another thing. Robust persons when the weather is warm may practise sea-bathing with impunity if the bath is taken at the right time of day and the bath is not prolonged beyond twenty minutes. The early morning sea-bath is to be condemned; for a man—and it is usually men who take a sea-bath at this time—to walk, without having had any food, for some distance from his dwelling to the sea, to undress in the cold morning air and wade into the water whilst his temperature and vitality are lowest, is calculated

to upset even the strongest. Women and children visitors to the seaside usually bathe about 11 o'clock in the forenoon; this is the best period of the day, for several reasons. The temperature of the body reaches the normal 98·4° during the forenoon, the temperature of the air is generally not far from its maximum for the day, the morning meal has been digested for the most part and the patient's strength thereby maintained. The sea-water, from the fact that it contains salt and that it is constantly moving, has a stimulant action on the skin, which produces a tonic effect upon the body; but if the bath be prolonged beyond a given time the effect, instead of being tonic, is to produce exhaustion, depression, palpitation, loss of appetite, lassitude, and often sleeplessness, owing to the loss of body heat. These evil effects can be prevented if the bath is taken for a suitable period only. For some persons the time should not exceed five minutes; for others ten minutes may be allowed, but it should never extend beyond twenty minutes even for the strongest.

River Bathing.—Bathing in the river in summer, so much indulged in by boys, is an excellent form of recreation, and as the water is generally at a temperature of 70° to 80° its direct effects are not calculated to cause evil consequences if the time spent in the water is not unduly prolonged. Boys, however, are not content to enter the river and stay there for a quarter of an hour only, but on a warm day in summer they are apt to spend hours in alternately bathing and playing on the bank. The effects of such prolonged river bathing, if continued day after day, are anæmia, pallor, debility, irregularity of the heart's action, flushing, loss of appetite, and not infrequently albuminuria (Bright's disease).

Hot-Air Bath.—Hot air may be applied so that the patient does or does not breathe the heated air. In its simplest form the patient may be seated in a chair surrounded by blankets or other suitable covering from the neck to the floor, and hot air is generated by a spirit lamp or by an electric heating apparatus placed beneath the covering. If a spirit lamp is used, care

must be taken to prevent the blanket, etc., taking fire. The patient is kept in the hot air until such time as perspiration freely flows, and in accordance with his

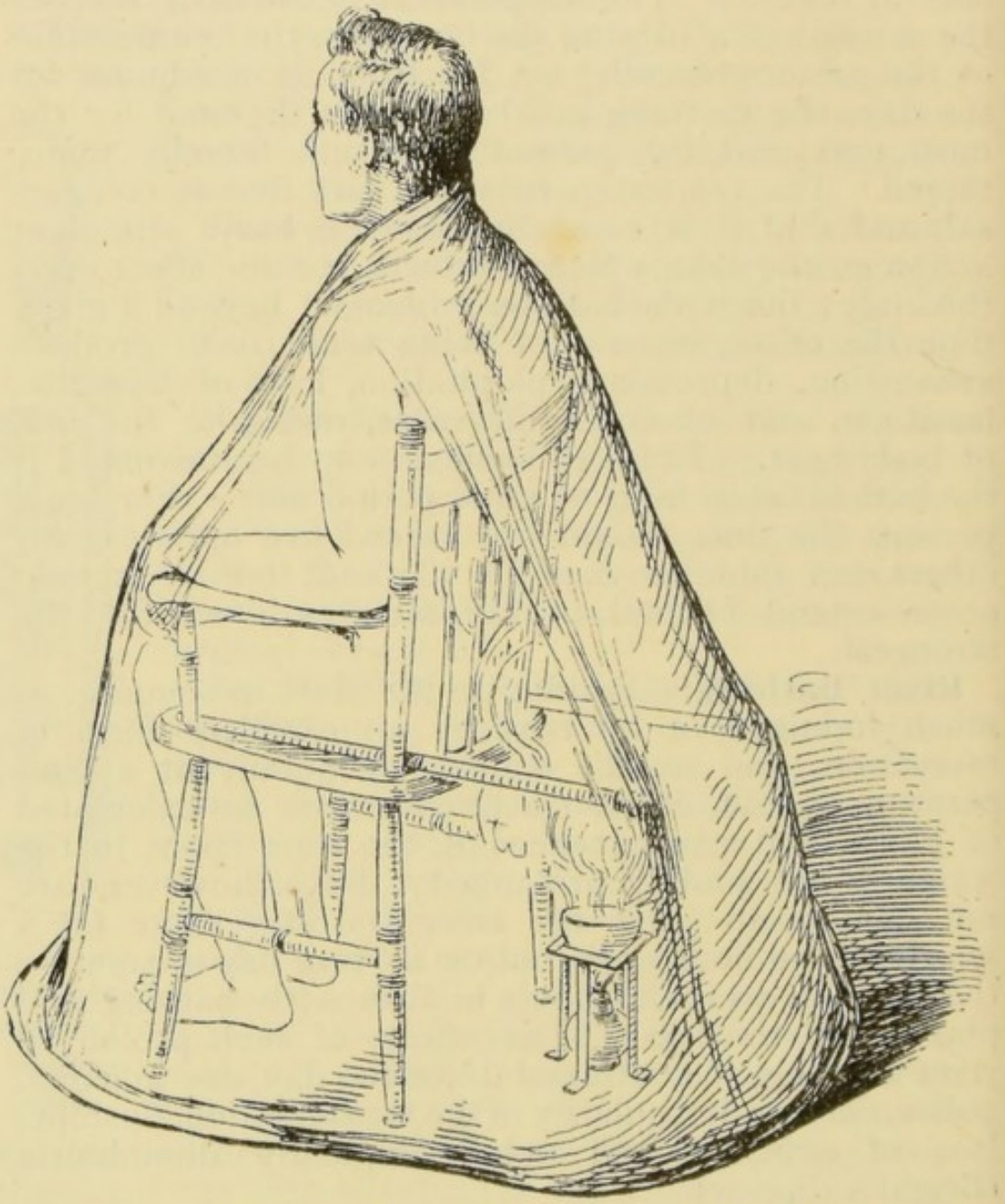


Fig. 20.—Improvised vapour bath.

condition as judged by his pulse, breathing, temperature and general appearance is the hot-air bath continued. When removed from the bath the patient is wiped down rapidly with towels and made to lie down in blankets. Whilst in the hot-air bath he may

have hot fluids to drink, the effect being to increase the perspiration as well as to relieve thirst. If the face becomes pale or faintness threatens, the bath must at once be stopped.

Vapour Bath.—In its simplest form the vapour bath is arranged in the same way as the hot-air bath, the only difference being that over the spirit lamp a vessel containing a pint or two of water is boiled and the steam thereby generated, or the steam may be introduced from the spout of a steam kettle so arranged that the steam enters the chamber in which the patient is enclosed, be it a box specially made for the purpose, with only the head emerging, or formed simply by blankets arranged as for a hot-air bath. (Fig. 20.)

Turkish Bath.—Under the name of Turkish, Russian or Roman baths the patient's body and limbs are not only exposed to the hot air or the vapour bath, but the chamber itself is heated with air or with steam so that he actually breathes the atmosphere around him. These baths consist of various processes, of which a summary may be given as follows: The patient, unclothed, goes into a room at a temperature of about 115° Fahr., where he remains until perspiration occurs; he afterwards proceeds, if his strength and condition allow, to a room at a temperature of about 180°, whereby his perspiration is enormously increased; he is then rubbed down with a towel or woollen gloves and his muscles massaged, and water is poured over him at a temperature of about 84°. The body is then soaped over and the suds rubbed off; a shower bath or a dive into cold water may follow, and the operation is completed by the patient going into a chamber at a temperature of about 65°, where he lies down until his skin is completely dry.

Hot-air and vapour baths are often applied locally to joints or part of a limb affected by rheumatism, sciatica, gout, or other ailments. Of the many other forms of bath there may be mentioned alkaline, acid, mustard, bran, pine, mud, peat, sand, and electric baths, but these should never be taken except under the direction of a doctor as to the kind of bath, its duration and character.

Treatment of the Febrile State

The heat generated in the body is got rid of by the four excretory organs, the skin, the lungs, the intestines, the kidneys. In the febrile state these organs naturally play an active part, and by various devices their action in this direction can be helped. The skin is by far the most important of them, and it is more accessible to external remedial measures than any of the others.

When the Fever is Slight or Moderate.—1. Send the patient to bed; this is always the best and safest plan when it can be managed. Sitting before a fire or lying on a sofa, however well wrapped up, does not give the general warmth afforded by being in bed.

2. Encourage perspiration by placing the patient between blankets, covering with extra blankets, increasing the heat of the air in the room, placing hot-water bottles between the blankets, giving hot drinks, such as hot tea, coffee, milk, home-made lemonade.

3. Certain drugs promote perspiration. These are left to the doctor to prescribe, but stimulants in small quantities and proportionate to the age and strength of the patient may be added to any of the hot drinks. In the case of an adult a teaspoonful of brandy or whisky added to hot coffee or milk will further stimulate the action of the skin; but alcohol, except in an emergency, should not be resorted to without the doctor's advice.

4. A purge, by the abstraction of an increased amount of warm excretions in a fluid form, is a direct means of carrying off excess of temperature. Salts, in the form of Epsom salts, Glauber's salts, or any one of the many purgative waters in use, serve better for this purpose than vegetable purgatives such as rhubarb, castor oil, etc.

5. The hot drinks given to promote the action of the skin help also to flush the kidneys, and by increasing the excretion of warm fluid from the body the excess of heat is reduced.

6. Washing the body once or twice daily favours the escape of heat by evaporation and also by removing the organic materials which condense in the skin and hamper the action of the sweat glands.

When the Fever is High.—In cases of very high

temperature, 106° Fahr. and over (hyperpyrexia), steps should be taken to check and reduce it. Independently of drugs there are several methods of abstracting heat by way of the skin. Before treatment is begun the patient should be placed between blankets, and the mattress protected by mackintosh sheeting. Take care to expose the patient as little as possible.

1. Sponging the body with hot, warm or tepid water is frequently efficacious in reducing high temperatures. The body may be dried or the skin may be left moist and the patient wrapped in blankets.

2. Sponging with cold water, which may be still further chilled by adding ice to the water, is a potent method of lowering temperature.

3. Wrapping the patient in a wet sheet at the temperature of the body and rubbing ice upon the sheet so as gradually to cool it is a safe and efficacious method of abstracting heat from the body in cases of very high fever. The process must be stopped as the temperature falls to about 100° Fahr.; the patient's skin is then dried and he is placed between dry blankets.

To apply a Wet Pack.—Over the mattress of the bed place a mackintosh, then two dry blankets, and on the blankets spread a large wet sheet wrung out of cold or warm water. The patient, unclothed, is placed on the wet sheet, and wrapped up in it from neck to toes, each limb being separately wrapped up so that the whole of it is enclosed in the sheet. Blankets are then placed over the patient to the number of three or four or more. Whilst thus wrapped up the patient is carefully watched; the pulse is taken at the temporal artery, the rate of breathing observed, the temperature taken, the colour of the face noted as to pallor, congestion, or distress. When the temperature falls to about 100° Fahr., or if any sign of distress or collapse threatens, the treatment must be discontinued. Twenty minutes is the usual period of application. At the end of this time the covering blankets and wet sheet are rapidly removed, the patient's body dried quickly, and he is placed between dry blankets or transferred to another bed for a time. Pieces of ice may be given

to him to suck whilst in the pack, or if preferred hot drinks, to promote perspiration and relieve thirst, and stimulants may have to be administered afterwards to favour reaction if the patient is exhausted, or to promote perspiration. A wet pack should not be given unless ordered by a doctor, and should never be administered except in the presence of or by a trained nurse.

Iced Bath.—When the temperature of the body is very high it may be reduced by placing the patient in a bath of iced water. He may be lifted in a sheet by four persons and put in a bath the water of which is at the temperature of his body; thus, if his temperature is 107° Fahr. the water must be at 107°, and it is to him, whilst he has this temperature, merely a warm bath. The temperature of the bath is gradually reduced by adding cold water to it, then iced water, and finally ice may be allowed to float in the water all around the patient. To accelerate the cooling of the bath the hot water may be run off or lifted out by a pail. In this bath the patient has also to be carefully watched in case of collapse, and it should be given only under medical supervision.

CHAPTER XIII

INFLAMMATION

Signs of Inflammation.—There is no organ or tissue of the body in which inflammation may not occur. When the *skin* is involved, inflammation is indicated by redness, heat, swelling, and pain. And when an organ of the body is attacked, its function will be interfered with, a condition which is spoken of as "perversity of function." Thus, if the lung is inflamed, there will be quick and incompetent breathing; if the kidneys are inflamed, their secretion may be scanty or altogether arrested; and, in fact, whether it be the heart, the brain, a joint, the eye, or any tissue or organ that is the seat of inflammation, the normal functions will be perverted or suspended. The redness is caused by the presence of an excess of blood supplied to the part; the heat is due to increased chemical change in the blood and tissues; the swelling is the result of effusion of fluid (serum) from the blood into the tissues of the affected part; and the pain is brought about by the pressure upon the nerves, and the irritation set up in them by the inflammatory processes. When the *deeper tissues*, such as the bones, or any of the organs of the chest, abdomen, or cranium, are the seat of inflammation, the classical signs seen in the case of the skin are not all in evidence. Thus, when the lung is inflamed (pneumonia) there is no redness of the skin, no swelling is apparent, and the pain may be slight or altogether absent. The presence of heat, however, can be proved by the thermometer; the breathing is hastened; and the medical man, by examination of the chest, can, with certainty, diagnose the condition. It is the same in inflammation of other organs, such as the liver, kidney, spleen, heart, etc.: their functions are upset for the time being, at least.

The Inflammatory Process described.—To understand inflammatory processes, a short account of what

takes place in the capillaries and the blood is necessary. When a small quantity of blood is examined by a microscope it is seen to consist of a number of minute bodies termed corpuscles, floating in a fluid. The fluid of the blood is technically known as the *liquor sanguinis*. Although within the vessels blood exists as fluid, no sooner does it escape than it coagulates and divides into two parts: the blood clot, consisting of *fibrin*, and a straw-coloured fluid termed the *serum*. This separation of the liquor sanguinis into two parts is readily seen when the blood is received into a glass vessel or test tube; the fibrin clots and falls to the bottom, the serum floats on the top. We are familiar with this serum when a bleb is formed, either in the case of a burn or of a chafe, or when a medicinal blister is applied to the skin. When blood escapes from a wound it coagulates; the fibrin clots and helps to arrest the hæmorrhage and close the wound, the serum escapes and may dry up and form a scab or crust, or it may soak into the dressings applied to the wound. (*See* Manual No. 1.) The solid particles of the blood consist of two separate kinds of *corpuscles*, named red and white corpuscles, from their colour.

Red Corpuscles.—When viewed under the microscope the colour of the blood is seen to be due not to the fluid part as would appear from naked-eye inspection, but to the colouring matter contained in the red corpuscles. It is in these small red corpuscles, in structure like a minute sponge, that the oxygen taken up in the lungs from the air is conveyed to all the organs and tissues of the body.

White Corpuscles.—These are fewer in number but larger in size than the red corpuscles; they are of a pale colour; their surface presents an appearance resembling finely ground glass. The proportion of the white to the red is 1 white to from 300 to 500 of the red. If the piece of glass (microscope slide) upon which the blood is placed is kept warm, it will be seen that the white corpuscles of freshly drawn blood change their shape, throwing out processes in one, two, or more directions, and that they are capable of moving slowly from one place to another across the field of view.

These are living bodies, and they play an active part both in health and in disease. In health they are concerned with building up and renewing the tissues; in disease they play several parts:

1. Some of them are endowed with the capacity of acting as blood scavengers, from the fact that they can destroy by incorporating within their substance deleterious germs of various kinds, which, in many ailments, infect the blood. The white cells possessing this power are termed *phagocytes*, and their office is to relieve the body of obnoxious or disease-provoking organisms.

2. In inflammation the white corpuscles play an important part. When the transparent web of a frog's foot is examined with the microscope the capillaries and the blood circulating through them can be distinctly seen. If the foot is irritated in any way, the circulation of the blood is seen to be affected, and the white corpuscles, if watched carefully for some time, may be observed to pass gradually through the capillary walls and gain entrance to the tissues around. (*a*) When the *irritation is considerable*, these corpuscles come through the walls of the capillaries in large numbers; and so great may be the collection of white corpuscles that those in the centre are deprived of nutrition and die, and what is known as an *abscess* is formed. The dead corpuscles in the abscess cavity are now termed *pus corpuscles*, and we are familiar with their appearance in the form of *matter* or *pus* issuing from an abscess when it is opened, or from the surface of an ulcer on the skin. (*b*) When, however, the *irritation is less severe* the white corpuscles do not always end by becoming pus and forming abscesses; if they are extruded in moderate numbers the white corpuscles may retain their vitality and undergo a change whereby they enter into the formation of fresh tissues for the body. If a bone is broken, a nerve torn, any organ of the body ruptured, or the skin wounded, it is chiefly by the white corpuscles finding their way out of the blood-vessels into the surrounding tissues that the injuries are repaired. The process of union of bones, nerves, skin, etc., is brought about by the white corpuscles finding their way into the coagulated blood which surrounds the injured

tissues or organ (Fig. 21); the corpuscles throw out processes and become fixed in position and join each other by their processes. A cellular tissue is thus formed which in time becomes endowed with blood-vessels. The cells' processes lengthen out to form fibres, and these serve to keep the torn tissues in apposition. In this tissue, in the case of a broken bone, bone salts are deposited; in the case of a torn nerve, nerve fibres grow; and so with other tissues a similar process of healing takes place. The fibres formed from the white

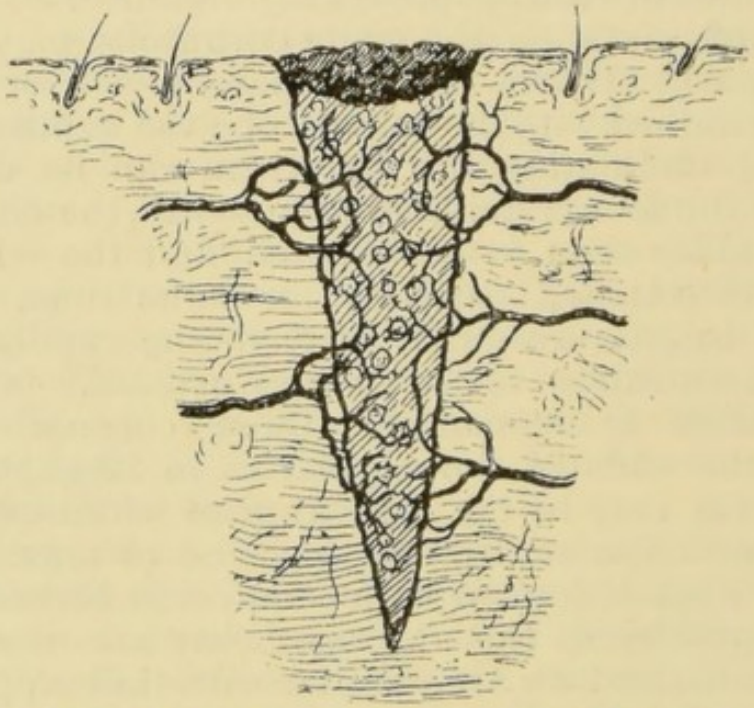


Fig. 21.—Wound of the skin in process of uniting (*see* text).

corpuscles in the process of healing contract, and it is by this power of contraction that the edges of a wound are brought together and united. Occasionally, however, the contraction is excessive, as in the case of severe and extensive burns and scalds of the skin, more especially of the hands and face, when the eyelids or mouth are distorted or the fingers are bound down and the hands deformed.

It is thus seen that the white corpuscles have much to do with inflammatory processes; and the explanation and reason for the several applications used to allay inflammation will be more readily understood now that the somewhat intricate processes have been briefly described.

Application of Cold

The application of cold, whether as cold water, ice, or evaporating lotions, over an inflamed part, has the effect of contracting the blood-vessels, and checking the effusion of fluid and the escape of white corpuscles from the blood into the inflamed area. Inflammation is thereby retarded, and perhaps aborted or dispelled altogether.

Cold may be applied (*a*) by wringing out a towel, piece of lint, linen or flannel in **cold water** and laying it upon the inflamed part. The dressing is kept cold by dripping more cold water upon it from time to time. Do not cover the dressing with a bandage, as thereby evaporation will be hindered, but over the inflamed part place a "cradle" to keep off the weight of the blankets if the patient is in bed. (*See* Figs. 24, 25, 26 in Manual No. 1, p. 36.)

(*b*) **Ice** may be added to the water in which the towel, lint, etc., is soaked; or ice may be broken up into small pieces and put in a towel or sponge bag or india-rubber bag, and laid on the skin.

(*c*) Cold water may be constantly applied as a **"drip,"** as follows: Lay a piece of lint on the inflamed area, say the leg; over this place a cradle; to the top of the cradle fix a medicine or other bottle slightly sloped; into the bottle pour sterile (boiled) water or some medicated solution such as iodine, carbolic acid, Condy's fluid, etc., of suitable strength; a wick made of lamp wick or of a few (four or more) strands of lint is then inserted into the bottle, one end of the wick reaching to the bottom of the bottle, the other end hanging from the mouth of the bottle for 3 or 4 in. or more. Wet the wick, and the water will drip from the end of it on to the lint covering the wound or inflamed part. To increase the drip, lengthen the part hanging from the mouth of the bottle; to diminish it, shorten the wick by pushing it farther into the bottle; to stop it, turn the end of the wick up on to the upper surface of the bottle.

(*d*) Cold may also be applied as a douche, affusion, shower bath or cold bath (*see* Baths, p. 77).

(*e*) An **evaporating lotion** may be made by taking 1 oz. of strong solution of subacetate of lead (sugar of lead), ½ pint of methylated spirits of wine to 3 parts of distilled or rain water; soak two or three folds of a piece of lint or linen in this lotion and lay it upon the inflamed area without further covering. This lotion, by the fact of its rapid evaporation, abstracts the heat from the part, thereby lowers the temperature, lessens the quantity of the blood in the part and checks the inflammation. The dressing may be renewed from time to time as required.

Application of Heat

The application of heat has upon the blood-vessels and the inflammatory processes the opposite effect to that of cold. It dilates the blood-vessels, and tends to bring about one of two things: If it is applied early, the serum in the tissues causing the swelling around the seat of inflammation may be reabsorbed, and by allaying the irritation the passage of white corpuscles through the walls of the vessels may be retarded, that is, an abscess is prevented. If, however, the inflammation has already proceeded farther, the application of heat in the form of poultices, fomentations, etc., will increase the effusion of fluid and white corpuscles and help the abscess to "point."

Dry Heat.—Flannels heated at a fire and applied to an inflamed or painful part tend to allay pain and inflammation. Dry heat is especially good in colic, neuralgia, etc., but owing to the necessity for frequent renewal it is a troublesome form of application. If, however, the flannel is kept hot by hot-water bottles the changes need not be so frequent.

Moist Heat. *Fomentations.*—To prepare a hot fomentation to relieve pain in the abdomen, for example, proceed as follows: Procure a basin, a large piece of flannel, a towel, boiling water, and, if the fomentation is large, two wringing sticks. Place the towel, open, across the basin; lay the piece of flannel, which should be large enough, in the case of the abdomen, to extend in a double layer from just below the nipples to the groin, and half way round the loins; on the towel as it

lies across the basin pour the boiling water on the flannel until it is well soaked; then wrap up the flannel in the towel, and seizing the towel at both ends, twist the ends in opposite directions. If the fomentation is a small one, it is possible for one person to wring it sufficiently dry; if it is a large fomentation, two persons are required to wring it out, one at either end twisting in opposite directions. Instead of wringing by the hands, more power will be obtained by using wringing sticks (Fig. 22), which consist of rounded pieces of wood, each 18 in. long and 1½ in. in diameter; wrap these one in each end of the towel

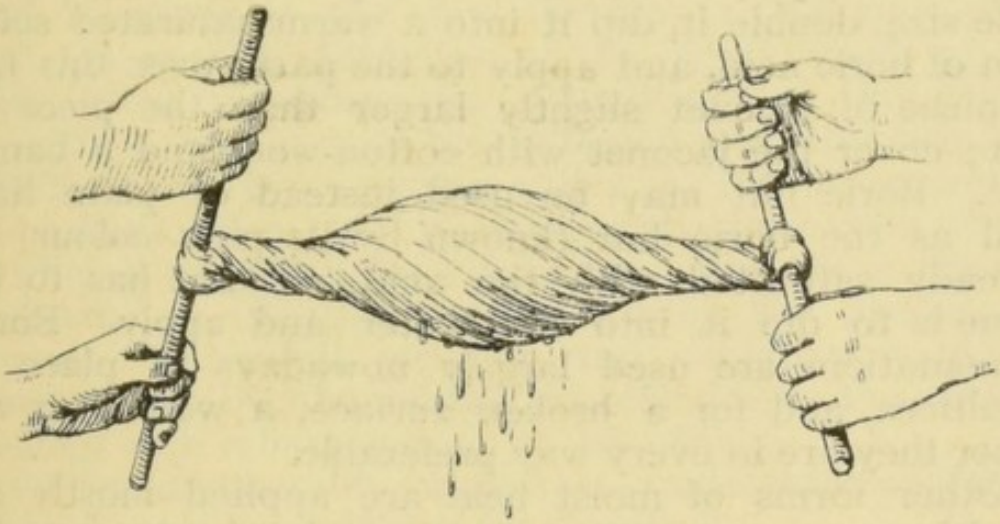


Fig. 22.—Wringing a fomentation.

and twist in opposite directions until the water is well squeezed out of the flannel. The towel is now undone and the fomentation applied as hot as the patient can bear it. The fomentation is then covered with a large bath towel, which should encircle the whole body, keeping the towel fairly tight by fixing it with safety pins. A piece of mackintosh a little larger than the piece of flannel used may be inserted between the flannel and the bath towel. If the pain is great the fomentation may have to be reapplied every twenty minutes, but as the pain subsides every two hours should suffice.

Poppy-head Fomentation. — Poppy heads contain opium, and when it is necessary to obtain, in addition to moisture and heat, the soothing effect of this drug

for the abdomen, take half a dozen poppy heads, break them up and boil them with a pint and a half of water in a saucepan for twenty minutes, then pour the contents of the saucepan through a strainer on to a flannel laid in a towel across a basin as for a simple fomentation (*see* above), wring the towel out in the usual way, and apply. If no poppy heads are available, a couple of teaspoonfuls of laudanum (tincture of opium) may be sprinkled over the flannel after it has been wrung out of the water.

Boric-Acid Fomentation. — A fomentation of boric acid is especially employed to allay inflammation in the case of open wounds. Take a piece of lint of suitable size, double it, dip it into a warm saturated solution of boric acid, and apply to the part; over this lay a piece of jaconet slightly larger than the piece of lint; cover the jaconet with cotton-wool and a bandage. Boric lint may be used instead of plain lint, and as the boric lint (known by its pink colour) is already saturated with the acid, all that has to be done is to dip it into hot water and apply. Boric fomentations are used largely nowadays in place of poultices, and for a broken surface, a wound or an ulcer they are in every way preferable.

Other forms of moist heat are applied mostly as poultices.

Poultices and Poulticing

The official name for a poultice is a cataplasma, of which there are several kinds recognised in the British Pharmacopœia.

Poultices have to a large extent gone out of fashion. Being a warm and moist mass, a poultice serves to foster and grow bacteria present in the discharge from a wound over which it is applied, and these, becoming absorbed by the surfaces of the wound or ulcer, re-enter the patient's system through the blood-vessels or lymphatics and set up blood poisoning (septicæmia). Poultices should not be applied to inflamed wounds or sores, but instead fomentations of lint soaked in some disinfectant solution and covered with oiled silk or other impervious material are to be used. For deep-

seated inflammation, however, as in the various organs of the chest and abdomen, as well as in joints and some other parts of the body, a poultice is at times a convenient method of applying heat and moisture to the surface of the unbroken skin beneath which the inflammation occurs. Poultices, therefore, still have a place in the nurse's armamentarium. Poultices are open also to other objections—for example, their weight, when applied to the front of the chest in inflammation of the lungs, is calculated further to hamper the breathing movements, rendered already difficult by the state of the lungs.

The objects of applying a poultice are to convey heat and moisture to the skin, thereby (1) allaying pain, and (2) causing dilatation of the blood-vessels of the skin, thus relieving the congestion of the blood-vessels in and around the inflamed part and bringing about one of two results: either (*a*) the dispersion of the inflammation, or (*b*) hastening the formation of pus —what is popularly known as "bringing the matter to a head," or in other words causing the abscess to "point." The full meaning and explanation of the changes will be understood by referring to the section dealing with inflammation (pp. 85—88).

Of the innumerable substances employed as poultices, linseed meal has retained its popularity.

To Make a Linseed Meal Poultice.—The requisite articles are: (1) Crushed linseed, that is, linseed merely crushed but from which the oil has not been expressed. Linseed meal without the natural oil it contains is too dry for poultice making; if, however, the crushed linseed cannot be obtained, it is necessary to add some olive oil or linseed oil to the meal whilst making the poultice. (2) A piece of lint, linen, cotton, brown paper, tow, or cotton-wool is to be used on which to spread the poultice; this is to be placed on a piece of wood or on a table, but not on the marble slab of the wash-stand, which is apt to render the poultice too cold. (3) A suitable basin or bowl. (4) A tablespoon or a large table knife or a spatula. (5) A kettle with boiling water.

When the kettle is boiling, pour a little of the water into the basin to be used; swill the water round the

basin until it is quite warm; pour the water out of the basin, as it is made cold in the process of warming the cold basin; again pour boiling water from the kettle into the basin, in quantity proportionate to the size of the poultice to be made: a little experience will determine the quantity necessary. Now take a handful (or spoonful) of the crushed seed and let the meal trickle through the fingers, keep stirring with a spoon, spatula, or large knife, and add sufficient meal until the poultice is quite thick. Test the thickness by standing the spoon in the centre of the poultice mass; if the spoon stands upright or falls gently against the side of the basin, or if the mass comes away clean from the sides of the

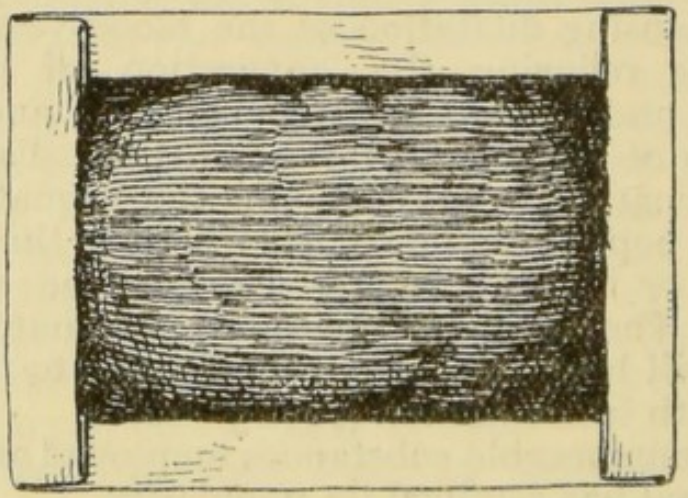


Fig. 23.—Poultice ready for application.

bowl, the poultice is known to be sufficiently thick. The poultice mass is now turned out on to the linen, paper, or tow, and spread evenly, leaving a portion, to the extent of about an inch all round, uncovered by the linseed. To facilitate spreading, dip the handle of the spoon or the blade of the knife or spatula into hot water; this expedient prevents the poultice from adhering to the spoon, knife or spatula, and ensures a smooth surface to the poultice mass. The edges of the cloth are now turned up so as to overlap the margins of the poultice all round (Fig. 23). Before the poultice is applied it is well to test its heat by holding the back (covered side) of the poultice against the cheek or the back of the hand; this will guard against the poultice

scalding the patient. When the poultice is applied to the skin it is kept in place by a bandage sufficiently tight to prevent slipping. If the patient is in bed no further covering is required, but if he is up and going about, it is necessary to cover the poultice with cotton-wool or a piece of flannel before applying the bandage, so as to ensure the maintenance of heat which is the object of its application.

In making and applying a poultice, the following points should be remembered: Boiling water can only be obtained from a kettle, saucepan, etc., just taken off the fire. It cannot be obtained when the water from the kettle is transferred to a jug, and carried from the kitchen to sick-room or ward. The poultice must be made, therefore, in the room in which the kettle boils. If instead of the poultice being made in the sick-room or adjacent dressing-room it is made in the kitchen, it must be put between two hot plates and so carried to the bedside.

A poultice should not be a sloppy mass, but of rather firm consistence, so as to stand the "spoon test."

Do not put a piece of muslin over the poultice; this custom came into use because of the tendency to make the poultice mass too thin; in consequence of which it sticks to the skin when being removed. A properly made poultice—that is, one of which the consistence is sufficient to allow of a spoon standing upright in it—does not stick to the skin, and the necessity for a piece of muslin to prevent this betokens ignorance on the part of the maker of the poultice. Further, muslin does away with much of the good the poultice is presumed to do; for inasmuch as between the warm poultice and the skin a stratum of moisture intervenes, the presence of a layer of muslin absorbs the moisture and conducts it to the margins of the poultice, where it escapes on to the clothing, and even the sheets are kept in a constant state of dampness.

To be of any value, a poultice must be well covered up after it is applied. There is no virtue in linseed meal or other poultice, except from the fact that it conveys heat and moisture to the skin. If the poultice is allowed to become cold after application, it is

quite useless. A poultice becomes cold *only* by being insufficiently covered, and from no other cause. This may be proved by taking the temperature of the poultice. When a thermometer is pushed in between the skin and a well-covered poultice, the temperature will be found to be the same as that of the patient's body, namely 98·4° Fahr. if the body temperature is normal. If the poultice is insufficiently covered, its temperature will fall to the temperature of the air around. The temperature of a well-covered poultice never falls below that of the body, even if the same poultice is kept on for a day. Why, then, change a poultice? Because it gets dry and foul and smells badly, owing to its being saturated with organic materials from the skin. How often should a poultice be changed? Every four hours. Why? Because at the end of four, or at most six, hours it becomes dry, and smells, and crumbles away into the dry meal of which it was made, and the meal escapes into the bed and around the patient.

A **jacket poultice** is the name given to linseed poultices applied one on the front and the other on the back of the chest, for inflammation of the lungs (pneumonia). To keep the poultice in place a piece of linen or bandage is laid across each shoulder, and pinned to the upper borders of the poultice, whilst down the sides of the chest similar strips are applied, thus rendering the whole like a jacket to enclose the body. This poultice, although excellent in theory, is practically not commendable, owing to its weight, which hinders the movements of respiration. This disadvantage may be partly obviated by spreading the poultice quite thinly in front—not over $\frac{1}{8}$ in. in depth; whilst behind, it may be made thicker, say $\frac{1}{3}$ in. in depth, as the weight does not signify, seeing that the patient lies upon the back, and the poultice is beneath. Even with this precaution, however, the weight of the poultice on the chest, when breathing is much impeded, had better be avoided. In bronchial affections, however, the jacket poultice is much in vogue, and with some reason, for the hot, moist evaporation escaping from a poultice placed on the upper part of the chest is readily inhaled by the patient and

is calculated to afford relief to the inflamed air-passages.

Charcoal Poultices.—Wood charcoal made into poultices was much used at one time as an application for the purpose of disinfecting foul sores, such as bedsores, so as to cleanse them, keep down the objectionable odour, etc. They have been replaced by fomentations containing disinfectants of various kinds. A charcoal poultice may be made of wood charcoal alone, in the same way as a linseed meal poultice is made, or it may be made half of charcoal and half of crushed linseed, or over a linseed poultice a layer of dry charcoal may be sprinkled. The official (British Pharmacopœia) method of making a "cataplasma carbonis," as a charcoal poultice is termed, is as follows: Take of wood charcoal 1 part, linseed meal 3 parts, bread crumb 4 parts, boiling water 20 parts.

Bread Poultices.—A piece of bread cut fairly thick, from which the crust is removed, may be laid upon a piece of linen, or a clean folded handkerchief; over the bread, boiling water or milk may be poured, and the poultice is made; or the bread may be beaten up with boiling water and spread on lint, etc. This is a pleasant method of poulticing the eyelids, ear, or any part of the head and neck, as, unlike linseed meal, the bread is light and it does not smell.

Bran Poultices.—In cases of sprained joints, neuralgic pains in the limbs, and several other ailments, especially of a rheumatic nature, a bran poultice affords relief from pain. This application differs from a linseed and most other poultices inasmuch as it partakes rather of the nature of a vapour or steam bath in its action. It is readily prepared by placing a suitable quantity of bran in a basin previously warmed or scalded, and then pouring boiling water over the bran until the water covers it. The whole is then turned out upon a towel, the water allowed to run off, and the painful part laid in the centre of the steaming bran, when the towel is wrapped fairly tightly round the limb. A more convenient but less effective method of application is to place the bran

in a muslin bag, dip the bag in boiling water, strain the water off and apply. It is an excellent plan, which has the commendation of old custom, to pour a tablespoonful or two of vinegar over the poultice just before applying it. The vinegar, owing to its acidity (acetic acid), makes of the vapour arising from the hot and wet bran an acid vapour bath, which is efficacious in relieving pain, especially in rheumatic affections.

Starch Poultices.—Mix a suitable quantity of starch with a little cold water and add enough boiling water to make a thick paste. This is a favourite application for boils on the face, scalp, etc.

Oatmeal made as porridge, but without salt, is applied instead of linseed as a poultice.

Soap and Sugar.—A mixture of soap and sugar is popular as an application to bring a boil, abscess or carbuncle "to a head," and is reckoned to possess the property of "drawing." This property is due to the fact that both soap and sugar speedily absorb moisture, and when they are worked up into a paste and placed upon a boil, etc., they greedily absorb the inflammatory materials around the inflamed part, or the pus issuing from the sore — hence the term "drawing." A **carrot** has similar "drawing" properties. To apply this, rub a dried carrot on a grater; take the pulp which falls through, and, placing it on a piece of linen, apply it to the surface. The carrot, of course, must not be boiled, otherwise, its "thirst" being assuaged by the water in which it is boiled, it loses its "drawing" powers.

In every parish some "wise woman" knows of wonderful "herbs" which, applied as poultices, have marvellous effects of which doctors are said to be ignorant. As, however, every available plant has been analysed chemically, its ingredients experimented with and tested therapeutically, these stories are but mythical; moreover, but few, if any, substances are capable of penetrating the skin when applied as a poultice, so that no virtue can be assigned to any herb or other material beyond the power it may possess of conveying heat and moisture.

Counter-Irritation

When it is desired to relieve inflammation or pain, a counter-irritant, such as mustard, iodine, or a fly blister, is applied to the skin immediately over or in the neighbourhood of the inflamed organ or tissue. The principle involved in the application is to set up a "counter" or second seat of irritation in the skin over the inflamed part beneath. The action of the irritation is to cause dilatation of the blood-vessels of the skin, and as the blood is "attracted" thither the blood-vessels at and around the seat of inflammation are thereby relieved and the diseased organ is given a chance of recovery. Familiar examples are a blister over the temple to relieve inflammation of the eye; behind the ear for ear troubles; iodine painted on the skin over a joint or over the liver, etc.; and mustard plasters applied to the abdomen over the seat of pain in colic.

Counter-irritation may be applied either to produce a mere reddening of the skin, or, by continued application, a blister or bleb. Thus, in cases of colic a large mustard plaster is applied over the painful spot for ten or fifteen minutes to cause a reddening of the skin merely; but in eye troubles the counter-irritant is applied to the temple and kept there until a bleb or blister is formed.

Mustard, in the form of table mustard, mustard oil, or a mustard leaf, may be used as a plaster. Supposing it is necessary to apply a mustard plaster over the pit of the stomach in order to allay vomiting, or for other reasons: take a tablespoonful of ordinary mustard, mix it with a sufficiency of cold or tepid water to form a paste (hot water destroys the efficacy of mustard); spread the mass to about the size of the palm of the hand upon a clean piece of lint or linen folded double, or on a handkerchief, and cover the mustard with a layer of fine muslin. The plaster is now placed upon the skin, and covered with a handkerchief laid on loosely. After, say, ten minutes the patient may begin to feel the plaster getting warm, and if after fifteen or twenty minutes the irritation is complained of, the plaster

should be removed. On no account should it be left long enough to cause blistering, for as the mass of mustard used is about the size of the palm of the hand, a blister of this dimension is undesirable; all that is required is that the blood should be brought to the skin in quantity sufficient to cause redness. The counter-irritation thus established will suffice to relieve the irritation or congestion of an organ for the time being and give it a chance of recovery. The object of placing muslin over the mustard is that when the plaster is being removed the mustard may not stick to the skin; if it is allowed to do so, it is difficult to wipe it off the irritated and painful part. If a piece of muslin is not at hand, a cambric handkerchief may be used instead, a single layer of the handkerchief being interposed between the mustard and the skin.

Mustard Leaf.—By dipping a mustard leaf into cold water and laying it directly upon the skin it will act in the same way as a mustard plaster. This is a convenient and ready method of applying counter-irritation.

Flying Blisters.—These must not be confounded with fly blisters (*see* p. 101). For purposes of stimulating the circulation, as in restoring persons to consciousness, mustard plasters the size of the hand, or mustard leaves, may be applied simultaneously to different parts of the body—one, we will say, on the calf of the leg, another over the heart, another on one side of the abdomen, etc.; they are left in place for only five or ten minutes, when they are moved elsewhere—say, to the thighs, over the liver, or to another part of the abdomen. After a sufficient interval, they are again moved to other regions, and it is from the fact of their being frequently moved about that they are named "flying" blisters.

Mustard Oil.—By rubbing mustard oil over a portion of the skin of the chest, abdomen, or other part of the body or limbs in cases of inflammation, and covering the part with a piece of linen, the skin is reddened, and may develop an eruption of vesicles (little blisters) if the application has been severe. This is a very pronounced form of counter-irritation, and is frequently

used in cases of inflammation of the lungs, pleura, liver, etc.

Fly Blisters.—The wings of the Spanish (or blistering) fly, made into a paste and spread upon chamois leather, paper, or linen, when applied to the skin act as a counter-irritant by producing a bleb (blister). As supplied by the chemist, it will be of the size (a sixpence, a shilling, a half-crown, etc.) ordered by the doctor, and covered with a piece of tissue-paper. Before applying the blister, remove the tissue-paper; wash the surface of the skin clean, dry it and put on the blister, the paste being directly on the skin, no muslin intervening. It is kept in place by pieces of strapping-plaster, or by cotton-wool secured by a bandage. If after, say, half an hour there is no sign of the skin becoming reddened, or a bleb rising, the bandage and cotton-wool should be removed and the plaster covered with a warm boric fomentation or a bread poultice. When the bleb has risen, remove the plaster, snick the lower part of the bleb with clean scissors, catching the fluid as it escapes in a spoon or cup, or receiving it on to a piece of absorbent cotton-wool. If it is desired to heal the bleb, cover the surface, without removing the skin of the bleb, with a piece of lint the size of the bleb spread with some simple ointment (boric, zinc), or a very fine layer of boric wool, held in place by a piece of plaster. If it is intended to keep the blistered surface open, cut away the skin of the bleb and apply a suitable ointment, as ordered by the doctor. The exact position at which the blister is to be applied will have been previously indicated by him; thus, if for the eye, the blister is usually applied on the temple of the same side as that of the irritated eye. In the case of the ear, it will be on the bony bump (mastoid process) behind the ear. If it is a joint that is inflamed the blister is to be applied above or below it, not over it, but the choice of the spot is the business of the doctor in charge. The bleb should never be allowed to burst by itself, as its contents possess the irritating effects peculiar to the blistering substance, and will blister the skin wherever it goes. Should some of the fluid escape into the eye or ear during sleep severe inflammation of the organ would ensue.

Leeches.—For the purpose of relieving an inflamed or congested part or organ, one or more leeches may be applied. If the eye is inflamed the leech or leeches (two, three or four) should be applied to the temple of the same side; if the ear, to the bony prominence (mastoid) behind. In the case of an inflamed joint several leeches may be applied directly over it; and when the liver, lung, or pleura is the seat of inflammation, leeches varying in number from four or five to as many as a dozen are not infrequently employed. The amount of blood which a leech can suck varies from 2 drachms (a dessertspoonful) to 4 drachms, that is half an ounce (a tablespoonful), so that if a dozen leeches are employed the quantity of blood withdrawn will amount to several ounces. Leeches as they come from the chemist are usually contained in a spill-box, or in a glass of water covered over with a piece of paper. To apply them the part should be washed clean, the surface smeared with a little milk, or sweetened water, the lid of the spill-box removed and the open mouth of the box held to the skin or secured in place with a bandage. If the leeches are sent by the chemist in a glass of water, the water is run off, and the glass (Fig. 24) held against the skin until they secure a hold. A series of leeches may be applied in a similar manner when they are required for the chest. When the leech has ceased to suck, the undulations of its body cease. A spoon or cup should be held below the leech into which it can tumble, or if it does not do so of its own accord, it may be gently detached with a spoon, but on no account must it be forcibly taken away, otherwise it may leave its jaws in the wound and give rise to subsequent trouble. By sprinkling salt on it, where it is adhering to the skin, its detachment will be facilitated. The leech bite should be covered with a thin film of cotton-wool, on which collodion is dropped or painted with a brush. If bleeding persists, the bleeding-point must be pressed upon by a finger, or

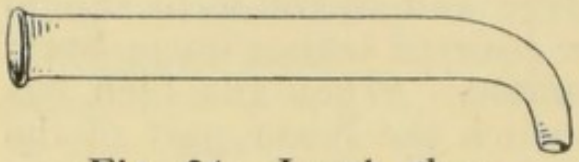


Fig. 24.—Leech glass.

held firmly between the finger and thumb; or it may be necessary to transfix the skin immediately below the bite by a surgical or an ordinary sewing needle, sterilised; a small piece of cotton-wool is placed over the bite and a strand of sterilised sewing cotton passed figure-of-8-wise over the ends of the needle so as to compress the bleeding-point (Fig. 25). A poultice or hot fomentation placed upon the part after the leech has been removed will cause the bleeding to continue, but this must be carefully watched, especially in young children, when a number of leeches have been applied over the side of the chest, otherwise the child's life may be in danger. The doctor may have advised that a poultice or hot fomentation be applied to the chest after the leeches have been removed; should this be done immediately afterwards, the heat and moisture of the poultice will encourage bleeding, and the child may faint from loss of blood. No hot applications should be employed in such cases for some time after the removal of the leeches.

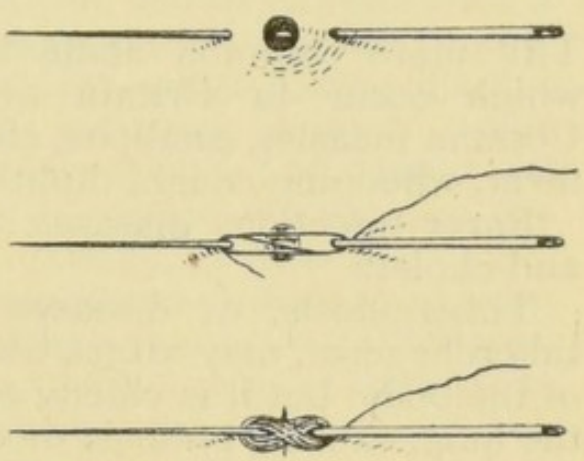


Fig. 25.—Arresting hæmorrhage from leech bite. (*See* **text.**)

CHAPTER XIV

INFECTION AND INFECTIOUS DISEASES

THE more common acute infectious febrile diseases which occur in Britain are scarlet fever, measles, German measles, smallpox, chickenpox, typhoid (enteric) fever, whooping-cough, diphtheria, and influenza.

Rarer infectious diseases are typhus fever, plague, and cholera.

Tuberculosis, or diseases due to infection by the tubercle germ, may attack almost any and every organ of the body, but it is chiefly regarded as an affection of the lung, causing phthisis or consumption. Rheumatic fever, a severe scourge in Britain, has not yet been proved to be infectious, but in all probability it will be found to be so.

Terms in Common Use.—By a **specific** ailment is meant a disease produced by an infection or an infective organism which has the power of producing the disease special to itself and no other; thus, the typhoid fever germ can give rise to typhoid fever only, the plague germ to plague only, the diphtheria germ to diphtheria only. The word *zymotic* is frequently used to express the whole group of acute specific diseases.

A **sporadic** outbreak means that an occasional case of the disease occurs here and there, but that it is not widely diffused; thus we may have a few sporadic cases of Asiatic cholera in our seaports now and again, but the disease dies out after attacking a few persons. When a disease is termed **endemic** we mean that the disease is local, or prevalent in a particular district, beyond which it does not spread, except occasionally. An **epidemic** signifies a widely prevalent and rapidly spreading outbreak of disease, many persons being attacked about the same time. Thus plague, which is endemic in certain small areas in Northern India, Mongolia, and possibly Central Africa, may spread, at intervals of a century, to other areas and become epidemic in many

parts of the world. The term **pandemic** is applied to a more or less universal outbreak of a particular disease; influenza affords the best example of a pandemic ailment.

The terms **contagious** and **infectious** applied to the communicability of disease do not to-day bear the distinct significance once applied to them. Contagion meant conveyance of disease by actual contact with a person suffering from a communicable disease; infection was applied to the possibility of acquiring disease by channels other than by personal contact. The term contagion has fallen into disuse, as almost all diseases are now proved to be infectious through the medium of air, water, food, clothing, or insects.

How Infection is Transmitted.—Infection is conveyed to the body by one of three channels: (1) *Respiration.* The infecting organism (germ, microbe, bacterium, bacillus) may enter the body by way of the air taken into the lungs. The principal ailments conveyed in this way are measles, influenza, scarlet fever, whooping-cough, tuberculosis (consumption), mumps, and perhaps chickenpox. (2) *Digestive tract.* In food, water, milk, etc., the germ of infection may be conveyed. Examples of diseases thus conveyed are typhoid (enteric) fever, diphtheria, dysentery, and cholera. Certain diseases are conveyed by both the respiratory and digestive tracts, such as scarlet fever, tuberculosis, plague (bubonic plague by food or water, pneumonic plague by the breath). (3) *The skin.* The bites of insects have of late years been proved to be a fertile channel of infection; the bites of certain animals also are known to convey infection. Thus hydrophobia is communicated by dog-bites; malaria and yellow fever are transmitted from an infected to a healthy person by mosquitoes; plague is conveyed to man by fleas from rats and other animals suffering from the disease; sleeping sickness is set up by infected tsetse flies; leprosy may be carried by lice, etc.

Toxic is a term employed to express poisoning by toxins—the poisons produced by the action of germs. In diphtheria, for instance, the diphtheria bacilli in the throat generate a toxin, which, when it is absorbed in the blood, causes an intoxication characterised by

severe febrile symptoms. The blood is poisoned (*toxæmia*), and, as with any other poison taken in large quantity, by accident or purposely, the struggle for life is severe. It is not the presence of bacteria that makes the patient ill, but the poisons they produce. The expression *auto-intoxication*, now so frequently used, means self-intoxication ; that is, the individual becomes the generator of the poison by which he is made ill. The chief seat of production of self-generated toxins is the alimentary canal ; decayed teeth, stomach and intestinal disturbances, as indicated by indigestion, constipation, etc., are especially productive of auto-intoxication.

Fomites.—These are substances capable of retaining infection and of being the means of propagating an infectious disease ; the most important fomites (pronounced fo'-mi-tēz) are bedclothes, bedding, night-dresses, carpets, curtains, towels, and letters. It must be remembered also that infection is carried by dirty hands, dirty instruments and utensils, and that bad water supply, contaminated food, defective drains, and a foul atmosphere are all means of conveying and propagating infectious disease.

Stages of Infectious Fevers

The infectious fevers run through stages which conform to a more or less common type, as follows :—

1. **The Period of Exposure.**—This may be known or unknown. If one has visited a person suffering from an infectious disease, and at some definite time afterwards develops the same disease, the period of exposure is exactly known. If, however, the disease is caught whilst travelling in public vehicles, or at public gatherings, it may not be possible to trace the source of infection and determine the period of exposure.

2. **Period of Incubation.**—When the disease-producing germs have been taken into the body, either by way of the breath, the food or the skin, the infected person does not at once develop the symptoms of disease, and it may be days or weeks before the illness declares itself. During the interval between the exposure and the onset of feverishness the germs that have

gained access to the body are developing, multiplying, hatching or incubating, and it is only when this process is well advanced that the patient becomes feverish. A few hundreds or thousands of germs taken into the body may not cause any evil consequences; but if they multiply to the extent of hundreds of millions their presence is made known by the development of the specific disease they are capable of producing. During the period of incubation the infected person does not as a rule feel ill, and will be able to continue work and take food with appetite. Persons in the incubation stage are seldom infectious to other people.

Table of Incubation Periods in Different Infections.

Disease.	Incubation Period.	Disease.	Incubation Period.
Scarlet Fever ...	1 to 8 days	Smallpox ...	12 to 14 days
Measles	10 to 14 ,,	Chickenpox ...	10 to 14 ,,
German Measles	8 to 21 ,,	Typhoid Fever	7 to 21 ,,
Whooping-cough	7 to 14 ,,	Typhus Fever ...	5 to 14 ,,
Diphtheria ...	2 to 8 ,,	Plague	2 to 8 ,,
Mumps	10 to 21 ,,	Cholera... ...	1 to 8 ,,
Influenza... ...	1 to 4 ,,	Yellow Fever ...	3 to 6 ,,

To simplify this table, and taking to the eighth day to represent seven completed days, the maximum incubation periods of the several diseases mentioned may be grouped as follows:—

Maximum Incubation Period 1 Week.	Maximum Incubation Period 2 Weeks.	Maximum Incubation Period 3 Weeks.
Scarlet Fever.	Measles.	German Measles.
Diphtheria.	Whooping-cough.	Mumps.
Influenza.	Smallpox.	Typhoid Fever.
Plague.	Chickenpox.	
Cholera.	Typhus Fever.	
Yellow Fever.		

3. **Period of Invasion.**—When symptoms of fever develop, they are usually marked by loss of appetite, foul tongue, thirst, headache, backache, pains in the limbs,

sometimes vomiting and purging, increased temperature, quickened pulse and respiration. In other words a state of feverishness occurs. In some ailments headache is more severe than in others, or again it may be a backache that is complained of, whilst in others of disturbance of the nervous system or the digestion is more pronounced. The symptoms, however, form collectively a state of feverishness, a term which is well understood. The period of invasion in many acute specific diseases ends in a rash or eruption.

4. **The Rash or Eruption.**—In the so-called eruptive fevers the rash may present itself in a day or two after the commencement of the feverishness, or it may be as late as a week or more before it is seen. Spots develop, or a general rash appears, the date of its appearance varying with the specific ailment. The following table presents this in an easily understood form :—

Disease.	Day on which the Rash Appears.
Scarlet Fever ...	Second.
Smallpox ...	Third.
Chickenpox ...	First, second or third.
Measles	Fourth.
German Measles	Second to fourth.
Typhus Fever ...	Fifth.
Typhoid Fever ...	Eighth or ninth, if at all.

The presence of an eruption on the skin is an indication that the poison—that is, the germs or their toxic products—is leaving the body ; for the skin is one of the principal organs of excretion. In the elimination of the poison each of the organs of excretion plays its part in degrees varying according to the specific nature of the ailment, and each of them may become seriously affected whilst it is thus ridding the body of poisonous material.

The channels by which the infectious germs and their products (toxins) escape from the body are the skin, the lungs, the kidneys, and the intestines—the four excretory organs.

(*a*) *The Skin.*—Richly supplied with blood-vessels, the glands of the skin abstract fluid from the blood, and get rid of it by means of the sweat (sudoriparous) glands. The perspiration consists of a clear fluid which has dissolved and suspended within it organic matters and salts of various kinds. The organic substances, when the fluid portion of the excretion evaporates, are left on the surface, and cause the dirty accumulation seen on the skin when it is not washed sufficiently often. In disease the excretory functions of the skin have extra work to do as a rule, for perspiration in fever is often profuse. In addition, the germs, the toxins, and material such as pus, abscesses, and cores (sloughs) from boils, carbuncles, etc., gain exit by way of the skin. Thus the skin in these ailments is called upon to do more work than it can normally accomplish, and, becoming irritated, as it were, in the process of elimination, develops a general redness as in scarlet fever, spots as in measles, blebs (blisters) as in chickenpox, small dead cores as in smallpox.

(*b*) *The Lungs.*—The lung is an excretory organ of great importance. Not only is carbonic-acid gas given off by the breath, but also organic substances, heat and moisture, and if in the lung or the blood germs are present they may escape by way of the breath, as may be proved by microscopic examination of the mucus, etc., coughed up from the air passages. In tuberculosis the germs are present in the sputum, and, becoming diffused in the air after expectoration, are inhaled by other people. In the pneumonic form of plague a patient may cough the sputum on to the nurse's face, and infect her through the eyes, nose, or mouth. In diphtheria, also, the breath or the spray from coughing may infect others who come close to the patient. There are but few infections indeed which do not find exit by way of the lungs; consequently, in many diseases, especially eruptive fevers, the lungs become affected at some period of the illness. The extra work thrown upon them by the passage of these abnormal constituents of the blood serves to irritate them and set up inflammation (pneumonia). It is not uncommon to

hear that a patient died of pneumonia in the course of a fever or some feverish ailment; popularly, pneumonia is put down to carelessness on the part of the doctor, the nurse, or the patient, whereas it will be readily gathered from the above that neither catching cold nor the administration of unsuitable medicine, food, etc., has anything to do with it, the cause being the extra work thrown upon the tissues of the lung in the attempt to eliminate poisonous material from the body.

(*c*) *The Kidneys.*—The watery elements of the body are chiefly got rid of by the kidneys, but many salts and organic substances are also excreted along with the fluid. Germs infecting the body may also make their escape by way of the kidneys, and the passage of the natural secretions, plus the disease-producing organisms and their products, through the fine tubules of which the kidneys are composed tends to obstruct the exit of fluid (urine) by the natural channel; the fluid is thrown back upon the blood and exudes through the walls of the blood-vessels in other parts of the body, appearing beneath the skin as "dropsy," or finds its way into any one of the great cavities of the body—the abdomen, the pleural cavities, or the pericardium (the bag which surrounds the heart). When dropsy is present the disease is usually termed Bright's disease, after the physician who discovered the connection between dropsy and kidney disease; but "dropsy" may be due to weakness, heart affections, etc., and not to kidney ailments; Bright's disease may be a complication of scarlet fever and other diseases. Popularly, Bright's disease occurring during or after an illness is often ascribed to carelessness in doctoring, nursing, or feeding, etc., whereas the kidney trouble is produced by the extra work thrown upon the kidneys in the elimination of the germs or their toxins from the diseased blood.

(*d*) *The Intestines.*—The main part of the "solid" elements of excretion are got rid of by way of the bowel; and when, along with the normal excretions from the intestines, infected material is eliminated, much additional work is thrown upon the mucous lining of the intestine, and as this becomes congested

by irritation, and subsequently by inflammation, ulcers may form and dire consequences result. In such diseases as typhoid fever and dysentery the ulceration may open a blood-vessel and hæmorrhage ensue, or the ulcer may eat its way completely through the wall of the intestine and allow the contents to escape into the cavity of the abdomen (*see* p. 120).

In many infections the diseased products find their way out of the body through not one but all of the excretory organs; but some prefer certain channels of exit to others. Thus, in scarlet fever, in addition to the skin, it is the kidney mostly that is called upon to act; whereas in measles it is the lung, and in typhoid fever the intestine. A knowledge of these facts serves as a guide to the treatment, nursing and diet suitable to the different ailments.

5. **Defervescence.**—When the temperature of the body falls to the normal, and continues at the normal night and morning, the period of feverishness is ended. The poison, however, continues to be eliminated, as in many ailments germs are given off for a considerable period afterwards—that is, during the period of convalescence. A fall of temperature in the morning to normal does not mean that the period of feverishness is finished, for the evening temperature may continue to rise for several days after the morning temperature is normal, or even below normal. It is only when both morning and evening temperatures stand at or below normal that the feverishness can be said to be at an end.

6. **Convalescence.**—Popularly the period of convalescence is regarded merely as the period of "getting well," but, although feverishness is over, the patient may be still infectious to other people. So much of the infective material (germs, toxins, etc.) has been got rid of that the patient is no longer rendered ill by their presence, but the body is still shedding germs and the patient remains infective.

The duration of the period of convalescence varies according to the disease, but as a broad rule it lasts for four weeks after the temperature has fallen to the normal. In several ailments, however, as in scarlet

fever, the patient is infective for six weeks, and in typhoid fever for two months or much longer (*see* p. 119).

Table of Convalescent Periods.

Disease.	Convalescent Period.
Scarlet Fever	6 weeks after feverishness has completely subsided
Diphtheria	4 ,, ,, ,, ,, ,, ,,
Typhus Fever	4 ,, ,, ,, ,, ,, ,,
Plague	4 ,, ,, ,, ,, ,, ,,
Whooping-cough	4 ,, ,, ,, ,, ,, ,,
Measles	2 ,, ,, ,, ,, ,, ,,
German Measles	2 ,, ,, ,, ,, ,, ,,
Mumps	1 week after swelling in salivary glands has disappeared.
Cholera	1 week after diarrhœa has ceased.
Influenza	3 days after temperature is normal.
Typhoid Fever (enteric)	Indefinite. Two months after fever has subsided is the shortest.

Quarantine.—The quarantine laws which prevailed in Great Britain have been laid aside for a system of "medical inspection." In almost all other countries, however, the old quarantine system obtains. The system pursued in Britain is as follows: On arrival of a ship from an infected country, a medical officer proceeds on board, and after getting the medical history of the passengers and crew during the voyage, examines the sick, if there are any. The nature of the illness is inquired into, and if there are any cases of infectious disease, such as plague, cholera, smallpox, or typhus, the patients are taken ashore to a hospital for such diseases, or placed in a hospital ship. Other patients in whom the disease has not declared itself, but who present a febrile state, are isolated and placed in an observation hospital for the time being. The healthy members of the crew and passengers are allowed to go on shore, with directions to report themselves to the sanitary authorities of the town or district

to which they are proceeding, and to continue to do so for such time as is required of them.

Under the old quarantine regulations the ship was directed to anchor at some distance from the shore and other ships, and to have no direct communication with either. There the vessel was kept for weeks or sometimes months, as long in fact as any persons on board showed signs of illness, and for two or three weeks after the last case of illness was reported. The hardships entailed by this system were many and severe, and they have been shown to be absolutely unnecessary, for in this country no serious drawbacks to the system of "medical inspection" have ever been known to occur.

Scarlatina—Scarlet Fever

Scarlatina is the scientific name for scarlet fever; it does not mean that the patient is suffering from a mild form of the disease, as is popularly supposed. The several stages through which it passes are in accordance with the description given above for the eruptive fevers generally. (1) *Exposure*: The period at which the disease was "caught" may be known or unknown. The patient may be known to have come into contact either with a person actually suffering from scarlet fever, or with someone in attendance upon, or who had just come from the bedside of, the sufferer, and so the date of infection can be determined. (2) *Incubation* lasts usually three to five, but may extend to seven, completed days (i.e. the 8th day). (3) *Invasion* and the *course of the illness* are characterised by the following signs and symptoms: A sudden rise of temperature (*see* Chart 3, p. 59); severe feverish symptoms; a sore throat; the tongue becomes coated white, with red spots showing up in the white coating (the "strawberry tongue"); there are enlarged glands beneath the lower jaw; and a characteristic rash. (4) The *rash* appears on the second day of the illness on the neck, chest and face, and rapidly spreads over the body. It begins to fade on the fifth day, and feverish symptoms decline and disappear about the tenth day. (5) *Defervescence*—that is, the fall of the morning and evening temperature to the normal—occurs

rather suddenly, although it is always preceded by a gradual fall. (6) *Convalescence* extends to not less than six weeks, when the skin of the hands and feet undergoes peeling. During the convalescent stage the patient is highly infectious to other people, and has to be kept isolated or in hospital for the full period of six weeks after the temperature is normal. The *complications* of scarlet fever are chiefly Bright's disease, due to kidney troubles, pneumonia and affections of the ear.

Variola—Smallpox

(1) The period of *exposure* is usually known, namely, from the patient having come into contact with persons suffering from smallpox. (2) The *incubation period* lasts from 12 to 14 days. (3) *Invasion* is ushered in by a rise of temperature, often attended by a rigor and followed by marked symptoms of feverishness, usually accompanied by headache and intense pain in the lower part of the back. (4) The *eruption* or *rash* is in evidence on the third day; beginning on the forehead and wrists, as small "shotty" particles (like small shot), to be felt below the skin; these in a short time may be felt distributed over the body generally and even on the mucous membrane of the mouth and nostrils. On the following day the skin over these "shotty" particles is raised into pimples (*papules*); next day these contain a small quantity of clear fluid (*vesicles*); the clear fluid in the vesicles becomes thick, and milky in appearance; they are now termed *pustules*, from the fact that they contain matter or pus; the pustules (or small abscesses) burst, their contents escaping and forming a crust (*scabbing stage*); finally the scab, with the core or shotty particle attached to it, comes off, leaving behind a small depression (*pitting*). (Fig. 26.)

There are differences and degrees in the virulence of smallpox infection. When the eruption is scanty and widely scattered over the body the smallpox is said to be *discrete;* when, on the other hand, a number of the vesicles and pustules are congregated together in clusters it is said to be *confluent.* When, in confluent smallpox, blood escapes in patches beneath the skin, into the eye sockets (orbits), or from the mucous mem-

brane of the mouth, air-passages, intestines, etc., the disease is said to be *hæmorrhagic* or *malignant* smallpox. The danger to life from confluent smallpox, and more especially from the hæmorrhagic variety, is very great.

The *complications* are pneumonia, and diarrhœa with intestinal hæmorrhage or the escape of blood with the urine.

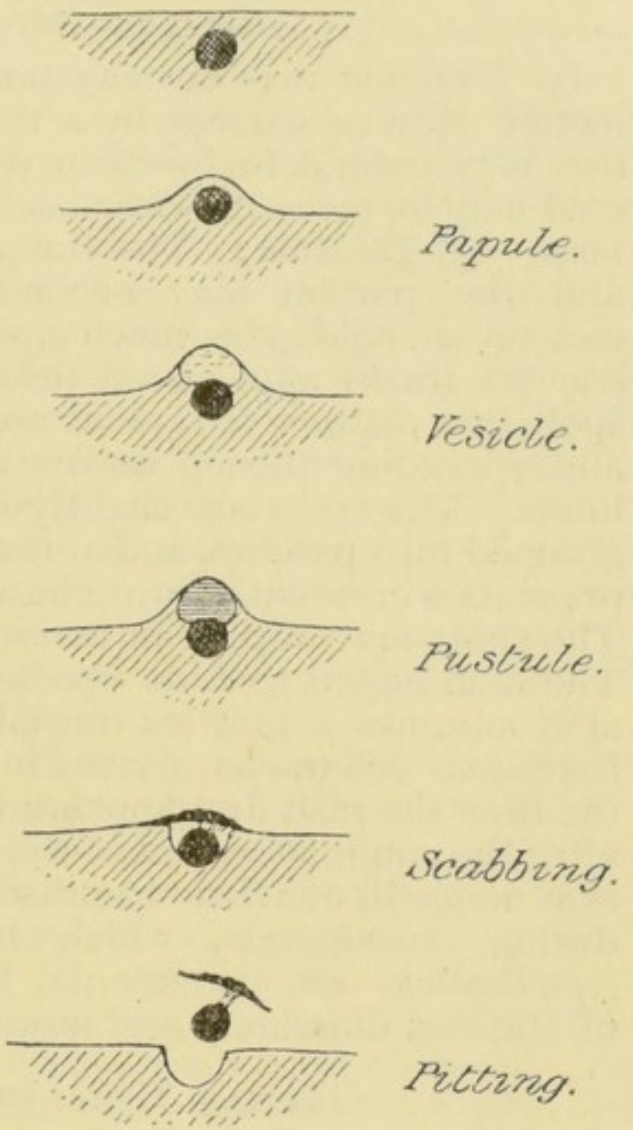


Fig. 26.—Diagram of the shedding of "shotty" particles (dead tissue) from the skin in smallpox. The dark round dots represent the "shotty" particles before, during and after escape. **(*See* p. 114.)**

Varicella—Chickenpox

(1) The period of *exposure* is generally known from the patient having been brought into contact with someone suffering from the disease. (2) The *incubation period* is usually ten days, but may extend to fourteen. (3) *Invasion* is ushered in by slight feverish symptoms, gradually increasing in intensity, but seldom severe. (4) The *rash* appears in one, two, or three days after feverishness develops, and begins to fade about the fourth; it consists of small pimples (*papules*) of a rose colour, appearing usually on the back, shoulders, or chest, and spreading to any part of the body. The papules in a few hours have a clear fluid on the top (*vesicles*); these become large, and their contents assume a milky appearance; they burst, and *crusts* or *scabs* form, which fall off, leaving in their place

faintly red spots, and sometimes minute pits. Successive crops of vesicles may appear. (5) *Defervescence* occurs in about a week. (6) *Convalescence.* The patient ceases to be infectious when all the scabs have fallen off.

Measles—Morbilli

(1) *Exposure* may or may not be known, for the infection may be carried by a third person. (2) *Incubation* may extend to fourteen days. Signs of a severe cold may be present, with headache and some feverishness. (3) *Invasion*: The temperature suddenly rises, and the patient may become delirious; the signs of a severe cold grow much more pronounced. (4) The *eruption* (rash) appears on the fourth day; it presents spots of a distinct red colour appearing first on the face, and spreading thence downwards over the body and limbs. The spots are slightly raised, and may become grouped into patches, and at its edge the rash frequently presents a crescentic form characteristic of this disease. The spots may appear in two or three successive crops. The rash begins to fade by the seventh day, when the skin assumes a mottled (measly) appearance. (5) *Defervescence* occurs, as a rule, in about eight days from the time the rash first appeared—that is, in twelve days after the commencement of the invasion period. (6) The skin may still continue to present a mottled appearance during *convalescence*, which lasts four weeks. The *complications* are pneumonia, bronchitis, inflammation of the ear, diarrhœa, and more rarely Bright's disease.

German Measles—Rubella

(1) *Exposure* may be known or unknown. (2) The *incubation period* may extend even to three weeks. (3) *Invasion*: The feverish symptoms are seldom severe; a sore throat is not uncommon. (4) The *rash* occurs on the second, third or fourth day. Rose-red spots appear upon the face and extend over the body and limbs, begin to fade on the fourth day, and usually disappear within a week. (5) *Defervescence* takes place, as a rule, within a week. (6) *Convalescence*, four weeks. In German measles there is no sign of a severe cold at the onset of the illness, as in ordinary measles.

Typhus Fever

When human beings are overcrowded in their dwellings, typhus fever is an imminent danger. In gaols and military camps typhus was, in times gone by, a common scourge, so much so that the terms "gaol fever" and "camp fever" were applied to the outbreaks. In private dwellings, also, not only in towns but even in the most isolated country cottages and farm houses, typhus will develop when overcrowding and insanitary conditions prevail. A family of, say, ten or twelve members, or two or more families, sleeping in a single room, dirty and ill-ventilated, will speedily generate typhus. At one time very common in Great Britain, typhus has wellnigh disappeared since about the year 1870—in fact, ever since the excessive overcrowding of private dwellings in towns was prevented. In addition to overcrowding of dwellings, what is known as surface crowding is also a danger. If more than 1,000 persons are dwelling upon one acre of ground, the surface crowding is excessive, and if in addition to this there is overcrowding of the rooms in this area, disease will inevitably occur.

Typhus fever runs through the definite stages characteristic of infectious, eruptive fevers: (1) *Exposure*—to persons suffering from the disease. (2) *Incubation*, 14 days as a rule. (3) *Invasion:* The attack is ushered in by a feeling of chilliness and rigor, and the patient speedily becomes very ill, with all the evidences of intense feverishness—headache, foul tongue, high temperature, aches in the limbs, loss of appetite, etc. (4) The *rash* appears on the fifth day on the body, and spreads to the extremities; it presents a number of spots of a pale-red appearance slightly raised above the skin; these gradually deepen in colour and assume a purplish hue. The name "mulberry" is often given to the rash from the resemblance the spots have to the mulberry. During the second week *complications* such as pneumonia and heart failure are apt to prove fatal. (5) *Defervescence*: The feverish symptoms usually disappear within fourteen days, rather suddenly, but may not do so until the twenty-first day. So commonly does the feverishness end on the fourteenth day that

typhus was often termed by the laity the "fourteen-day fever," to distinguish it from typhoid, which was spoken of as the three-week or four-week fever. (6) *Convalescence*, four weeks.

This is a highly infectious malady, and contagious in a high degree, as evidenced by the frequency with which it is contracted by doctors and nurses attending cases of typhus.

Mumps

Mumps occurs as a rule in epidemic form, and is carried directly from one person to another. (1) *Exposure* is usually known. (2) *Incubation* may extend to three weeks. (3) *Invasion*: The attack is usually ushered in by feverish symptoms, followed frequently in a few hours by pain and swelling in the salivary glands (parotid). The swelling occurs between the back of the lower jaw and the ear in one or both parotid glands; hence the disease is often termed parotitis. The salivary glands below the jaw (the submaxillary) are also at times swollen. As a rule the patient experiences great pain in the affected glands. There is also difficulty in swallowing, and often deafness. (4) No skin eruption. (5) *Defervescence* usually occurs in from seven to ten days, but the swelling of the gland may continue after the temperature is normal. (6) *Convalescence*, one week. The *complications* are often more serious than the disease itself. Several organs may become the seat of inflammation, and both the heart and the lungs may be involved.

Whooping-Cough—Pertussis

Whooping-cough as a rule attacks young children in epidemic form. (1) *Exposure*, known; one child is believed to communicate the affection to another directly, although it may be occasionally carried in clothing (fomites). (2) *Incubation*, usually seven days, but may extend to fourteen. (3) *Invasion* is marked by an an increase of feverishness and feeling of illness, and there are evidences of catarrh of the respiratory track, with cough. The "whoop" in the cough may come after a few days, or it may be delayed for ten days. It is characteristic of the disease, and is due to

spasm in the muscles of the air-passages, causing difficulty in breathing, especially during inspiration. At first the spasms of coughing are severe, lasting for several minutes, and are frequently repeated; the child's strength is severely taxed by the struggle to breathe. (4) There is no rash. (5) *Defervescence:* The feverishness subsides after ten to twelve days, but the characteristic cough may continue for weeks or months. (6) *Convalescence* lasts four weeks, after which date, although the cough may continue, the child is not infectious to others. *Complications:* The lungs may become inflamed (pneumonia), and both the digestive and nervous systems may be the seat of trouble for some time afterwards.

Typhoid Fever—Enteric

Typhoid and typhus fevers have only been distinguished as separate diseases within recent times. The word typhoid means "resembling typhus," the termination "oid" being derived from a Greek word signifying "like." The disease is also known as enteric fever, from the fact that the part of the body that typhoid manifestly attacks is the small intestine, known to the Greeks as the "enteron." In many countries the disease is known as "abdominal typhus," meaning thereby a typhus-like disease which attacks an organ of the abdomen. The old term "gastric fever," used in this country, pointed in the same direction. Typhoid fever may be spread from person to person by uncleanliness owing to the germs of the disease being in the urine and fæces of a sick person. Occasionally, a person who has been ill with typhoid fever discharges the typhoid germs for weeks, months or years when quite well; such persons are called "typhoid carriers." The disease is also caused by the typhoid germ getting into water or milk, or by infected dust contaminating food. (1) Only by proof that an infected food or drink has been consumed can the *period of exposure* be known. (2) The *incubation period* is usually fourteen days, but it may be from seven to twenty-one days or longer; there need be no symptoms of illness during this stage. (3) *Invasion*: The feeling of illness is sudden, but the rise of temperature is at first

slight; day by day the temperature gains slowly (*see* the chart on p. 58), rising as a rule in the evening a couple of degrees above that reached on the previous morning; it drops on the following morning by about 1°, to rise 2° again on the succeeding evening; and so on from day to day for seven or eight days till it reaches the maximum, usually 105° or over, about the end of the first week. During the second week a high level of temperature is maintained until towards the end of the week it begins to decline, and the fall continues gradually (i.e. by lysis) during the third and fourth weeks until it reaches normal. Delirium is a common feature during the first few days after the onset, and may continue in severe cases for a week or more; diarrhœa is usually present, the motions passed being like "pea soup," hence the phrase "pea-soup stools." The most marked evidence of the disease is met with in the intestines, where certain spots (Peyer's patches) on the lower part of the small intestine become ulcerated. Ulcers also occur in the large intestine. (4) The *rash* appears on the eighth or ninth day—that is, at the beginning of the second week of illness, as reddish spots over the upper part of the abdomen and round the waist; on the other hand, there may be no rash. The spots vary in number from two or three to several dozens; the rash never spreads to other parts of the body. (5) *Defervesence*: The temperature falls to the normal, and so remains both morning and evening, on either the twenty-first or the twenty-eighth day. It never falls to the normal in the interval, for if it is not normal on the twenty-first day it will not become so until the twenty-eighth. (5) *Convalescence*, two months, but, as mentioned above (p. 119), a person who has had typhoid may continue to be a carrier for several years. *Complications*: The ulcers in the intestines, which develop at the lower part of the small intestine and at the commencement of the large intestine (colon) in considerable numbers, may extend deeply into the wall of the bowel, and, penetrating a large blood-vessel, may give rise to severe hæmorrhage which often proves fatal; or the ulcer may eat its way completely through the

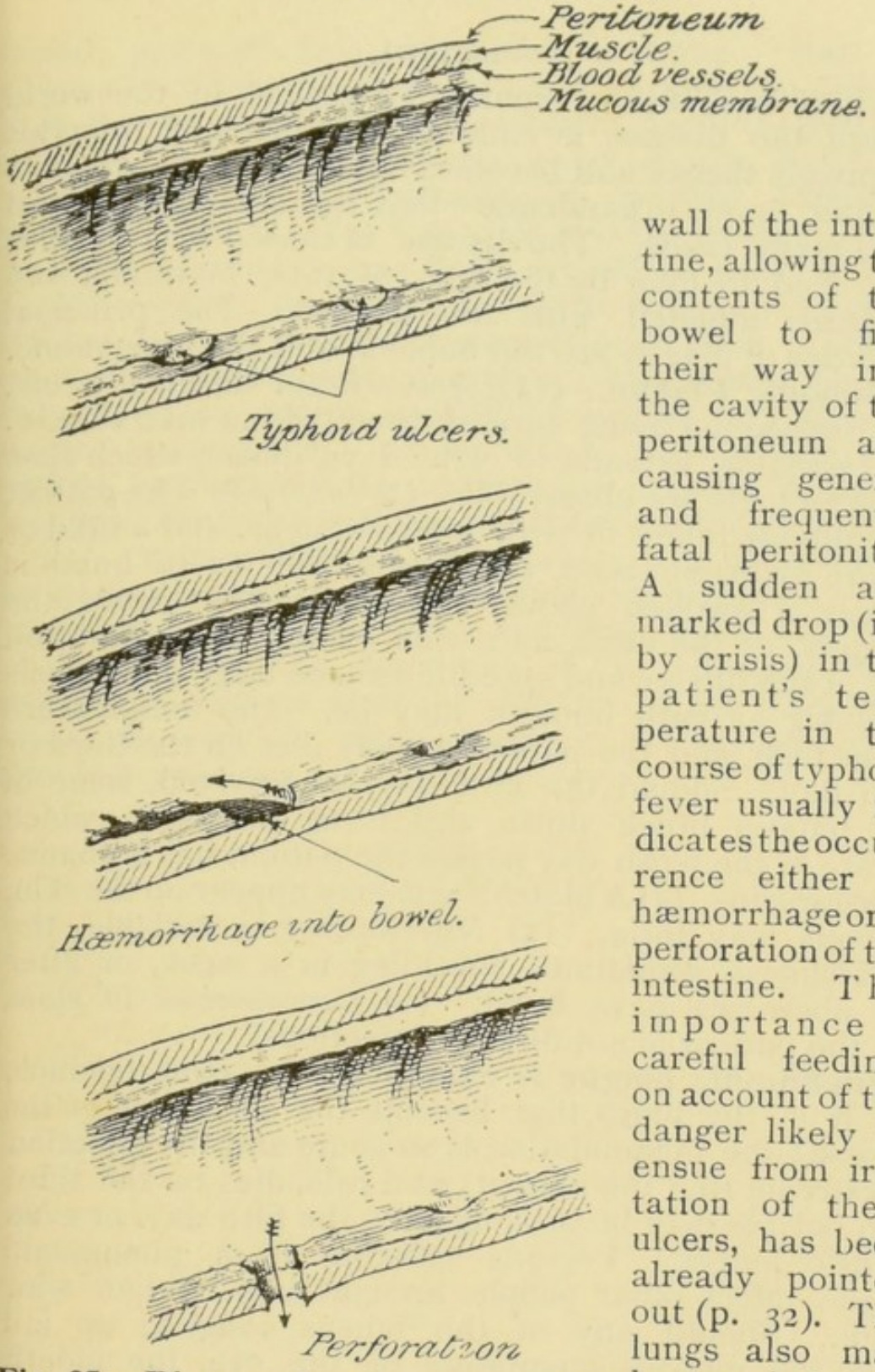


Fig. 27.—Diagram showing structure of intestine (which is laid open), the presence of typhoid ulcers, and the occurrence (1) of hæmorrhage, (2) of perforation at the seat of ulceration. (*See* text.)

wall of the intestine, allowing the contents of the bowel to find their way into the cavity of the peritoneum and causing general and frequently fatal peritonitis. A sudden and marked drop (i.e. by crisis) in the patient's temperature in the course of typhoid fever usually indicates the occurrence either of hæmorrhage or of perforation of the intestine. The importance of careful feeding, on account of the danger likely to ensue from irritation of these ulcers, has been already pointed out (p. 32). The lungs also may become inflamed (pneumonia), and this, too, may prove to be a very dangerous complication.

Plague

There are various centres of plague in the world where the disease is endemic, but at long intervals it spreads thence and becomes epidemic in the districts around, or even pandemic—that is, universally spread over many lands. The disease is caused by a bacillus conveyed to man by the fleas of rats, marmots, and squirrels afflicted with the disease. The principal varieties of plague are the bubonic and the pneumonic.

Bubonic Plague.—(1) *Exposure* is not known as a rule, the disease not being carried directly from man to man. (2) *Incubation* extends to eight days, during which time no symptoms are observable. (3) *Invasion*: The patient is suddenly taken ill with feverish signs, and a mild or severe delirium soon develops. Buboes (a bubo is simply a swollen gland) appear in the groin, the armpits, or the neck, as a rule on the first or second day of the illness, and speedily assume large dimensions —as big as bath buns, it may be. The temperature keeps high, and the patient usually dies on the third or fifth day. Should the fifth day be survived, some of the buboes break down and form abscesses, which burst ; if the tenth day passes the patient has a chance of recovering. (4) A blotchy *rash* may appear on the skin, or boils may form. (5) *Defervescence* is variable, the feverishness sometimes subsiding in a week, or after the abscesses have burst. (6) *Convalescence* is slow, but the patient is not directly infectious.

Pneumonic plague is caused by the same bacillus, but it is the lungs that become the chief seat of the disease; the inflammation is so acute and the infection so extreme that the patient, as a rule, dies on the third day, but life may be prolonged to the fifth day, or even a little longer. Persons suffering from pneumonic plague infect other people brought into contact with them. Should any of the mucus coughed up fall upon the mucous membrane of the eye, the mouth or the nostrils of doctor or nurse, infection (contagion) is almost certain to follow.

Cholera

What is known as the Asiatic cholera is endemic in

certain parts of Asia, especially in India. Not infrequently it becomes epidemic, and at times pandemic. It is due to a bacillus—the cholera bacillus—getting into the food, especially the water supply, which is contaminated by the excreta of persons suffering from the disease. (1) *Exposure* is only known when the germ causing it has been proved to exist in the drinking water. (2) *Incubation* varies from a few hours to a few days—it may be as much as eight days. There are no symptons during incubation. (3) *Invasion* begins with diarrhœa, which speedily develops into violent purging accompanied by vomiting. The stools are copious, and present the appearance of water in which rice has been boiled, hence the term "rice-water stools"; exhaustion and great prostration supervene; the patient's skin becomes shrunk and wrinkled; the pulse fails, and the last stage may speedily be reached —collapse. At the beginning of an epidemic the majority of persons attacked die, but as the epidemic wanes recovery is more frequent. Convalescence extends over a long period.

CHAPTER XV

DISINFECTANTS AND DISINFECTION

A *disinfectant* is an agent capable of destroying the organisms (styled microbes, micro-organisms, germs, bacteria) with which it is brought into contact. "Bactericide" and "germicide," have the same meaning as disinfectant.

An *antiseptic* has the power of hindering or staying the growth of the organisms and of preventing decomposition.

A *deodorant* serves merely to mask the effluvia which emanate from bacterial growth or are evolved during decomposition.

Of the many disinfectants and antiseptics, the best known are :

1. **Heat.** i. *Burning.*—Articles of small value, such as dressings, swabs, etc., may be burnt in the fire in the sick-room ; these, as well as any material used to mop up discharges from mouth or nose, should be placed on the fire immediately, that is, before the secretions upon them become dry. If in camp, cholera, dysenteric and enteric stools should be mixed with sawdust saturated with paraffin and burnt.

ii. *Boiling* for twenty minutes is a convenient method of disinfecting instruments, crockery, glasses, bed-room utensils, bed and body linen, and of preparing towels and receptacles for the operation table, etc. If blood, fæces, or foul discharges have stained linen or cotton material, the stained portions should be soaked and rubbed off in cold water before the materials are boiled, otherwise the stains become fixed.

iii. *Dry heat* is seldom used except for leather, rubber and fur, which are injured by moist heat. The hot-air kilns or chamber, at one time so much used to disinfect carpets, mattresses, etc., were found incapable of killing germs unless the heat was raised so high that the fabrics were in danger of being scorched. For small

articles the kitchen oven kept at a high temperature, as for cooking, will serve as a dry-heat disinfecting chamber; a baker's oven, if during manœuvres no other means are available, will suffice for larger articles.

iv. *Steam.*—Bulky articles such as mattresses, pillows, blankets and clothing are more rapidly and completely disinfected by steam than by dry heat. The steam, when generated, is passed into the disinfecting chamber without pressure at a temperature of 212° Fahr., or under a low pressure giving a temperature of 230°, or at a high pressure temperature of 240° to 248°. These temperatures are obtainable by machines of various designs, which may be stationary (as at disinfecting stations), or portable and moved about from village to village, or house to house. The principle of their working is that of exposing the articles within cylinders to either saturated or superheated steam, by either of which methods the disinfected materials emerge quite dry.

2. **Liquid disinfectants.**—*Carbolic acid* belongs to the group of phenols from which many of the popular disinfectants of to-day are derived, and carbolic acid in its pure state is frequently spoken of as phenol. Absolute phenol exists as crystals, which require a heat of about 104° F. to melt them. Liquid carbolic acid is a clear fluid possessing caustic powers, and can be recognised by its odour. Other derivatives of phenol met with in the market are Cyllin and Izal, both powerful and valuable disinfectants.

When pure carbolic acid has to be made into a lotion, warm water must be used to dissolve it. It is used in the following strengths:—

1 part	carbolic acid	to 19	of water	(1–20) = a 5	per cent. solution.
1	,,	,, 39	,,	(1–40) = a 10	,,
1	,,	,, 59	,,	(1-60) = a 20	,,
1	,,	,, 79	,,	(1-80) = a 40	,,

For practical purposes a 1 in 40 solution of carbolic is most serviceable; at this strength the solution may be used to place hands, instruments, and dressings in during an operation; it may be sprinkled on the floor from time to time as a disinfectant, and placed in the utensils in the room; in infectious cases a sheet

dipped in the solution may be hung outside the door, and bed linen, night garments, etc., from the sick-room are to be placed in the solution, which is kept in a jar, bucket or bath outside the sick-room door.

Mercury.—The perchloride of mercury (hydrargyri perchloridum), often called corrosive sublimate, is the most ancient, the most reliable and potent of all chemical disinfectants; it is a direct germicide. A solution of 1 part perchloride of mercury to 1000 parts of water (1–1000) is a standard strength, useful for many purposes. The solution should be kept in glass bottles (coloured) as the salt acts on metals, and it should be coloured so as to distinguish it from plain water. A useful solution to keep in stock is made as follows:—

Perchloride of mercury	½ oz.
Hydrochloric acid (spirits of salt)	1 oz.
Aniline blue (for colouring)	1 gr.
Water, sterilised by boiling... ...	3 gals.

A label must be put on the bottle, marked "Poison." Metal instruments must not be placed in any solution containing a salt of mercury, otherwise they become discoloured and the metal is corroded. A preparation of mercury much favoured in operating theatres for dipping the hands in is the biniodide of mercury.

3. **Gaseous Disinfectants.**—*Sulphur* in the form of sulphurous acid gas, generated by burning sulphur, is a favourite means of disinfecting unoccupied rooms. Although much has been said against the efficacy of sulphur as a disinfectant, yet both scientifically and practically its use is justified (*see* p. 129). Sulphur candles are a convenient form of disinfection; the candle should be placed in a metal saucer before lighting the wick.

Chloride of lime (bleaching powder) may be used in the sick-room when the smell of carbolic acid is objected to by the patient. Bleaching powder, however, owing to the chlorine gas given off from it, has an acrid and pungent odour, objectionable and intensely irritating to many. Saucers or plates containing the powder may be placed about the room. As chlorine gas is very heavy the vessels in which the powder is

contained should be raised as high as possible from the floor, as on the top of a wardrobe, chest of drawers, etc.

4. **Solid disinfectants** are of many kinds. Ordinary soap, with or without incorporated disinfectants, has marked disinfecting powers. Carbolic powders, Sanitas powders, etc., are in frequent use as deodorants in closets, latrines, middens, etc. Of all solid disinfectants, earth is the most potent, and as dry earth its virtues are utilised in the earth closets so commonly met with in country districts.

Disinfection of a Sick-Room

1. **Before Occupation.**—When an important operation is undertaken in a room or a private house, or a person is seriously ill from any cause, steps must be taken to render the apartment aseptic, that is, as free from all infective germs as possible. A full description of how to prepare the room is given at p. 11. If in time of war outhouses or public buildings are used, similar precautions are to be taken, modified according as it is a barn, a schoolroom, etc., that is being prepared. In a barn all cobwebs, dust and offensive materials are to be removed; the walls wiped over or sprayed from a watering can with a solution of 1 in 40 carbolic acid or other disinfectant; the floor, if of packed earth, brushed over with a rough birch broom and sprinkled with a disinfectant fluid. The straw or hay to be used as a bedding must be well shaken out in order to remove the dust it contains, before it is utilised for a bed.

2. **During Occupation.**—The floor of the apartment, especially in infectious diseases, must be daily wiped over by a broom with a piece of cloth tied over it, which has been moistened with a 1 in 40 solution of carbolic acid, or other disinfectant. Carbolic solution of the same strength is placed in all the utensils of the room—the wash-hand basin, sputum cup, bed-pan, nightstool and urine bottle. Outside the room a solution of 1 in 40 carbolic acid is kept in a tub, bath, bucket, or other convenient receptacle into which the patient's night garments and handkerchiefs, as well as the sheets, pillow-cases, towels, etc,, removed from the

room, are steeped for eight hours, when they are wrung out and may be safely sent to the wash in the ordinary way. Carbolic-acid solution may be occasionally sprinkled on the floor, or bleaching powder may be used instead (*see* p. 126).

If the patient is suffering from an infectious disease no dish, spoon, knife, fork, or tumbler should be sent out of the room without being first scalded with boiling water, and it must be remembered that the tray cloth and table napkin, if taken out of the room after each meal, must be placed in a disinfectant jar outside the room door and not carried to other parts of the house, otherwise infection will be spread to the other inmates. No books, papers, or toys must be taken from the room, as they are certain to spread infection through the house; these articles must be left in the room until the patient leaves it, when they are to be burnt on the fire in the room, not on the kitchen fire, as during conveyance thither they may infect those handling them. Bandages with pus or other foul material on them should be burnt at once on the fire in the room; if this is not possible they must be placed in a pail with a lid, taken out of the room and burnt as soon as possible. Unsoiled bandages should be placed in a pail with carbolic acid (1 in 40), afterwards wrung out and boiled with soda, rinsed in plain water, dried, and rolled up. Soiled bandages and dressings should be burnt on the fire in the room or carried in a covered pail and burnt elsewhere. Poultices, if they have been removed from a foul wound, may be burnt, or buried if a plot of earth is available, at a depth of 2 or 3 ft. Bed pans, chamber utensils, glass urinals, and other receptacles should be emptied at once, permissibly into a slop pail, but it is better that they be carried direct to the water closet and there emptied, rinsed and dried; if the water closet is adjacent to the sick-room it is better to leave the utensils there until wanted. If they are brought back into the room, a small quantity of disinfecting fluid is poured into them, and they are placed not below the bed, but at some part of the room out of the patient's sight but convenient for the nurse to reach. From time to time it is well thoroughly to

scald bed pans, and all chamber utensils. The addition of carbonate of soda to the boiling water is advantageous.

3. **After Occupation.**—Before the patient changes his room for another, if the ailment has been of an infectious nature, he should be washed all over with a disinfectant, or given a bath in the room if this be possible. After the bath and rubbing down with a towel, the patient is wrapped in a blanket or dressing gown and taken to the room prepared for him, where he puts on fresh nightgear or underclothing. When the patient, after having passed through an infectious illness, leaves the room, nothing is to be removed except such materials as night garments, sheets, pillow cases, and towels, which are to be collected and placed in the 1 in 40 carbolic solution in the jar or tub at the door of the room. The blankets are to be taken one by one and thrown over the head or end of the bed, or upon the open door of a wardrobe, or on a clotheshorse, or arranged in any other way so that the disinfectant gas to be used can reach both sides of them; rugs are thrown over a chair, not left on the floor; the mattress is to be set on its edge on the bed or floor for the same reason; the wardrobe or cupboard doors are to be opened; all drawers should be taken out of the chest, wardrobe, basin-stand, etc., and stood up against the wall all round the room; the window is now shut and latched, and pieces of paper pasted over any place on the sill or around the frame where air might enter. The register of the grate is closed, or the mouth of the chimney stopped up with paper, canvas or straw, so that there is no current of air up or down the chimney. In the centre of the room a pail, bucket or foot bath is placed into which a few pints of water have been poured. If the room is a large one several pails, buckets, baths, etc., must be placed in different parts of the room; across the pail, tongs or other support are laid, and on this an old metal tray, or a flower-pot with some earth in it, is stood (Fig. 28). Rolls of sulphur broken up into small pieces the size of marbles are placed upon the tray or in the flower-pot to the amount of two pounds for each 1,000 cubic feet of air in the room; to

light the sulphur, place upon it a live coal, or pour over it some spirits of wine and apply a match. As soon as the sulphur is alight the nurse leaves the room, shuts the door, locks it, removes the key from the lock so as to prevent anyone entering, places a mat against the lower part of the door, and even pastes paper over the keyhole, and also round the edges of the door itself. These precautions against the entrance of air by

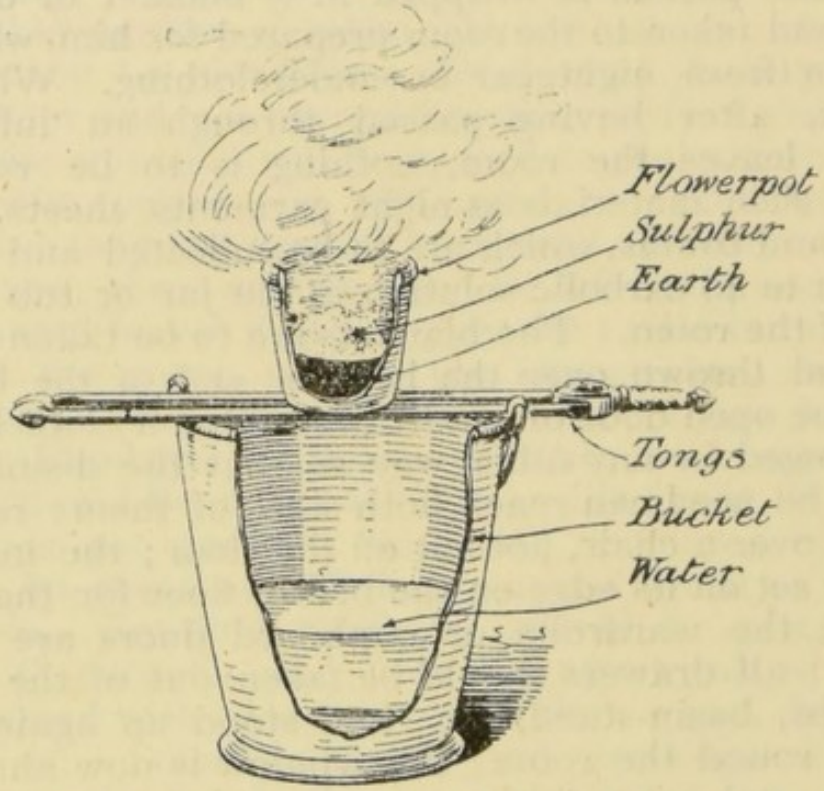


Fig. 28.– Section of bucket showing water, tongs, and flower-pot containing burning sulphur.

the window, door, or fire-place are taken in order to ensure that the air in the room is perfectly still, otherwise a current of air, however small, will blow the sulphur fumes to one side of the room and thereby render the disinfection incomplete. Sulphur, when it burns, is converted into sulphurous acid gas, which in the still air of the room rises to the ceiling, whence it spreads down the walls and along the floor until every corner and crevice of the room is subjected to its influence. After some twelve hours the room is entered, the window opened, the chimney freed, and everything allowed to stand for twelve hours until provision is

made for dealing further with the contents of the room. The presence of the sulphur in the room is evident, for in every part of it and on every article sulphur dust will be found to be present. Sulphur, although not the most potent of disinfectants, has many advantages, but neither it nor any other disinfectant employed in the room should be regarded as sufficient in itself to render any material free of infection.

The subsequent method of dealing with the contents of the room will depend upon the nature of the disease from which the patient or patients may have suffered. If it has been a case of infectious fever, or blood poisoning, especially if the patient has died, the mattress had better be burnt, but if this is not necessary the mattress, blankets, floor mats, rugs, pillows, window blind, curtains (should any have been inadvertently left in the room), and all wearing apparel must be handed over to the sanitary authorities for further disinfection. It may be necessary to remove the wall paper, to lime-wash the walls, and to let the room remain empty for a while—perhaps a week—exposed to full ventilation from opened windows and doors, before a fresh paper is put on; the floor and skirting must be scrubbed, and all articles of furniture, including the bedstead, must be wiped over with a damp cloth dipped in a disinfecting solution. If the house is in the country, after disinfection of a room and its contents by sulphur, it is sufficient to put the blankets, floor mats, drugget, articles of clothing, pillows and mattress, in the open air, hung upon ropes, or otherwise so placed that the sunlight can reach them. In summer, with bright sunshine, these articles can be kept out of doors from early morning, say 5 o'clock, until late in the evening. After a couple of days' exposure they will be thoroughly disinfected. A horsehair mattress may be unpicked, the hair teased and spread out in a room or sheltered place, where the wind cannot blow it away, yet where the sun's rays may fall directly upon it; feather pillows may be dealt with in the same way; the horsehair and feathers should be left thus exposed for a week or more, so as to ensure their being germ free.

CHAPTER XVI

SURGICAL INSTRUMENTS AND APPLIANCES

A NURSE is usually held responsible for seeing—(1) that the surgeon's instruments are in good order; (2) that faulty instruments are reported; (3) that the instruments are sterilised for the surgeon's use; (4) that trays, basins, etc., are at hand for instruments, swabs, and dressings; (5) that antiseptic solutions are ready for immediate use; and (6) that a table is prepared for operation. The nurse ought to know the instruments by their technical names, and to understand the mechanism of complicated instruments, so as to take them to pieces for the purpose of cleansing and sterilising them.

Cutting Instruments.—Surgical knives are named according to the use to which they are put. A *scalpel*

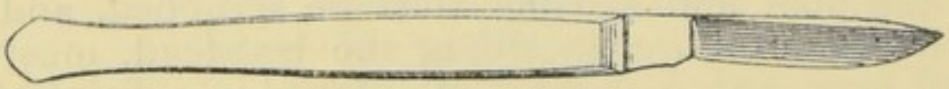


Fig. 29.—Scalpel.

(Fig. 29) is a short knife with a convex cutting edge and a straight back, used to open abscesses, to incise the skin, etc. A *bistoury* is a long narrow knife, the cutting edge being parallel, except near the tip, to the back of the knife; its point may be sharp or blunted. A sharp-pointed bistoury is used for operations especially upon the fingers and toes, and the blunt point is made to run along a director when deeply seated tissues are being cut. A curved bistoury, as its name implies, is curved in the blade and tapers to a sharp point; it is used mostly for opening abscesses. A special *hernia knife* has a blunt end and a short cutting edge about ½ in. in length, supported upon a rounded stem; it is used in operations for strangulated hernia, and is made in this shape so that only a small part of the

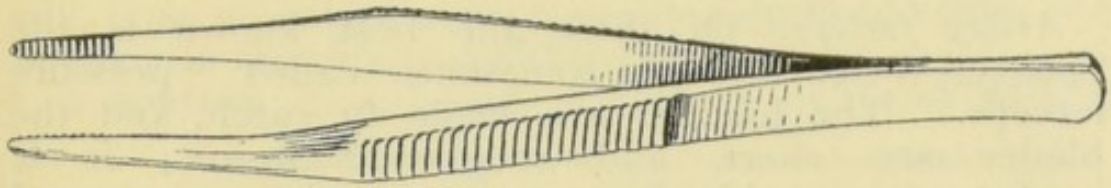


Fig. 30.—Dissecting forceps.

obstructing tissue may be cut. *Amputation knives* are stout knives with long blades, having a convex cutting edge and a sharp point.

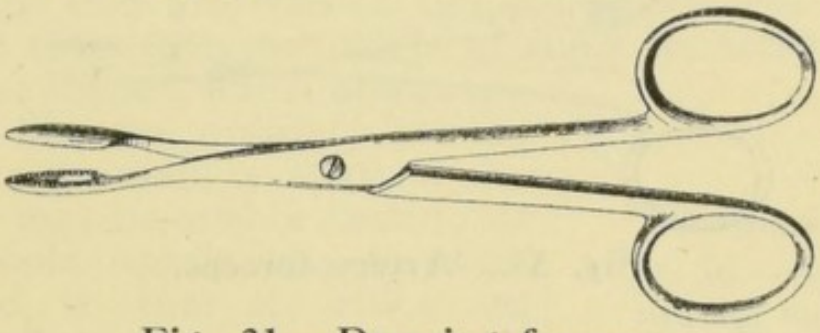


Fig. 31.—Dressing forceps.

Forceps.—*Dissecting forceps* are in shape something like ordinary pincers; the inside of the points is roughened so that the tissues may be grasped (Fig. 30).

Dressing forceps have handles like scissors, and broad points, roughened on their inside, by which dressings are removed from a wound or handed to the surgeon during an operation, so that the nurse does not touch the dressings with her hands (Fig. 31).

Tongue forceps have scissor handles and ring-shaped or oval blades for seizing the tongue should there be difficulty of breathing in anæsthesia. They are not to be confused with the tongue depressor (Fig. 32).

Nasal or *polypus forceps* are long-bladed, narrow, roughened on the whole length of their inner side, and scissor-handled; they are used for grasping and removing polypi from the nose or elsewhere.

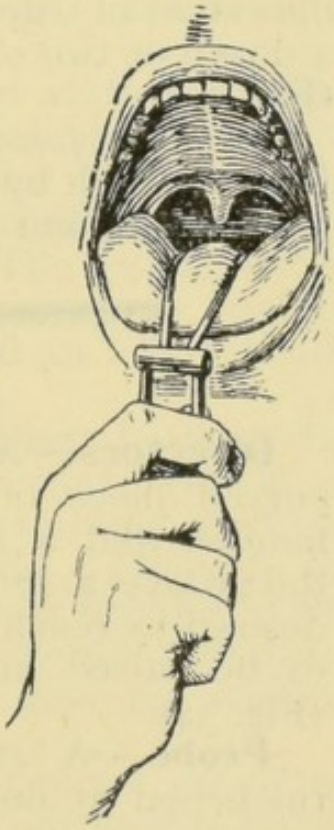


Fig. 32.—Tongue depressor in use.

Artery forceps.—Of these the best known is the Spencer-Wells forceps, sometimes called "pressure forceps." The handles are made to catch, and the blades are short, and roughened inside; it is used to seize a bleeding vessel exposed in a wound

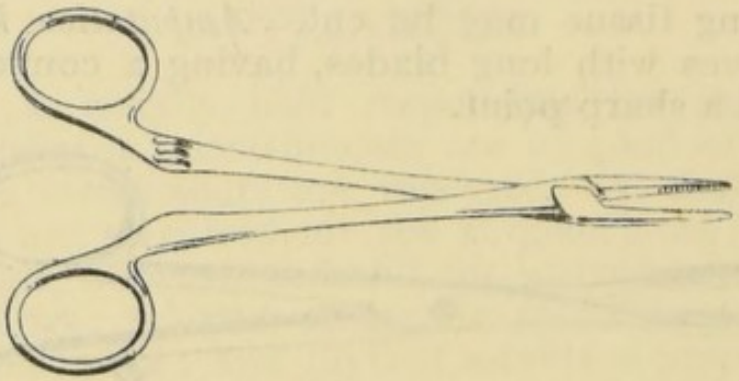


Fig. 33.—Artery forceps.

whereby the hæmorrhage may be arrested, and if necessary the vessel may be held by the forceps until it is tied by a ligature-thread, catgut, etc. During an operation of any magnitude the nurse should see that a dozen or two of these forceps are constantly at hand (Fig. 33).

A *bulldog forceps* is a short, stout forceps, 2 in. in length, which by a spring-like action serves to compress a bleeding-point in a wound during an operation.

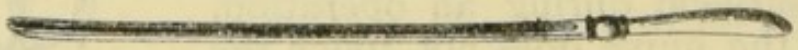


Fig. 34.—Director.

Directors.—A director is a grooved, straight, or curved piece of metal with a flattened or scooped handle, and a rounded or probe-pointed end; along the groove a probe or knife may be guided when it is desired to reach deep structures, or when tissues have to be raised and cut, and for many other purposes (Fig. 34).

Probe.—A small rod of silver or steel slightly thickened at one end into a bulb, and at the other tapering off to a sharp point or flattened, with an eye in the flattened part. It is used for probing wounds, and by threading the eye of the probe with a piece of

silk, tape, or catgut a drain can be introduced from one opening in the skin to another (Fig. 35).

A **spatula** is a broad, flat piece of metal with a

Fig. 35.—Probe.

roughened handle and a flat blade, used for spreading ointments, etc.

Surgical needles are of many kinds. According to shape they are termed straight, half-curved, or full-curved (Fig. 36); the points of some are triangular or bayonet shaped, whilst others are round like an ordinary sewing needle; the stem or shaft of the needle may be oval or round; or the whole needle may be compressed, so that its sides are flattened. Some needles are mounted on fixed handles; they are intended for inserting ligatures in the depth of a wound, where ordinary needles are unsuitable.

Fig. 36.—Surgical needle, curved.

An *aneurysm needle* is a metal blunt hook having an eye at its end for the passage of a thread; the handle is long and roughened. The instrument is meant to convey a ligature (thread) round an artery which has to be tied.

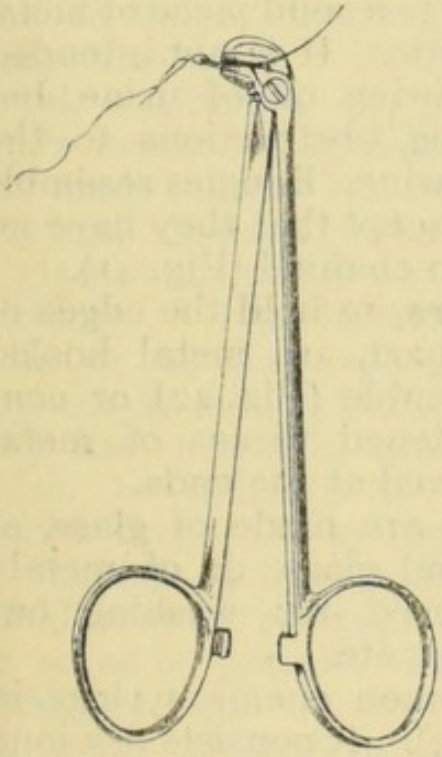


Fig. 37.—Needle-holder.

Needle-holders have scissor handles and short straight or curved blades, roughened on the upper side. They are intended to grasp needles firmly so that the deeper structures in a wound may be reached (Fig. 37).

Catheters, tubes of silver, india-rubber, or gum-elastic material, are intended for drawing off the contents of the bladder. The silver catheter (Fig. 38) is about 12 in.

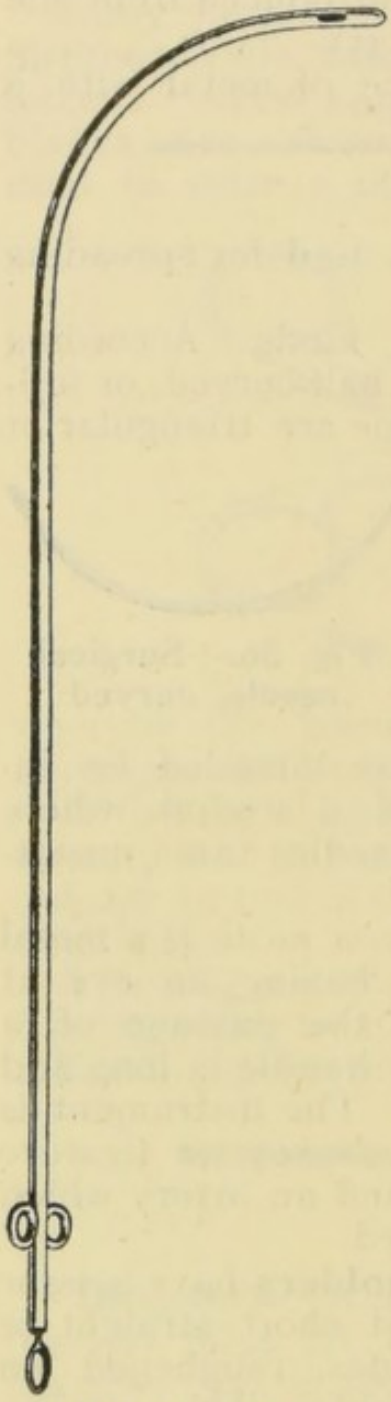


Fig. 38.—Silver catheter.

in length, curved, and possesses two eyes just behind the point, and two side rings on the stem whereby it is held in position by tapes. When it is not in use a fine metal wire with a button end (a stylet) is passed into the tube, but this is removed before use. Gum-elastic catheters (Fig. 39) also possess a stylet which serves to give curve to the catheter; the stylet is removed after the instrument is introduced. The safest instrument for anyone not a doctor to use is the india-rubber catheter, and without a stylet, for it is readily passed and can do no damage (Fig 40). Catheters and bougies are graded from No. 1 (the smallest) to No. 12 or even 18.

A **bougie** is a solid piece of metal or gum elastic. It is not intended for the drawing off of urine, but for removing obstructions to the passage of urine. Bougies resemble catheters except that they have no eyes and no channel (Fig. 41).

Retractors, to hold the edges of a wound apart, are metal hooks, single or double (Fig. 42), or consist of flattened pieces of metal sharply curved at the ends.

Syringes are made of glass, of vulcanite and glass, or of metal; they are used for washing out wounds, ears, etc.

Enema syringe.—The most common enema syringe in use is termed Higginson's (Fig. 43). It consists of a long

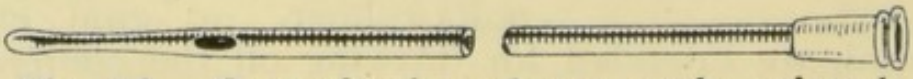


Fig. 39.—Gum-elastic catheter, probe-pointed.

Fig. 40.—India-rubber catheter.

piece of rubber with a bulb about the centre of the tube; at one end is a piece of metal containing a valve which is inserted in the fluid to be injected. At the other end is a nozzle, usually of bone, about three inches long, with a shield at one end, and a rounded point at the other; the point, when vaselined, is introduced into the bowel, and gently pushed on as far as the shield; or an india-rubber catheter may be fastened to the nozzle of the syringe and slowly introduced. By repeated compression of the bulb the fluid is introduced.

The *hypodermic syringe* (Fig. 44) is used to inject medicinal fluids beneath the skin. It consists of a barrel, a plunger or piston, and a hollow needle. The material of which it is made (except the needle) may be all glass, all metal, or a combination of glass and metal, or of glass and vulcanite. Hypodermic syringes of metal or of glass are preferable, as they can be boiled before being used. They are marked, usually, from 5 to 20, to indicate the number of minims (drops) the syringe holds. In the channel of the needle a fine wire should always be kept when not in use, so as to prevent the needle from getting blocked by corrosion. It is well to dip the wire in vaseline before inserting it into the needle.

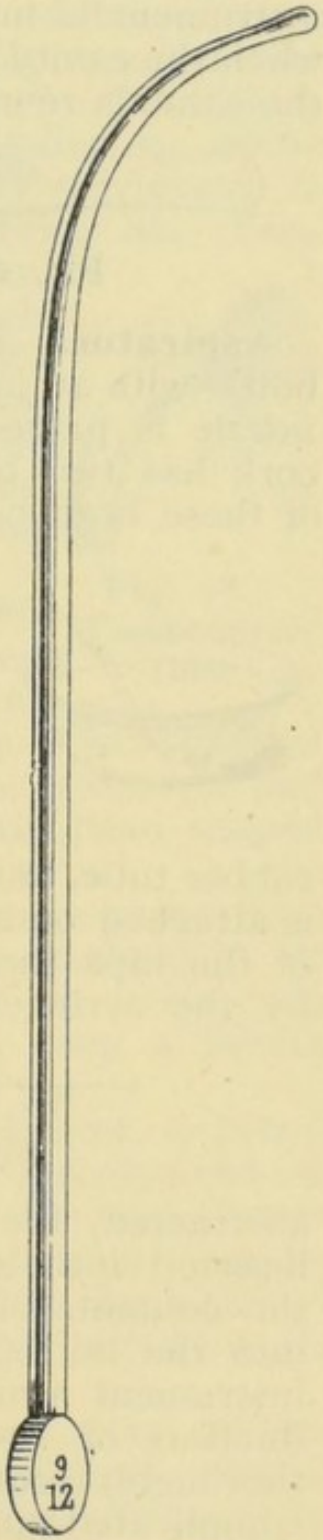


Fig. 41.—Metal bougie.

Trocar and Cannula.—The cannula is a metal tube with a shield at one end and a slit or slits at the other.

The trocar is a metal rod with a stout handle and a sharp triangular point which, before being used, is pushed to its full length into the cannula so that the bulb protudes beyond the slit end of the latter. The instrument is introduced into a collection of fluid, and when the cavity is reached the trocar is removed while the cannula remäins and the fluid finds exit.

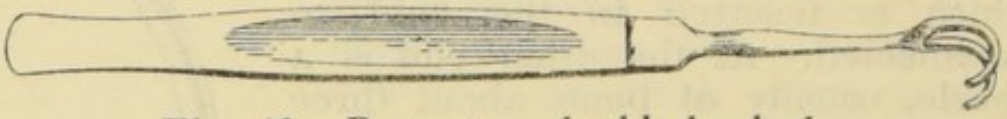


Fig. 42.—Retractor, double hooked.

Aspirator.—This instrument consists of a large bottle with an india-rubber cork, through which a metal nozzle is passed; the part of the nozzle above the cork has two branches with a tap on each; to one of these branches a syringe is attached by an india-

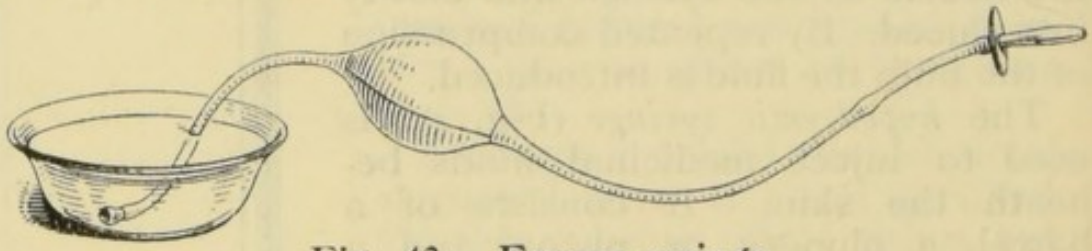


Fig. 43.—Enema syringe.

rubber tube, to the other a long, straight, hollow needle is attached on a long piece of tubing. By adjustment of the taps the air can be pumped out of the bottle by the syringe; when a sufficiency of air has been

Fig. 44.—Hypodermic syringe.

abstracted, the taps are altered and the needle is inserted into a cavity of the body containing fluid, the contents of the cavity being sucked or aspirated into the bottle. As the nurse has to manipulate the instrument while the surgeon attends to the introduction of the needle, it is necessary to become thoroughly acquainted with the technique of this rather complicated apparatus.

Tracheotomy Tube (Fig. 45).—This instrument consists of an outer and an inner tube of metal. The

outer tube presents a shield at one end with two apertures, one on either side, intended for the passage of a tape by which the instrument is maintained in place; below the shield the tube is split so as to form two lateral valve-like pieces capable of being compressed or distended. The inner tube is rounded, and when passed into the outer is seen to be the longer. It presents at one end two small handles by which it can be pushed in and out. The instrument is introduced after the windpipe (trachea) has been opened in the neck to allow the patient to breathe when air cannot enter through the natural passages, as occurs in diphtheria and other ailments, and when the larynx is obstructed by a scald of the throat. The inner tube can be removed from time to time and cleansed, and again inserted.

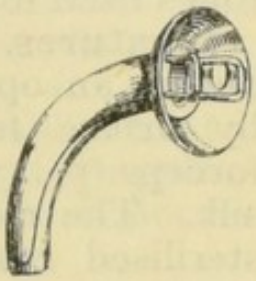


Fig. 45.—Tracheotomy tube.

A **hernia truss** is an instrument consisting usually of a piece of metal covered with chamois leather, vulcanite, or other material, long enough to encircle the lower part of the body, having at one end, in single trusses, a pad which may be round, oval, or a snake-head shaped expansion for placing over the aperture in the groin through which the hernia (rupture) escapes from the abdomen, the rupture thus being retained in its place. A double truss has a pad at each end; this is used when it is necessary to keep a hernia in place on both sides of the body.

Saws.—Surgical saws are narrow and short, or broad and of good length, accordingly as they are required for sawing large or small bones. A movable-backed saw is one in which the back of the instrument can be raised by a movable attachment so that the blade of the saw can sink more deeply without increasing its dimensions.

Hey's saw consists of a long handle of metal, at one end of which is a flat piece of metal presenting a sawing edge about 1 in. in length. It is intended for operations in the skull.

A **scoop** may be sharp-edged or blunted, and

presents the appearance of a small spoon. It is intended when sharp-edged for scraping the walls of a cavity or channel to remove diseased tissues. The sharp spoon in ordinary use is called Volkmann's spoon.

Drainage Tubes.—Wounds after operations are frequently drained by maintaining a channel for the exit of discharge. Tubes are of india-rubber, of different sizes, with holes cut in them here and there to allow of better drainage; glass drainage tubes are sometimes used for the abdomen.

Ligatures.—When large-sized blood-vessels are cut during an operation their mouths are instantly seized by artery forceps, usually Spencer-Wells pressure forceps (p. 134), and the vessel is tied with catgut or silk. The catgut is supplied of different sizes and is sterilised ready for use; the silk ligatures may be procured already sterilised, or the silk is sterilised by the nurse or surgeon immediately before the operation by boiling for twenty minutes. The catgut, in a short time, it may be in a few days, or in a few weeks, is absorbed; the silk threads remain permanently in the wound, and, as a rule, if thoroughly sterilised, give rise to no disturbance.

Sutures.—The edges of wounds are closed by stitching with catgut, silk, silkwormgut, horsehair, ordinary linen thread, or wire, usually of silver. With the exception of catgut, which becomes dissolved, they are removed at a subsequent date, that is to say, the sutures are cut with scissors and then removed by forceps. Buried sutures are sutures that are applied deeply in the wound and the edges closed over them. Only catgut, silk, thread, or silver wire may be buried; none of these, except catgut, becomes absorbed.

Stethoscope.—To listen to the sounds of the chest the doctor uses stethoscopes of various patterns. They may consist of a hollowed stem of wood with a large disc at one end to which the doctor applies his ear; or of a mechanism of two jointed hollow steel tubes, with two knobs at one end which fit into his ears: this instrument is known as the binaural stethoscope.

CHAPTER XVII

SUBSTANCES USED IN DRESSING WOUNDS

Cotton-Wool.—Absorbent or surgical cotton-wool is ordinary cotton fibre freed from oily substances and thereby rendered capable of absorbing liquids. As a dressing it is not absorbed so readily as gauze. After a gauze or other dressing has been applied next a wound, cotton-wool in a thick layer is usually applied to absorb discharge, to give support, and to maintain equable pressure and thereby arrest bleeding.

Absorbent wool may be plain or impregnated with boric acid, or with other antiseptics. It is met with as (1) *boric* wool which is coloured pink for distinction; (2) *salicylic* wool, white, crisp, and with salicylic-acid crystals apparent; (3) *alembroth* wool, which contains corrosive sublimate in its fibres and is stained blue. Other substances with which cotton-wool may be impregnated are iodoform, cyanide, etc.

Swabs.—Cotton-wool when rolled into balls (about the size of a golf-ball) and enclosed in gauze, makes a useful (and cheap) substitute for sponges. The *swabs* thus made are used to mop out blood, discharge, etc., from large, deep wounds.

Wool for padding splints may be either the ordinary non-absorbent cotton-wool of commerce, or prepared sheep's wool, or flock.

Wood-wool is finely ground wood from which the oily material and other impurities have been removed, when it presents the appearance of a woolly mass endowed with high absorbent powers.

Gamgee tissue consists of large sheets of absorbent wool enclosed between two layers of gauze; it may be cut into squares or any other convenient shape, and laid over the dressing on a wound, or the cut squares may be tied up into pads or swabs (artificial sponges).

Absorbent gauze is prepared from cheese cloth, from which all fatty ingredients have been removed.

Gauze may be either plain or impregnated with boric acid, cyanide, iodoform, salicylic acid, etc.; these are distinguished by their colour, being white (plain), pink (boric), salmon-coloured (cyanide), or yellow (iodoform).

Lint.—Surgical lint cloth is a cotton material specially woven; it presents two sides, one soft and fluffy, the other smooth. It is usually applied double, the soft side being inwards so that the smooth surface comes in contact with the wound. The fluffy side of lint should never be applied next a wound, as the fluff irritates its surface. Lint is sterilised by boiling, or in a steam steriliser; or, in an emergency, a single sheet may be held before the fire until scorching begins, when it may at once be applied as a dry aseptic dressing. Lint may be used plain, or impregnated with boric acid (and coloured pink), when it has merely to be dipped in sterilised water and applied as a dressing. Antiseptics of several kinds besides boric acid are used for prepared lints.

Peat moss, prepared and sterilised and supplied in masses as a compressed sheet, is endowed with great absorbent qualities, and is specially adapted as a dressing for foul wounds.

Oakum (teased rope), tow, and marine tow are used for various purposes as dressing. "Sharpie," sometimes known as lint proper, is a fluffy material made by scraping a piece of old linen with a sharp knife, when a fluffy ravelled mass is produced which has marked absorbent powers.

Impervious Dressings.—To prevent the lotion contained in lint, cotton-wool, etc., from being absorbed by the bandage applied to retain the dressing of a wound in position, it is necessary to interpose a piece of non-absorbent material between the dressing and the bandage. The best known of these are oiled silk, gutta-percha tissue, jaconet, mackintosh, and prepared oiled paper. It is necessary to cut the impervious dressing a little larger than the application it covers, but care should be taken that it does not extend too far, say more than half an inch, beyond the edges of the dressing, otherwise

the impervious material is apt to cause irritation and bring out a crop of pimples where it touches the skin. Unless the "surface" of the impervious material is destroyed by the nature of the lotion it comes in contact with, or by the discharges from the wound, it may be wiped or washed clean and used again.

Powders used in Dressings.—Instead of applying wet or dry cotton-wool, lint, or gauze directly to a wound, its surface may be dusted with boric-acid powder, iodoform, or a mixture of boric acid and iodoform in equal parts, or with fuller's earth, zinc and starch, iodol, etc. These powders should be well dried before being placed in the sprinkler, which resembles an ordinary pepper-box, but with larger holes in the lid so as to facilitate the escape of the powder.

Emergency Dressings.—In an emergency, when neither a dusting powder, lint, nor wool can be obtained, a sterile dressing may be improvised by taking the hot ashes from a wood fire, allowing them to cool, and dusting them directly on the wound. Burnt paper in several layers applied next to a wound gives a sterile dressing, and has the advantage that it can be obtained anywhere.

Drainage tubes may be sterilised by boiling, and then placed in a suitable antiseptic solution ready for use. Tubes which have been for some time in a wound have to be removed, sterilised by boiling, and reinserted if the "surface" of the rubber has not perished.

CHAPTER XVIII

THE NURSE'S DUTIES BEFORE, DURING, AND AFTER OPERATION

The success of an operation depends largely upon the nurse. Although members of a Voluntary Aid Detachment, who have not had a complete hospital training, should never be placed (except in extreme emergencies) in charge of an operating room or theatre, it is impossible to be even a useful assistant to a Head Nurse or Sister unless the work the members may have to do is studied and practised.

Before Operation

The nurse, or her assistant under supervision, has to prepare the patient, arrange the suitable instruments, dressings, and bandages in the operation room, and attend to the cleansing, lighting, heating, ventilation, and furnishing of the room itself.

Preparation of the Patient.—The preparation of the patient for a serious operation is a most important item towards a successful issue; but when the operation has to be performed almost immediately the patient is first seen—an emergency operation—there will, of course, be no opportunity for elaborate preparation. In ordinary cases the patient should be confined to bed for at least two days previous to the operation. On the second day the lunch should be light, tea and bread and butter may be given in the afternoon, and some beef tea in the evening. If the operation is to take place next morning, say at 11 a.m., a purgative should be given about 10 o'clock in the evening; this may be a pill or a dose of castor oil (in the case of an adult about 1 oz.=2 tablespoonfuls). If a pill has been given, a dose of Epsom salts (½ oz.), Carlsbad salts (2 teaspoonfuls in half a tumblerful of hot water), or a Seidlitz powder, is to be administered at, say, half-past six in

the morning, and if necessary an enema may be given at nine. If for any reason the operation is later in the day than 11 o'clock, it is well to let the patient have a cup of tea or home-made beef tea three hours beforehand. The patient should have been given a bath, or sponged all over, about 6 o'clock the previous evening. This is better than waiting till the morning of the operation, and even the purgative and enema may with advantage be given on the evening previous to the operation, as the patient is not thereby disturbed at a time when he is necessarily nervous and anxious, and there is less risk also of straining and vomiting both during the operation and afterwards. The times suitable for these to be given must, however, be left to the doctor in charge. If the patient has any false teeth they should be removed before an anæsthetic is administered; and the bladder must be emptied, especially in abdominal cases, before operation.

During an operation it is most important that the patient should be kept warm. All parts of the body not concerned in the field of operation should be covered; a woollen vest and drawers or pyjamas, and long stockings of soft wool loosely knitted, should cover the lower extremities and the trunk. However carefully these garments have been sterilised previously, they must be covered with sterilised towels at the time of the operation.

The part to be operated upon must be specially attended to. The skin of the part is to be shaved, washed with soap and hot water, using a scrubbing brush if necessary, then cleansed with methylated spirit, and covered with a clean towel or a layer of sterilised cotton-wool or Gamgee tissue secured in place by a clean (sterile) bandage. If the skin is irritable, owing to the application of poultices or blisters, a hot boric fomentation may be applied in place of the cotton-wool. Tincture of iodine is frequently painted over the seat of the operation, and for some distance around, the night before or early in the morning, some hours before the operation, and when dry the part is covered with cotton-wool.

Preparation of the Room.—In a private house the room has to be stripped of curtains, carpets, pictures, and all unnecessary furniture, all dust and dirt removed

with a damp cloth, and the woodwork, doors, windows, floor, skirting, shutters, etc., thoroughly scrubbed with a hot solution of washing soda; and it is well to follow this up by washing the wood with carbolic acid, 1 in 40, Formalin solution 2 per cent., or Cyllin emulsion. The wall may be sprayed with carbolic, Formalin, or Cyllin solution; then wiped with a cloth or piece of bread. Window blinds must be disinfected, or they may be replaced by sheets which have been boiled in a solution of soda or wrung out in some disinfectant, and which, while still damp, are put across the window to a suitable height. The operation table may be extemporised: the kitchen table may be used for the purpose, or an ironing board upon trestles, or smoothly planed planks of wood of suitable length may be placed upon packing cases. The extemporised table and supports must be thoroughly washed and mopped over with a disinfectant solution, such as carbolic or Formalin, before being placed in position. If packing cases are being used they must be washed both inside and out. If no table of sufficient size is procurable two smaller tables may be used, being placed transversely to each other in the form of the letter T, the patient's head and shoulders being supported on the cross table. The operation table must be allowed to dry before it is covered. On it is placed a folded blanket covered with a dry sterilised sheet. The blanket to be used for covering the patient during the operation should be enclosed in sheets and rolled down to the foot of the table ready to be spread over the patient when he arrives. Pillows are to be arranged for the patient's head. One or two wooden or bedroom chairs, two or more small tables for instruments and sponges, two wash-hand stands or a table on which the basins for washing may be placed, constitute all that is required in the way of furniture. The nurse must see that the following articles are to hand:—

1. Sterilised hot and cold water (boiled water allowed to cool) in clean covered jugs, in large quantity.
2. A quart of carbolic solution, 1 in 20.
3. Two or more basins for washing the hands.
4. Nail brushes.

5. Soap.
6. Methylated spirit.
7. Bowls, surgical trays if available, or large flat dishes, such as a large fish-service dish, plates, or other suitable vessels, for instruments and dressings.
8. Sheets and towels.
9. Linen aprons, or sheets, to be worn by surgeon, nurse, and assistants.
10. A razor, in case shaving the skin should be necessary.
11. Hot-water bottles.
12. Dressings, bandages, and a supply of swabs.
13. Steriliser, which may be improvised from a fish kettle or pot, in which instruments may be boiled over a fire, gas-ring, or spirit lamp; add a pinch of baking soda to the water.

Needless to say, all vessels, dishes, sheets, towels, etc., must be sterilised. The jugs containing hot or cold water must have been previously sterilised, and before filling the jug with water from the kettle the jug should be covered over with a towel, which is tied with tape or string round its neck, the boiling water from the kettle being poured upon the part of the towel which covers the mouth of the jug and allowed to filter through.

During Operation

When the patient has been placed upon the table and anæsthetised, a nurse or assistant who is not to take part in the operation will uncover the part to be operated upon and remove the dressings. The nurse, who has sterilised her hands and kept them uncontaminated, will then proceed to expose and isolate the part to be operated upon by placing sterilised towels, wet or dry, so that the blanket, sheets and the patient's clothing are completely covered; the edges of the towels are tucked under these around the exposed part, and fastened together with safety pins or clips at the corners where the towels cross, so that nothing but clean towels surrounds the seat of the operation; additional towels should be placed all over the patient so that no blankets, etc., are to be seen. During the operation it is the nurse's duty to hand the

requisite instruments to the surgeon. It is better that her hands be covered with india-rubber gloves, but if these are not available she must not only see that her hands are surgically clean, but must touch nothing during the operation except the clean instruments. Should an instrument or dressing or a bandage touch the blanket covering the patient or fall upon the floor it becomes unclean (septic) and therefore dangerous. These septic instruments must be picked up by a nurse not taking part in the operation, and removed.

After Operation

Warmth.—The patient must be kept warm by blankets and hot bottles whilst being taken from the operating table to the bed. The bed itself must be warm, care being of course taken that the hot-water bottle is wrapped in flannel, and it is well to remember that even then the bottle may be too hot and the patient may be burnt.

Position.—As a rule the patient should be placed with the head quite low, and if turned on the side bend the knees and place a pillow behind the shoulders to support them. If much blood has been lost and the patient looks pale, the foot of the bed may be raised on bricks or pieces of wood placed below the castors; if, again, the patient's face is flushed, the head and shoulders may be elevated.

Vomiting.—This is specially apt to occur unless the patient has been carefully prepared beforehand; turning the patient on the side favours the escape of vomited matter and prevents the danger of suffocation (asphyxia) from the contents of the stomach being drawn into the windpipe. When vomiting is persistent many methods may be tried to overcome it. Sometimes a few small pieces of ice placed in the mouth will help to allay the sickness; at other times some bicarbonate of soda in water, half a teaspoonful to a tumbler of water, perhaps made to effervesce with a little lemon juice, will allay the vomiting; or sips of hot water, with or without a pinch of soda, may be given. A mustard plaster placed for ten minutes over the pit of the stomach sometimes helps to quieten the vomiting. If this continues and the

patient is getting feeble a nutrient enema (p. 42) may be administered.

Diet.—If vomiting does not occur, or has passed off, weak tea or barley water may be given in small quantities five or six hours after the operation; on the following day, chicken tea, milk diluted with barley water, arrow-root, or prepared infant's food; on the third day, milk puddings, eggs, toast, rusks, and tea or milk or coffee. The subsequent diet will be prescribed by the doctor in attendance. As a rule a purgative either of salts or of castor oil is given on the fourth or fifth day.

Change of Position.—To help the patient to move in bed and alter his position various contrivances are employed. One of the most useful methods is to suspend by a rope from the ceiling, or by a hook fixed above the head of the bed, a smooth, round stick about 15 in. long and about 1 in. thick, so that it hangs crosswise just within easy reach. In this contrivance the patient finds great comfort; by grasping it from time to time in his hand he may rest the arms, or he can alter his position in bed as he pleases. In certain illnesses, especially those affecting lungs and heart, and during convalescence from any illness, a bed-rest affords a welcome change of position (p. 74).

Bed-cradle.—When it is desirable to prevent pressure of the bed-clothes on the body or limbs a bed-cradle may be arranged over the patient. It is made of metal or wooden hoops fixed on wooden supports and wide enough to enclose a limb, or the whole body. A bed-cradle may be improvised from a band-box, or from a small packing-case from which the lid, bottom, and one side are removed, when it stands like a stool upon the bed; a three-legged stool makes a good "cradle" for a limb; or if none of these is at hand a piece of twine may be passed through the bed-clothes and fixed to either the bottom or the top of the bedstead, to a stand by the side of the bed, or to a pole of sufficient height fixed to the sides or foot of the bed, so that the string can be tied to it and the bed-clothes supported. On all occasions when a "cradle" is placed over the body a light blanket should be put over the patient beneath the cradle. (*See* No. 1 Manual.)

CHAPTER XIX

ROLLER BANDAGES*

Materials—*Unbleached calico* is the material commonly used for making roller bandages. In teaching and practising the art of bandaging, unbleached calico should always be used, as owing to its stiffness and substance the correct methods of making reverses, figures-of-8, etc., can be more easily learnt.

White cotton or *sheeting* material makes a comfortable and efficient roller bandage. Linen is seldom used owing to its cost.

Flannel bandages are mostly used for the trunk and rheumatic joints. Red flannel is preferred to white by many for rheumatic joints; in all probability the red substance with which the flannel used to be dyed was efficacious in the relief of rheumatism, but with modern aniline dyes the colour of the flannel seems to be unimportant.

Gauze is useful as a means of retaining dressings, but does not afford the support to the limbs that the stouter materials do.

Domette is useful for retaining dressings and splints in position. *Stockinette* is endowed with an elasticity which is advantageous in cases of varicose veins and dropsy of the legs. *Tape* is used as a bandage for the fingers. *Muslin* and *crinoline* are employed in the application of plaster of Paris, starch, and silicate bandages.

Widths and Lengths of Roller Bandages (Fig. 46).—As a general rule the widths and lengths of roller bandages for the different parts of the body should be as follows:—

Part bandaged.	*Width.*	*Length.*
Finger	$\frac{3}{4}$ in.	$1\frac{1}{2}$ yd.
Upper limb	$2\frac{1}{4}$,,	4 ,,

* The triangular bandage and its application are fully described in the First-Aid Manual, No. 1.

Part bandaged.	*Width.*	*Length.*
Lower limb	3 in. (women), $3\frac{1}{2}$ in. (men)	6 yd.
Trunk	6 in.	8 „

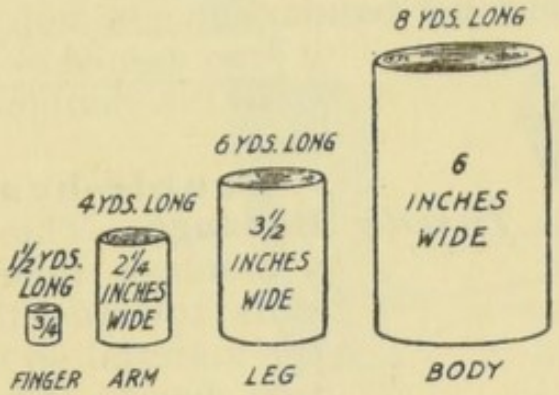


Fig. 46.—Regulation widths and lengths of roller bandages.

Special widths and lengths for different parts are as follows :—

WIDTH AND LENGTH OF SPECIAL BANDAGES

Part to be bandaged.	*Width.*	*Length.*
1. For one finger, tip not covered	$\frac{3}{4}$ in.	1 yd.
2. For one finger, tip covered ...	$\frac{3}{4}$ „	$1\frac{1}{2}$ „
3. Spica for thumb	$\frac{3}{4}$ „	$2\frac{1}{2}$ „
4. Continuous, for all the fingers	$\frac{3}{4}$ „	4 „
5. For forearm	$2\frac{1}{4}$ „	4 „
6. For upper limb from elbow to shoulder	$2\frac{1}{4}$ „	6 „
7. To cover tip of elbow ...	$2\frac{1}{4}$ „	4 „
8. Spica for shoulder	3 to $3\frac{1}{2}$ „	8 „
9. Wood's bandage for collar-bone	3 to $3\frac{1}{2}$ „	14 „
10. Capelline	$2\frac{1}{4}$ „	8 „
11. For one breast	$3\frac{1}{2}$ „	8 „
„ For both breasts	$3\frac{1}{2}$ „	16 „
12. Spica for one groin	$3\frac{1}{2}$ „	8 „
„ Spica for both groins ...	$3\frac{1}{2}$ „	16 „
13. For lower limb—leg	3 to $3\frac{1}{2}$ „	6 „
„ „ „ „ thigh ...	3 to $3\frac{1}{2}$ „	8 „
14. For heel	3 to $3\frac{1}{2}$ „	4 „
15. For abdomen	6 „	8 „

Named Parts of a Roller Bandage.—When a roller bandage is ready for application the roll is termed the "head" of the bandage, the loose end the "free end"

or "tail," and the surfaces the "outer surface" and "inner surface."

Single-headed Roller Bandage.—This is the technical name for the roller bandage in common use (Fig. 47); it is so named to distinguish it from the double-headed bandage.

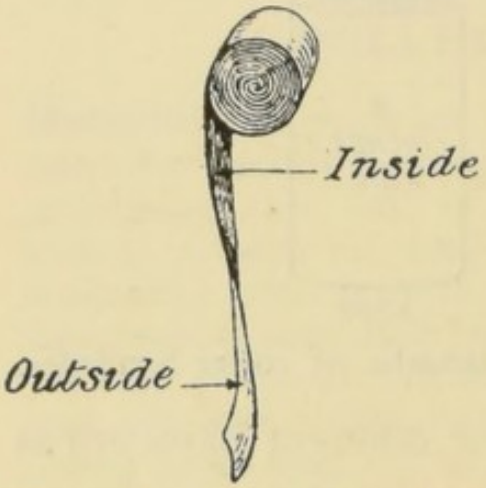


Fig. 47.—Single-headed roller bandage, showing head, end, and sides.

Double-headed Roller Bandage.—This consists of a bandage rolled from both ends towards the centre of the material, so that there are two heads (Fig. 48). The double-headed roller may also be made by pinning or stitching together the ends of two single-headed bandages which are equal in length and width.

To Make up a Roller Bandage.—The two essentials in rolling up a bandage are that it be done tightly and that the edges be even. Should any threads be frayed out they must be pulled or cut off.

In rolling up by hand, commence at one end of the strip by making a few rolls as a nucleus; then hold the bandage as in Fig. 49, that is, with the thumbs above and the forefingers beneath the strip, the ball of the thumbs pressed against the sides of the roll so as to

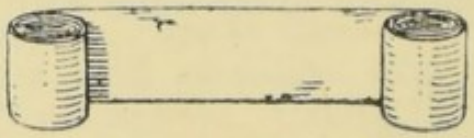


Fig. 48.—Double-headed roller bandage.

keep all in place. The bandage is "fed" to the upper part of the roll (Fig. 49), and the forefingers beneath press upon the head of the bandage so that it is kept tight. To keep the bandage smooth and tight as it is being "fed" to the roll there are various devices. One person may simply hold the loose end, smoothing the creases if there are any, and keeping it fairly tight as it is slipped through the fingers. If no helper is at hand,

the free end may be placed on the floor and the foot put on it so as to keep it tight; this is apt to dirty the

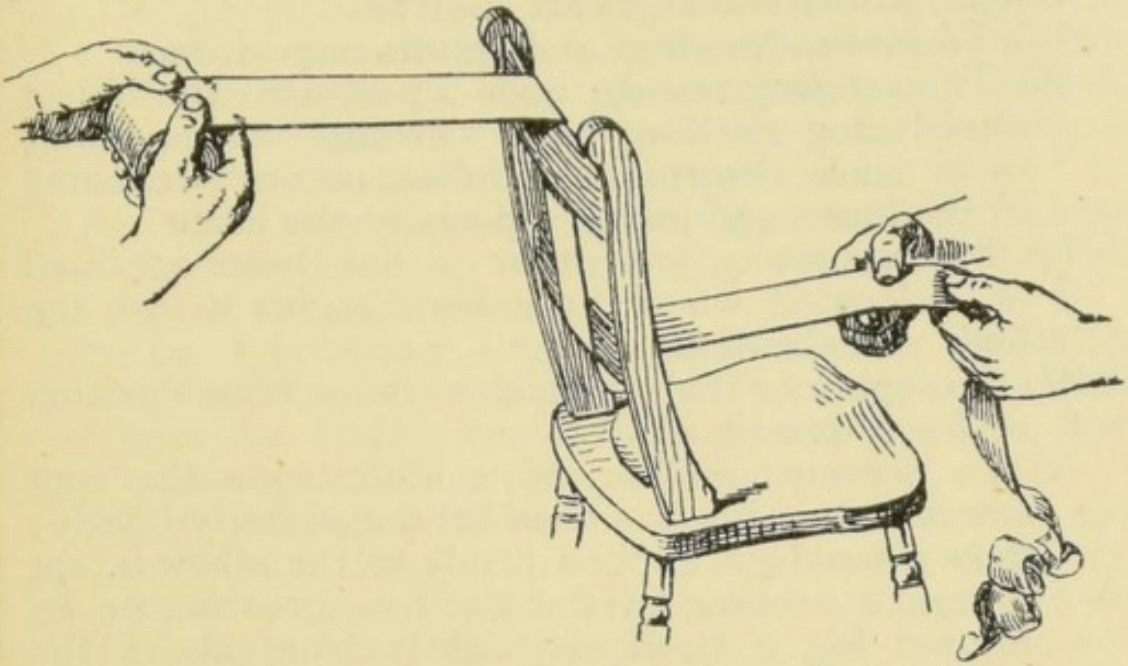


Fig. 49.—Bandage passed over bars on back of chair to keep it smooth and tight in rolling.

bandage unless it is placed on a towel and the bandager's boot is protected by a handkerchief, piece of

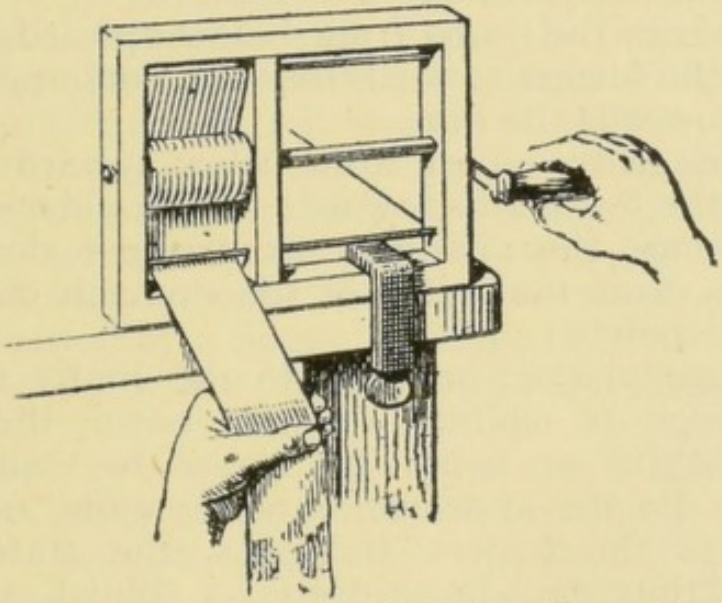


Fig. 50.—Roller-machine. The handle, with the rod it turns, is pulled out when the rolling is complete.

paper, or some such device. Or a roller-machine, as in Fig. 50, may be used. If a helper is at hand, the

bandage may be run over the bars of the back of a chair (Fig. 49).

Uses.—Roller bandages are used :—

(*a*) To retain dressings and splints in position.

(*b*) To exercise pressure upon a part with the object of reducing swelling, as in "dropsy" of the limbs, or to cause absorption of inflammatory thickening in the limbs and joints, especially the latter.

(*c*) To support a joint after it has been sprained or dislocated when the patient begins to use the limb as in walking.

(*d*) To support a limb in which varicose veins threaten or have developed.

(*e*) To prevent swelling of a limb below the spot where a dressing has been bandaged fairly tightly ; thus a bandage applied firmly to the elbow is apt to cause swelling of the hand or forearm ; or an injured leg, if bandaged tightly from above the ankle to the knee, will cause swelling of the foot.

(*f*) To prevent hæmorrhage from small blood-vessels after injury, or operation ; for this purpose the bandage must be applied evenly and firmly.

Rules to be observed in applying Roller Bandages.—These may be formulated as follows :—

(1) Bandage the limbs from below upwards ; that is, from the fingers towards the shoulders and from the toes towards the hips.

(2) Bandage the chest from below upwards ; that is, from the lower ribs towards the shoulders.

(3) Bandage the abdomen from above downwards, that is, from the region of the stomach downwards to the pelvis.

(4) In applying a bandage to the limbs to retain dressings or splints, do not cover the tips of the fingers or toes, but leave the nails to be seen. By the appearance of the nails, and of the ends of the fingers and toes, the state of the circulation can be judged ; a bluish colour of the nails indicates that the veins are being compressed, and numbness, swelling, and immobility of the fingers or toes show that the bandage wants slackening or the splints and dressings readjusting.

(5) It is well also to leave the tip of the elbow and the heel uncovered when a bandage is applied along the length of a limb, in order to be able to gauge the state of the circulation and prevent strangulation of the tissues by over-tight bandages. Of course, when the elbow or heel is wounded or diseased, it must be covered by the bandage.

(6) When bandaging limbs, take up a position exactly opposite the hand or the foot, as the case may be, not at the side of it.

(7) In bandaging limbs, commence by applying the outside of the bandage to the side of the limb next the middle line of the body (inner side); that is, always bandage from within outwards.

(8) In bandaging limbs, the nurse or dresser should hold the bandage in the left hand when the limbs of the right side are to be bandaged, and in the right hand when the limbs of the left side are to be dealt with.

Precautions in applying the Roller Bandage.—1. Never commence a bandage for either upper or lower limb by taking turns round the wrist or above the ankle as a preliminary to carrying the bandage round the hand or foot. The instructions given in text-books to commence by fixing the bandage round the wrist or above the ankle are fraught with danger, as a little consideration will show. If, before applying a bandage to the hand, wrist or forearm, you carry it round the wrist in order to fix it, the superficial (surface) veins are necessarily compressed and the circulation interfered with. Avoid this always, whether it be in the application of a finger bandage (when it is usual to commence by a few turns round the wrist to fix the bandage), or of a bandage for the foot. Further, a roller bandage should never be carried horizontally round the limb; all turns must be made in an oblique or spiral fashion, hence the terms spiral, reverse spiral, figure-of-8, applied to the different forms in which the roller bandage is applied.

2. In applying a bandage to the upper limb, always bend the elbow when this part is being approached. To bandage the elbow when the limb is straight and

then to bend the elbow to place the arm in a sling will arrest the flow of blood in the large veins, which can always be plainly seen immediately beneath the skin at the front of the elbow. The result will be pain in the limb, blueness of the nails, swelling and congestion of the fingers, hand, and forearm; and if the bandage is maintained long enough, the whole limb below the elbow may become black and gangrenous, necessitating amputation to save life.

3. When the leg or forearm requires to be bandaged, from whatever cause, it is neither legally, theoretically, nor practically correct to commence the bandage above the ankle or at the wrist respectively. There is no such bandage, for instance, recognised in the law courts as a "bandage for the forearm" alone; its application is regarded as not in accordance with surgical principles: in other words it is illegal. A bandage thus applied is detrimental and apt to cause swelling and congestion of the parts below. The hand and wrist must be bandaged before the forearm; and the law even holds that each individual finger should be covered before a bandage is applied to the hand, wrist, and forearm. Practically the absolute necessity for bandaging the fingers separately seldom arises, but it is well to remember that the hand and wrist must always be included whenever the forearm requires to be bandaged. The same holds good as to the lower limb. To bandage a leg without including the foot and ankle is wrong from every point of view; there is no such bandage legally as a "bandage for the leg" alone; if the leg requires to be covered the foot and ankle must first be bandaged.

Bandage for the Hand, Wrist, Forearm, Elbow, and Arm

Straighten the limb, bring it away from the side of the body, extend the fingers, turn the hand so that the palm looks downwards, that is, in the position of pronation,* and stand opposite the extended fingers. When bandaging the right limb, hold the bandage in the left hand, or vice versa.

To bandage the **hand and wrist,** lay the outside of the

* *See* First-Aid Manual, No. 1.

bandage on the inner aspect of the wrist (Fig. 51), carry it obliquely over the back of the hand, round the little-finger side of the hand, across the palm, round the forefinger side of the hand, and horizontally across the back of the fingers, so that the lower border of the bandage just touches the root of the nail of the little-finger (Fig. 52). The bandage

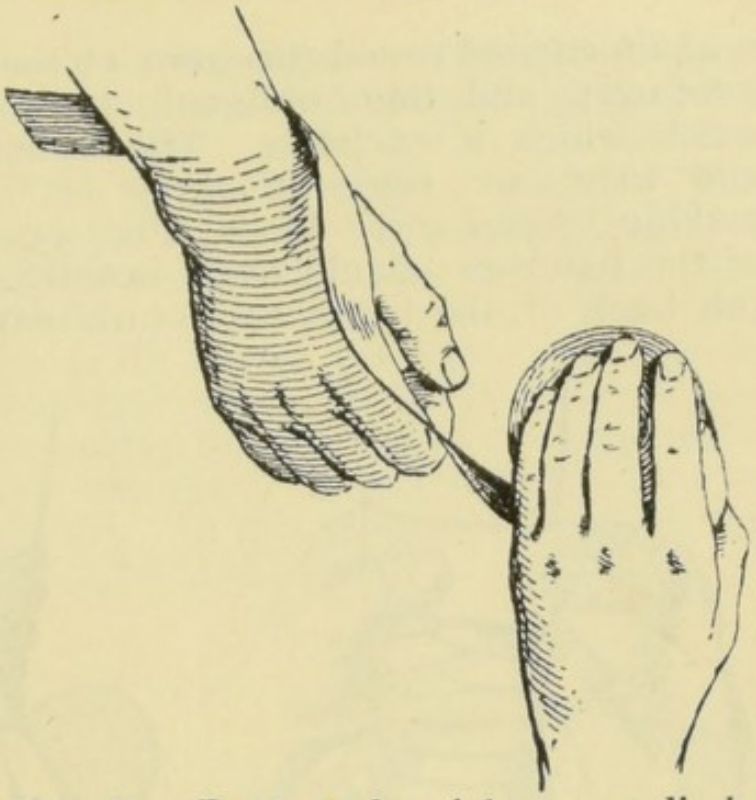


Fig. 51.—Bandage for right upper limb commenced.

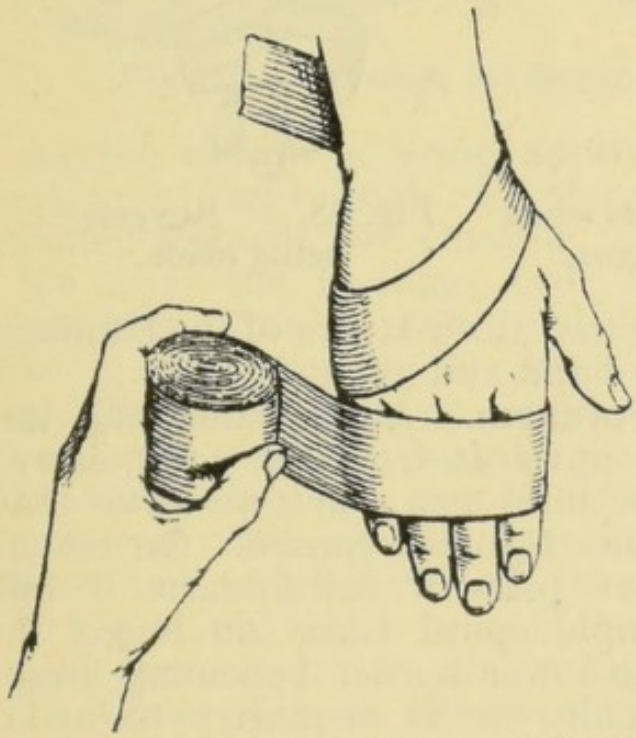


Fig. 52.—Bandage for upper limb applied over hand.

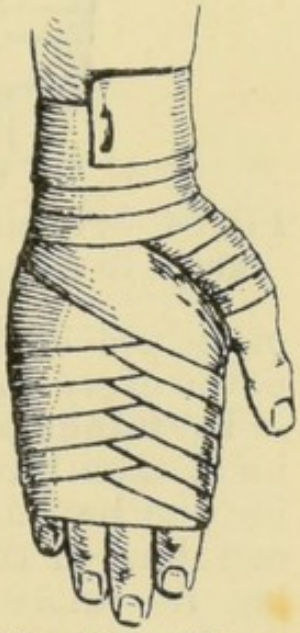


Fig. 53.—Figure-of-8 bandage for hand, and simple spiral for wrist.

is again carried round the front of the hand, round the forefinger, and then obliquely upwards towards the wrist, which it encircles. The turns round the hand and wrist are repeated three or four times, thus making "*figure-of-8*" loops (Fig. 53). The crossings of the bandage should come exactly in the middle of the back of the hand, each turn exposing one-third

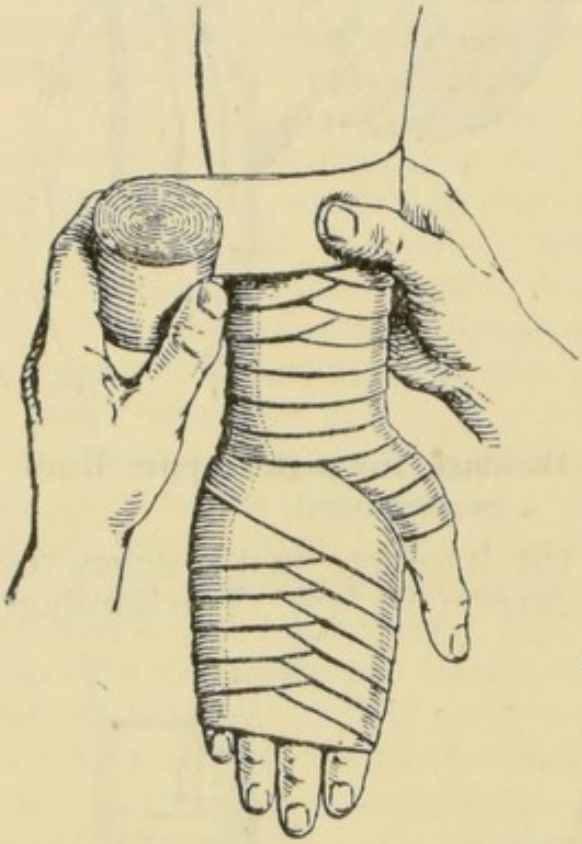


Fig. 54.—Position of hands when about to make a "reverse."

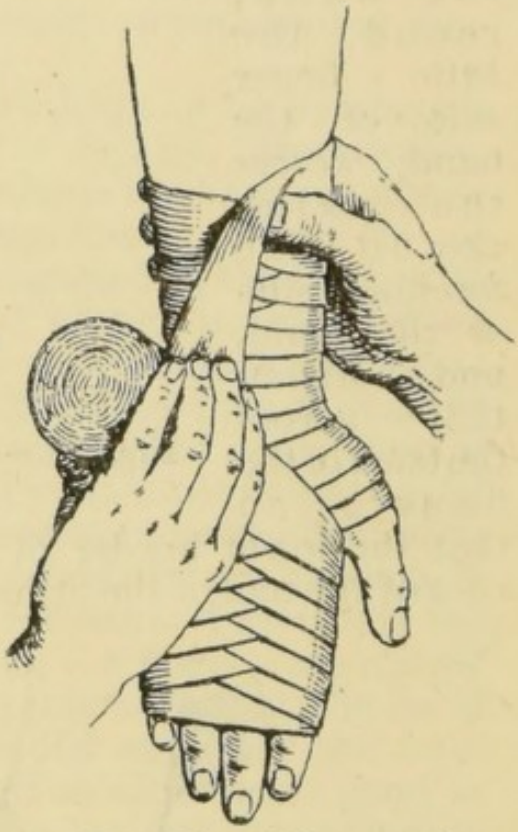


Fig. 55.—"Reverse" being made.

of the previous turn, so that three layers of the bandage cover every part of the hand and wrist.

To Bandage the Forearm.—After bandaging the hand take three turns upwards from the wrist, carrying the bandage up the limb as a *simple spiral*, so that one-third of the previous turn is exposed. On reaching the more muscular part of the forearm it will be found that the simple spiral turns no longer lie evenly on the limb, the lower border becoming loose. To obviate this difficulty it is necessary to make an ascending *reverse spiral* bandage (Figs. 54, 55), as follows: While supporting the forearm with the fingers

of the free hand, carry the bandage across the back of the forearm, keeping its head inclined upwards so that the bandage lies flat on the skin; whilst it is in this position place the thumb of the hand supporting the limb on the bandage just below its upper border, and bring the head of the bandage downwards, so that the upper edge folds over the thumb, when a "reverse" is made. Carry the bandage again round the limb and repeat the reverse, and continue up the forearm towards the elbow. As the ascending reverse spiral is being made each turn exposes one-third of the breadth of the previously applied turn. In this manner three folds of the bandage are applied to the limb.

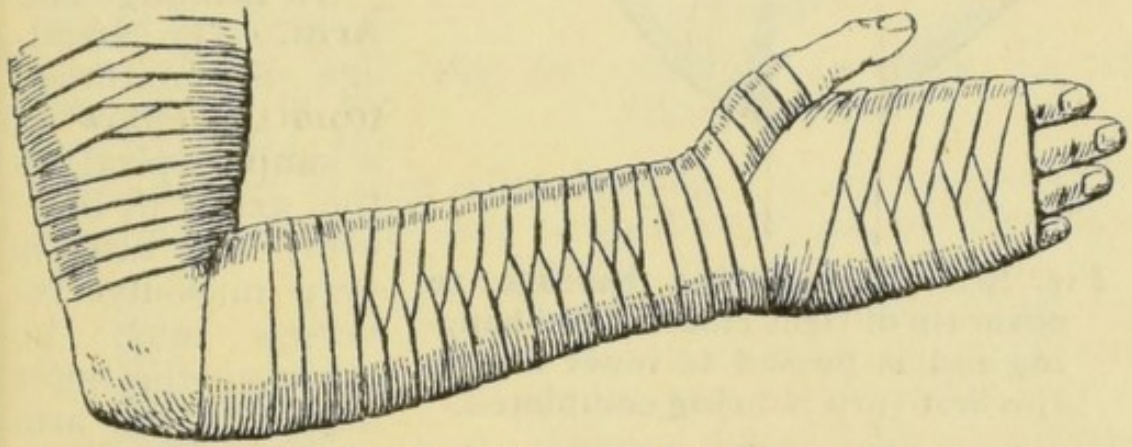


Fig. 56.—Bandage for upper limb completed.

As the **elbow** is being approached the forearm is bent at a right angle to the arm, with the palm directed towards the chest.

To carry the bandage over the elbow a series of figure-of-8 turns is made, one loop of the "8" embracing the forearm, the other the lower end of the arm, the crossing being made in front of the elbow. Four figure-of-8 turns may be made around the elbow. The lowest turn on the forearm is first made, then the lowest turn on the arm immediately above the elbow, and so on until all the four turns are made. The tip of the elbow is not covered by this bandage unless there is reason for so doing.

To Cover Tip of Elbow.—Lay the outer side of the bandage on the inner side of the elbow, carry the bandage over the tip of the elbow, and round the limb

at the elbow level; the second turn is made to encircle the arm, and the third the forearm. Each of these turns covers the margins of the first-applied turn. The figure-of-8 turns are continued upwards and downwards alternately until some six or more are made. (Figs. 57, 58 and 59.)

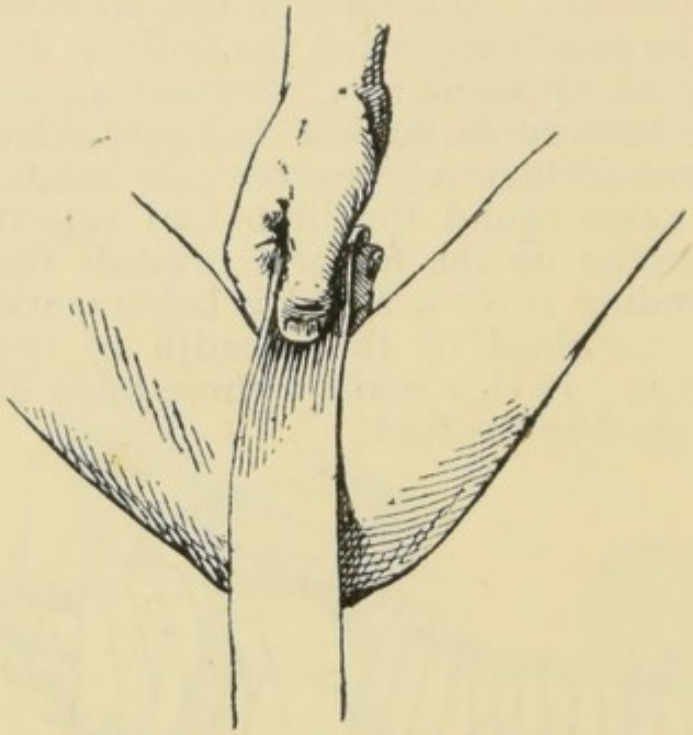


Fig. 57.—Commencing bandage to cover tip of right elbow. The hanging end is passed to inner side as the first turn is being completed.

To Bandage the Arm.—The bandage is continued from the elbow as a simple spiral up the arm; if, however, the arm is very muscular reverses must be made on the outer aspect of the arm as high as the axillary folds at the shoulder will allow.

To Bandage the Fingers. 1. *The continuous finger bandage to cover all the fingers.*—This is required (1) when the fingers are scalded or burned; (2) when several or all of them are crushed or otherwise injured; (3) when they are threatening to swell or have actually swelled, owing to injury or to too

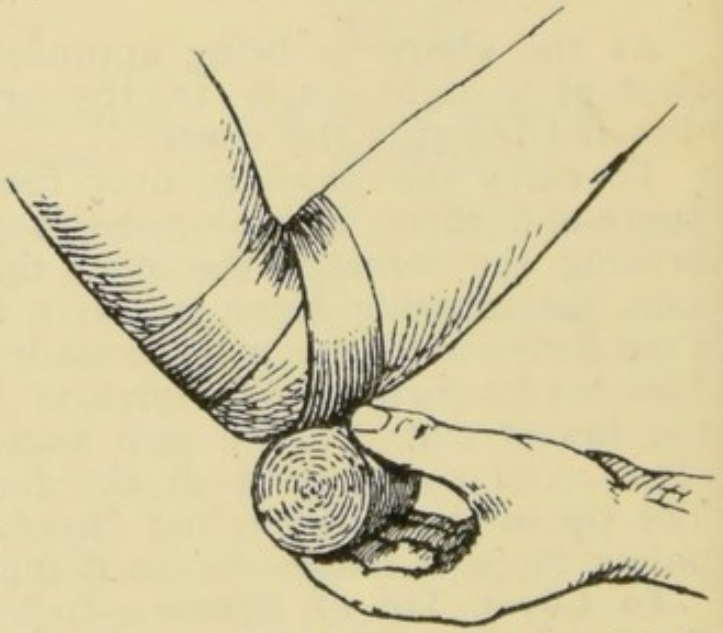


Fig. 58.—Bandage to cover tip of right elbow, showing early turns.

tightly applied bandages higher up the limb, when the circulation in the hand and fingers is thereby impeded. Select a finger bandage of calico or tape ¾ in. in breadth and 4 yd. long. Turn the hand with the palm downwards (pronation) and extend the fingers. Stand opposite the finger-tips of the hand to be bandaged. Lay the outside of the bandage on the inner aspect of the wrist, leaving 4 in. of the bandage end free, so that it may be used for tying the bandage when finished. Carry the head of the bandage obliquely across the back of the hand to the root of the little finger. Take a spiral turn round the finger so as to bring the bandage up to the nail of the little finger. Carry the bandage round the little finger, the lower border of the bandage crossing the finger parallel to the root of the nail, then make ascending spiral turns round the little finger, exposing one-third of the breadth of the previous turn, until the root of the finger is reached, when the bandage is brought round the little-finger side of the hand obliquely over the back of the hand towards the wrist, which is again embraced. The ring and each consecutive finger, including the thumb, are thus covered

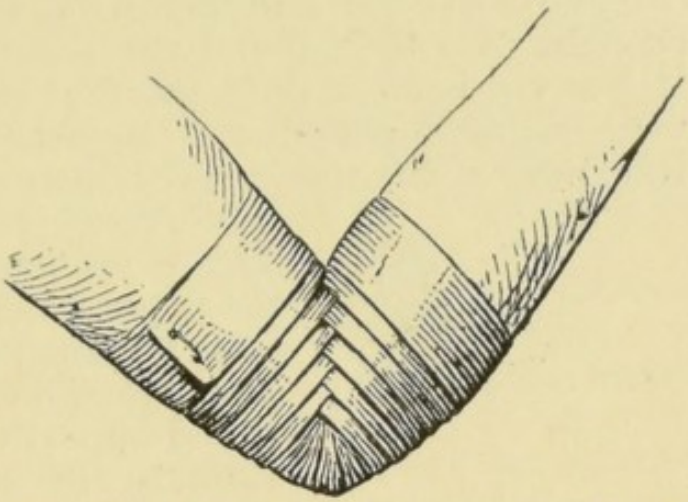


Fig. 59.—Bandage to cover tip of elbow, *Completed.*

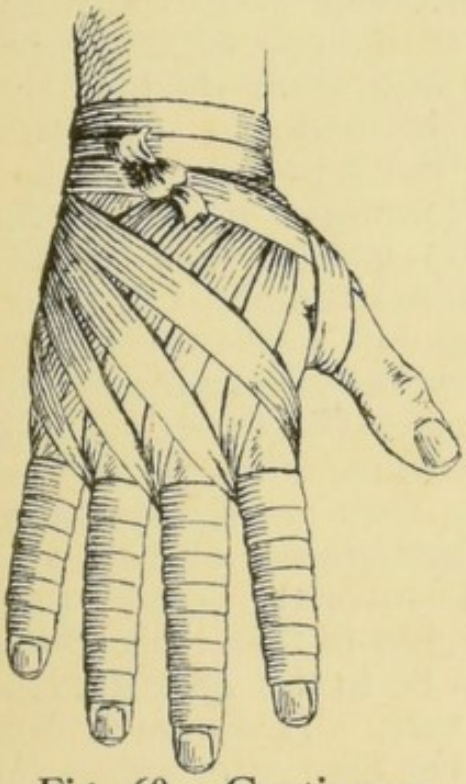


Fig. 60.—Continuous finger bandage.

and the end is tied off at the wrist, the initial end left free being utilised for the purpose. It will be observed (Fig. 60) that the bandage as it leaves each finger is brought over the back of the hand, not over the palm, as it is the back of the hand that swells when the blood-vessels are impeded and not the palm, of which the thickness of the tissues prevents swelling.

2. *Bandage to cover finger-tip.*—This is required when the point of the finger has to be covered to retain a dressing in place. Use a bandage 1½ yd. long and ¾ in. wide. Stand opposite the extended finger. Pronate the hand. Lay the bandage on the inner aspect of the wrist, leaving 4 in. of the end free, whereby finally a knot may be made in tying off the bandage. Carry the head of the bandage over the back of the hand obliquely to the little-finger side of the root of the finger to be covered, around which a loose spiral turn is made to reach the tip. Hold the finger up and with your own forefinger placed at the back of the middle bone of the finger, and the thumb at a corresponding point in front of the finger, carry the bandage over the tip of the finger (Fig. 61), backwards and forwards, securing the folds in place with your forefinger and thumb. The bandage over the end of the finger is made first to pass over the centre of the finger-tip; the second turn is made to lie a little to one side of the tip, the third turn to lie to the opposite side of the finger-tip to the second turn. Three turns thus made should completely cover the finger-tip, unless the dressing is bulky, when one or two additional turns on either side are made. The folds over the finger-tip are now held in place by bringing the head of the bandage around the finger close to the tip, passing

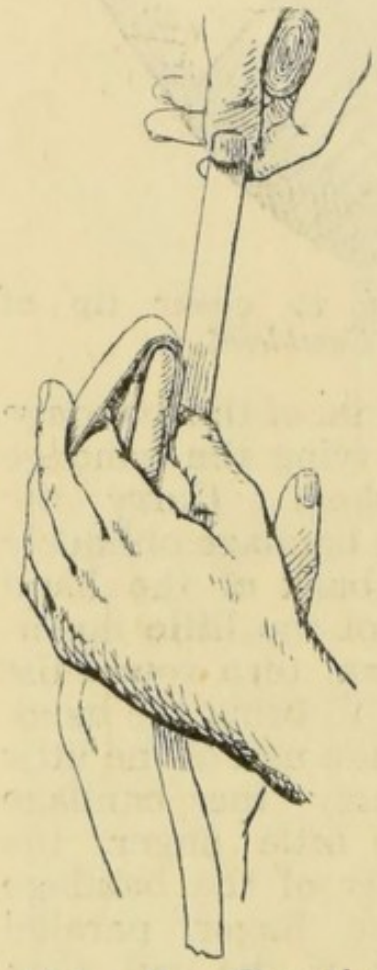


Fig. 61.—Covering tip of finger.

first to the thumb side of the finger, when a simple spiral bandage is applied from the tip to the root of the finger, and the bandage carried over the back of the hand to the wrist, where the ends are tied. A better fixation is afforded by first tying a knot with the two ends over the back of the wrist and then carrying the free ends round the wrist and tying them off. The turns round the finger may be in the form of simple spiral turns, or the bandage may be carried in figure-of-8 turns from tip to root (Fig. 63). Unless the precaution given above is observed, namely, to bring the bandage round the thumb side of the finger after the backward and forward turns are taken over the finger-tip, the bandage when it reaches the root of the finger will be on the little-finger side of the root, that is, the same side as the bandage reached the root of the finger from the back of the hand. The finger is thereby less supported, and it is an important point to keep the finger braced back so that it may be out of the way of the other fingers, more especially if the hand is to be used for writing, for work, or at meals.

Spica Bandage for the Thumb.—The word spica is applied to bandages for thumb, shoulder, groin, &c., as the crossings of the bandage turns bear a resemblance to the position of the grains in a head or spike of barley.

Place the hand midway between pronation and supination, with the back of the thumb upwards. Stand opposite the hand. Select a bandage $\frac{3}{4}$ in. wide and $2\frac{1}{2}$ yd. long. Lay the free end of the bandage across the front of the wrist, leaving 4 in. free in order finally to tie the ends. Carry the head of the bandage across the back of the root of the thumb to the little-finger side of the thumb (that is, between thumb and forefinger). Then take a wide spiral turn round the thumb to within $\frac{1}{2}$ in. of the root of the nail. Take one (or two) turns round the thumb horizontally so that the lower border of the bandage is $\frac{1}{2}$ in. above the root of the nail.

The next turn passes obliquely down the back of the thumb, crossing forwards to the palmar aspect to reach the ball of the thumb, whence the head is carried round

the wrist, then up over the back of the hand and thumb, then round the thumb, and again obliquely across its back towards the base of the thumb in front. These turns are repeated again and again until five or six turns are made, the ends being then tied off at the wrist. The spica bandage will be seen to be a figure-of-8 bandage, one loop enclosing the wrist and the other the thumb. (Fig. 62.)

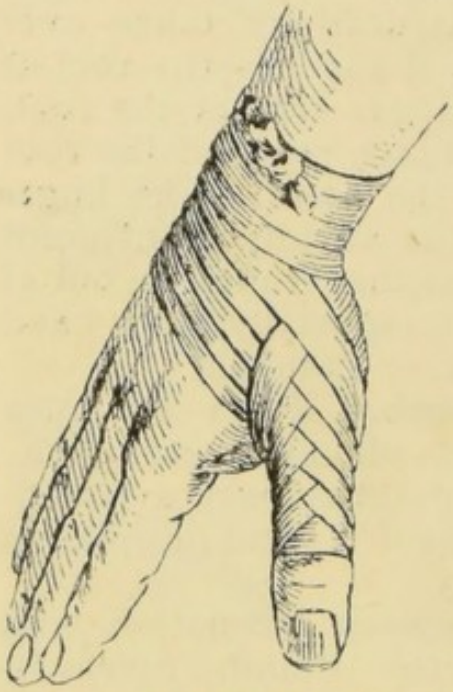


Fig. 62.—Spica bandage for thumb.

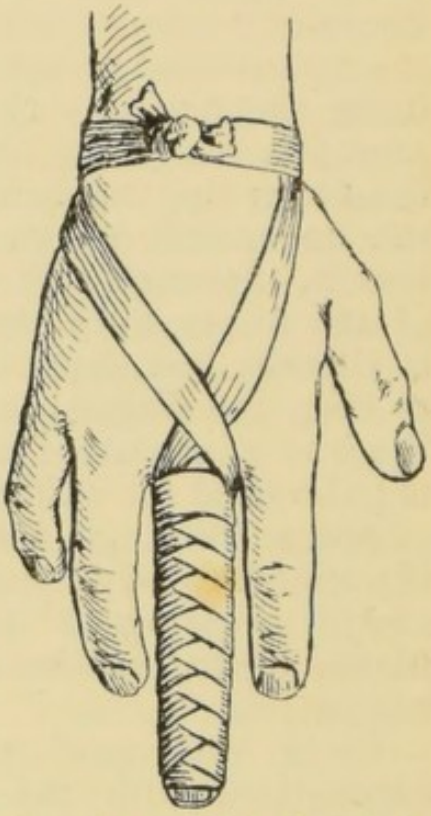


Fig. 63.—Spica bandage for finger. Tip not covered.

When the point of the thumb is required to be covered, proceed in the same way as when other fingers have to be covered; the spica bandage may be applied round the root of the thumb after covering the point.

For the spica bandage as applied to a finger, *see* Fig. 63.

Spica Bandage for the Shoulder.—To bandage the (right) shoulder select a bandage 3 or 3½ in. wide and 8 yd. long. Stand opposite the right shoulder. Holding the bandage in the left hand, carry it round the arm

2 in. above its centre and with the second turn make a reverse on the outer side of the limb, repeating the turns with reverses three or four times until the folds of the arm-pit (axilla) are reached; then carry the bandage over the shoulder and round the back of the body beneath the opposite (in this case the left) axilla (in which a piece of cotton-wool should be placed to prevent chafing). The bandage is then carried over the chest and round the shoulder. The turns round the body in this figure-of-8 fashion are repeated four or more times until the shoulder is completely covered. As in other applications, one-third of each layer is left exposed by the next one superimposed, so that there are three layers on every part. The crossings must be in line one with another and also in a line with the reverse spirals round the arm, so that it is impossible to know, when the bandage is deftly applied, where the reverse spiral turns end and the spica or figure-of-8 turns commence. (Fig. 64.)

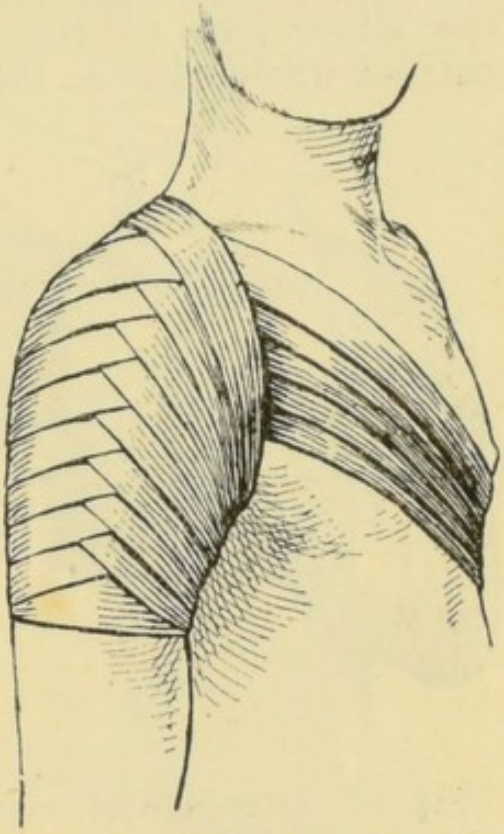


Fig. 64.—Spica bandage for right shoulder.

Bandage for the Collar-bone.—Although fracture of the collar-bone is temporarily supported by triangular bandages to begin with, it is usual to apply plaster or a roller bandage subsequently. Wood's collar-bone bandage is applied as follows: Take a bandage 3 to $3\frac{1}{2}$ in. wide and 14 yd. long. For the right collar-bone, after applying a thick pad in the right arm-pit (axilla) and a piece of cotton-wool in the left axilla to prevent chafing, stand opposite the (in this instance) right side of the body. Bend the elbow, lay the forearm across the front of the chest, and place a piece of cotton-wool between the palm of the hand and the chest; the hand

should be kept a little above the level of the elbow. Holding the bandage in the left hand, apply the outside of it to the inner side of the arm immediately above the elbow and take a couple of turns, carrying the elbow well back at the same time. The bandage is now carried across the back and round the left side to the front, where it is passed just below the hand and along the back of the forearm, and over the elbow, pressing the elbow well to the side. The bandage is now carried upwards over the back to below the left axilla, then over the front and top of the left shoulder, and down the back to beneath the right elbow. It is then carried up the front of the arm, over the top of the right shoulder, down across the back, round the left side of the body to the front, again over the forearm, and so on, the turns being repeated until some six or eight turns round the body and over the shoulders are made. At each turn round the body the bandage is carried higher so as to expose one-third of the previous turn, and at each turn beneath the elbow (and forearm) and over the right shoulder the bandage is carried farther inwards, exposing one-third of each previous turn. Instead of using a 14-yd. bandage in one piece, it is better to take an 8-yd. and a 6-yd. bandage, pinning the ends together when the first has been applied.

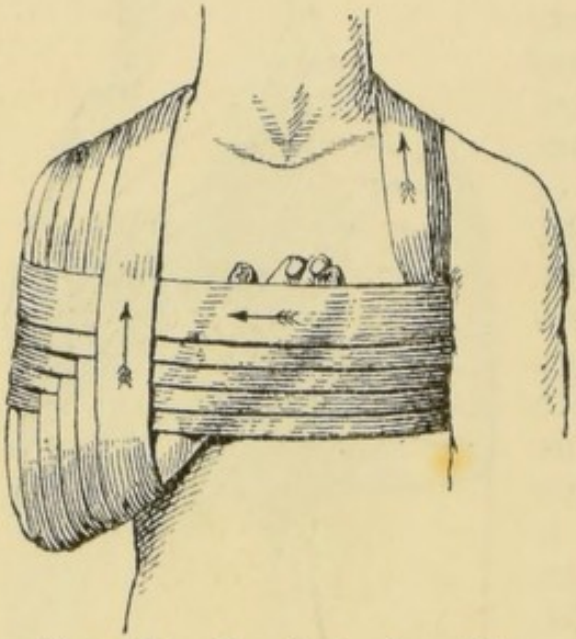


Fig. 65.—Bandage for right collar-bone.

Bandage for the Foot, Ankle, and Leg

Directions for Bandaging the Left Lower Limb.—When the bandage is to be carried to just below the knee the width should be 3 to 3½ in., and the length 6 yd. When the bandage has to be carried over the

knee 10 yd. will be required. If the patient is in bed, elevate the left heel upon a support 6 in. high ; if he is up and about, seat him in a chair. The dresser then sits in a chair opposite the patient at a convenient distance, lays a towel over his own (in this instance) right knee, placing the heel of the limb to be bandaged on the tip of his knee. (Fig. 66.)

To Bandage the Foot and Ankle.—Lay the outer side of the bandage on the inner side of the limb on a level with the ankle. Carry the bandage across the back (dorsum) of the foot in a direction towards the little toe. Bring the bandage round the sole of the foot on a level with the balls of the toes to the inner side of the ball of the great toe, then across the dorsum of the foot horizontally on a level with the root of the little toe, and then once more across the sole to the inner side of the foot. Thence bring the bandage across the dorsum obliquely to the outer side of the foot just above and behind the tip of the heel, then round the back of the heel to the inside of the ankle. Thence the bandage is brought once more round the foot, and again round the back of the heel. Figure-of-8 turns are thus made, one loop enclosing the foot, the other the ankle, until four (or more) turns are made. The bandage is now brought

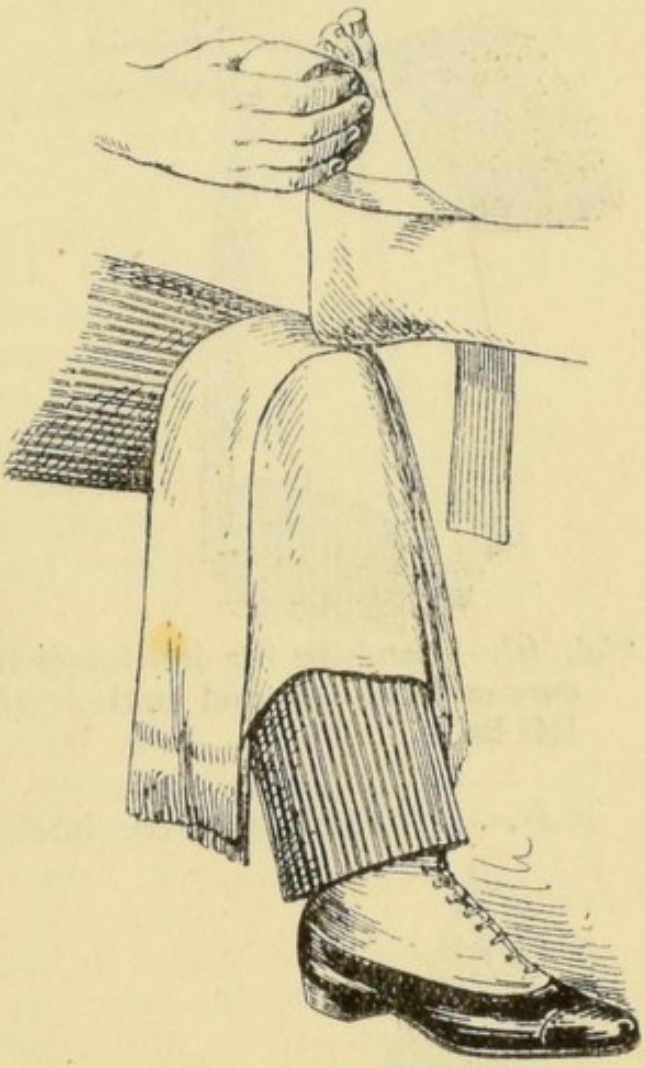


Fig. 66.—Commencing to bandage the left lower limb.

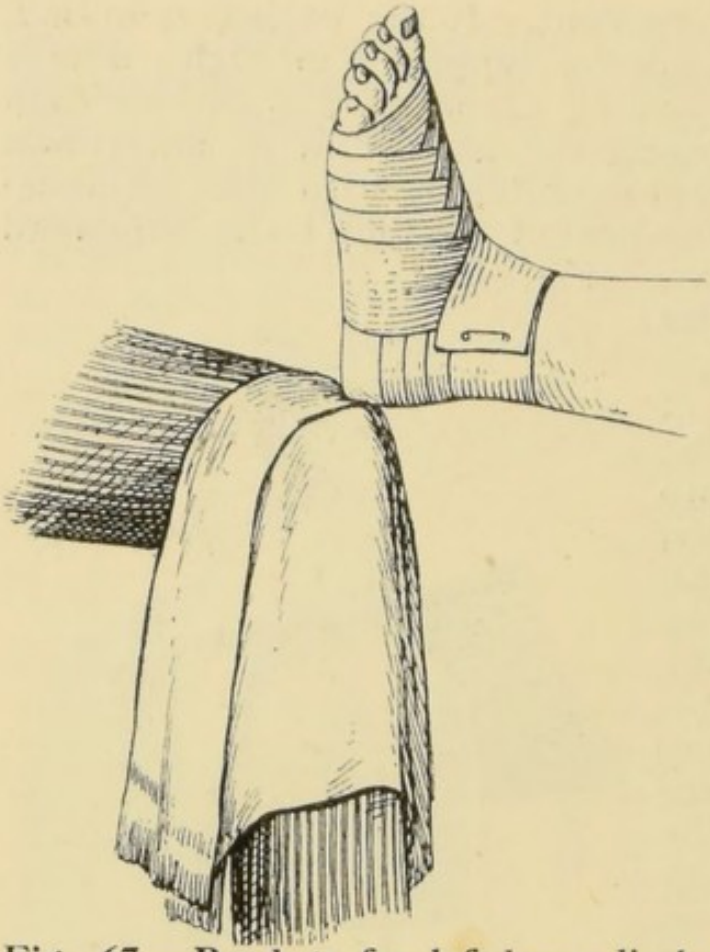


Fig. 67.—Bandage for left lower limb carried over foot and ankle. Heel left bare.

round the lower part of the leg, where three turns of a simple ascending spiral bandage are made. If there is no necessity to go higher the bandage is pinned off. (Fig. 67.)

To Bandage the Leg. — The bandage is carried up the leg from the foot as a reverse spiral bandage (Fig. 68) to 3 in. below the knee (that is to where the swelling of the calf ends); this having been done, three turns of a simple spiral are made.

N.B.—(1) The tip of the heel being on the top of the

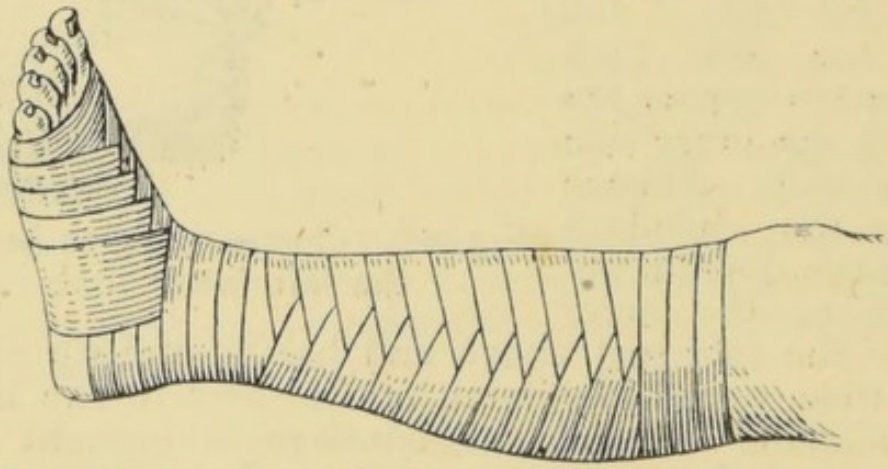


Fig. 68.—Bandage for left lower limb carried as far as the knee, showing figure-of-8 for foot, ascending simple spiral for lower part of leg, ascending reverse spiral for calf of leg, and ascending simple spiral just below knee.

bandager's knee, the bandage can be applied without raising the limb from off the supporting knee. (2) The reverses are all made on the outer, muscular part of the leg, never over the sharp edge of the tibia (shin-bone) in front.

Bandage to Cover the Heel.—Support the leg on a pillow or seat of a chair so that the heel projects well over the edge. Keep the foot at right angles to the leg. Lay the outside of the bandage on the inner side of the ankle. Bring the bandage straight across the front of the ankle, round the outer side, and over the tip of the heel, so that the centre of the turn lies over the tip of the heel. The bandage is again carried round the ankle and slightly below the tip of the heel. The next turn is brought round a little above the tip of the heel, and the turns are continued alternately below and above the heel, so that the last turns are about half-way along the foot and well above the ankle. (Fig. 69.)

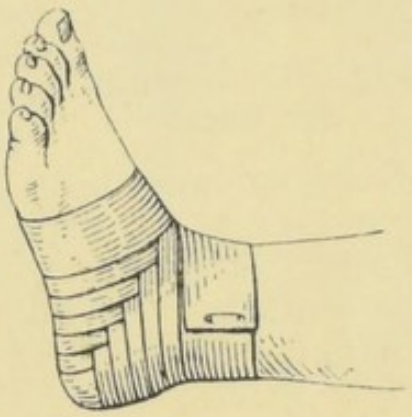


Fig. 69.—Bandage to cover tip of heel.

Bandage to cover the Knee.—Support the heel on a pillow so that the knee is raised from off the bed to allow the bandage to pass underneath. Use a bandage 3½ in. wide and 6 yd. long. Apply the outside of it to the inner side of the knee, and carry it across the front of the knee-cap to the outer side. The bandage is then brought round the knee slightly obliquely just *below*, and the next turn is carried round slightly obliquely just *above*, the centre of the knee-cap. Turns are made round the knee, alternately below and above the joint, until the upper end of the leg and the lower end of the thigh are covered to the extent of 3 in. below and above the knee-cap. The bandage may be also applied as in Fig. 70.

Bandage for the Hip.—Use a bandage 3½ in. wide and 8 yd. long. Stand on the outer side of the (left) hip. Place the outside of the bandage on the inner side of the thigh, 6 in. below the groin. Carry the bandage horizontally round the limb and make four as-

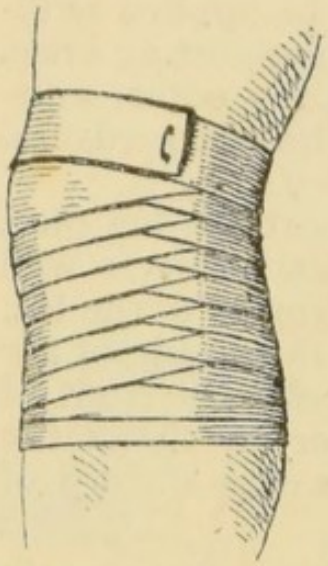


Fig. 70.—Bandage for knee.

cending reverse spiral turns round the thigh. Carry the fifth turn across the front of the left groin, round the left side of the body just below the crest (highest point) of the haunch-bone (innominate), round the body, down the outer side of the thigh, and again round the trunk and thigh until four (or more) turns are made (Fig. 71).

Bandage for the Groin.—A *single* spica for the groin is applied as for the hip, the crossings being made over the front of the groin, and the reverse spiral turns round the thigh being omitted.

In applying a *double* spica for both groins, use a bandage $3\frac{1}{2}$ in. wide and 16 yd. long. Standing in front of the patient, lay the outside of the bandage in the front of (say) the right groin; carry the bandage round the outer side of the right thigh, then over the front of the right groin, round the right hip, across the back, along the left groin, down the inner side of the left thigh, round the left thigh, up over the left groin, and across the lower part of the abdomen to the outer side of the right hip. The bandage is now brought round the back, across the lower part of the abdomen to the outside of the right thigh, round the right thigh and body to the left groin; these turns are continued until the part is sufficiently covered, making four or five turns. Each succeeding turn is higher than its predecessor. (Fig. 72.)

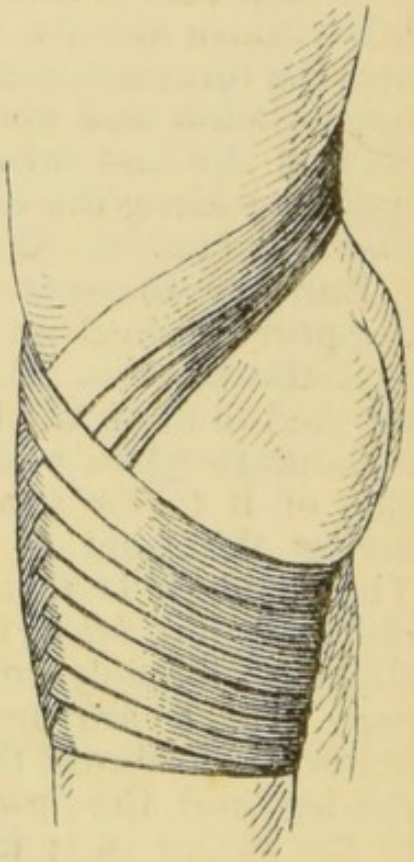


Fig. 71.—Spica bandage for left hip. If the crossings were farther forward a spica bandage for groin would be made.

Bandages for the Head

Capelline Bandage.—This is used to keep a dressing on the head; it is a useful bandage to apply in ringworm and other diseases of the scalp, especially when the scalp has been shaved. Use a double-headed roller bandage (Fig. 48) 2¼ in. wide and 8 yd. long. To secure an equal amount in each head of the bandage a good plan is to mark the centre of the length of the bandage by a pin, when each end is rolled towards the pin; the pin is then removed. Instead of rolling from the ends of one bandage, two bandages 2¼ in. wide and 4 yd. long may be pinned together, the outside of the end of one bandage being applied to the inner side of the end of the other. Stand behind the patient whilst he is seated on a chair. Apply the outside of the bandage to the forehead, the lower border of the bandage lying just above the eyebrows (Fig. 73).

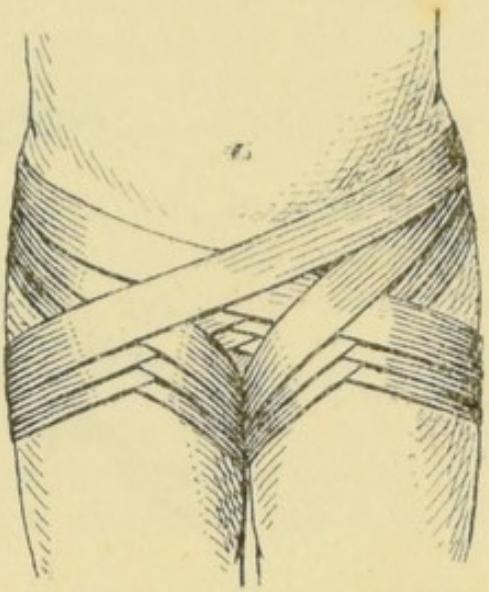


Fig. 72.—Double spica for groins. If applied to one side only, a single spica for groin is made.

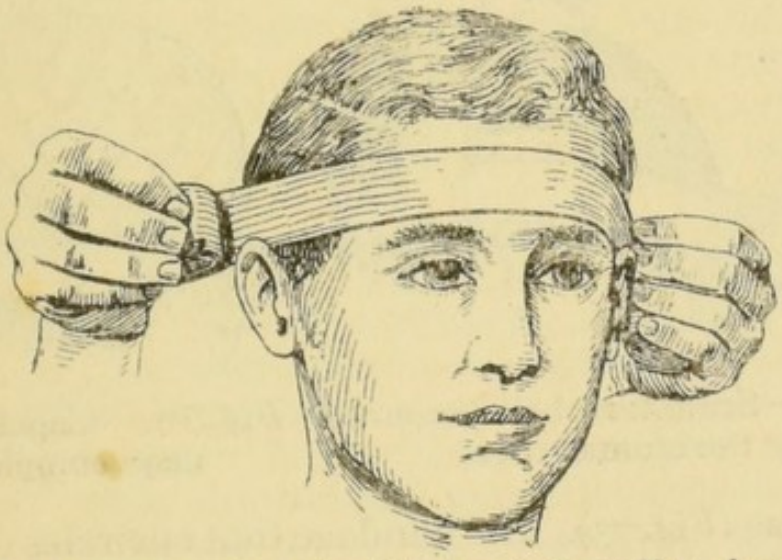


Fig. 73.—Commencing double-headed roller bandage for head.

Carry each head of the bandage backwards over the side of the temple, and above the ears to the back of the head (Fig. 74). Here the ends are

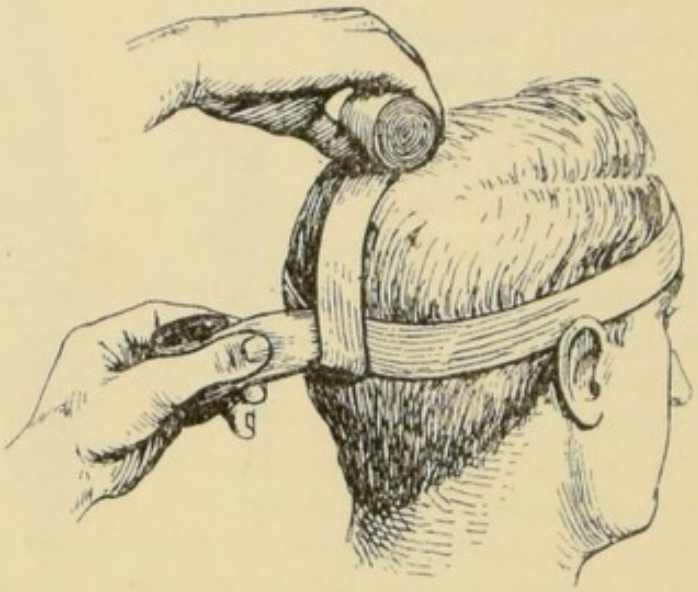


Fig. 74.—One head being continued round the scalp and the other going over it.

crossed, the upper bandage being continued onwards round the head whilst the other is brought upwards over the centre of the top of the scalp as far as the root

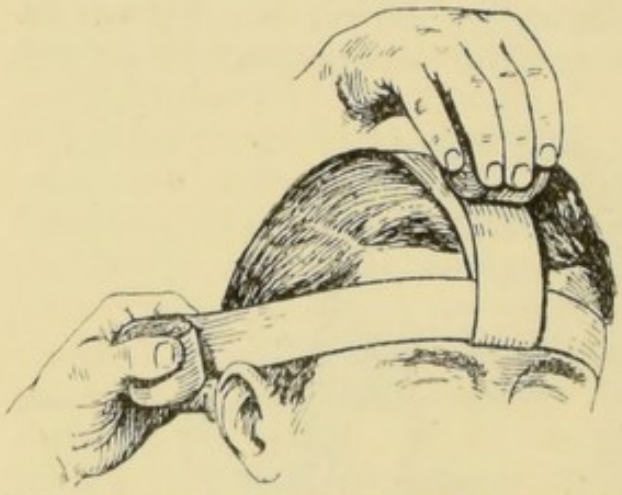


Fig. 75.—Scalp turn being secured by horizontal turn.

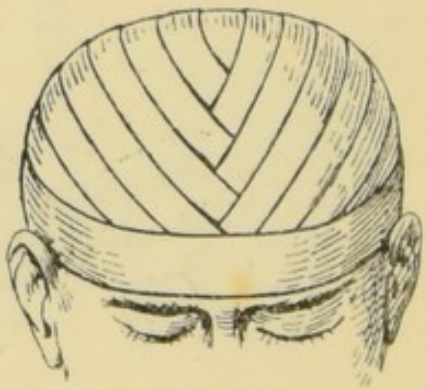


Fig. 76.—Capelline bandage completed.

of the nose (Fig. 75). The bandage that encircles the head is then brought over the forehead, covering the bandage that traverses the scalp, and so fixing the latter in place.

The turns are continued, the scalp end of the bandage passing alternately backwards and forwards first at one side and then at the other of the central fold until the whole scalp is covered; while the bandage that encircles the head fixes each fold of the scalp turns as it is made (Fig. 76). At the finish both ends of the bandage are carried round the head horizontally above the ears and pinned off.

Half-Capelline Bandage.—This bandage is made by passing the scalp folds backwards and forwards over one side of the head only, the other bandage encircling the head as for the whole head bandage.

Four-tailed Bandage for the Head.—Take a piece of calico (or other material) 1 yd. long and 8 in. wide. Tear or cut from the centre of each end to within 5 in. of the centre of the bandage, thus leaving a place 10 in. long undivided in the centre.

1. *For the Top of the Scalp.*—Lay the centre of the undivided part of the bandage in the centre of the top of the head. Bring the two front ends backwards behind the ears and tie at the back of the neck, then bring the two back ends forwards in front of the ears and tie below the chin. (Fig. 77.)

2. *For the Front of the Scalp* (*Forehead*).—Bring the two front ends horizontally round the head and tie at the back of the neck. The two back ends are tied below the chin. (Fig. 78.)

3. *For the Back of the Scalp.*—Bring the back ends horizontally round the head above the ears and tie in the middle of the forehead in a line with the eyebrows, then bring the two front ends down and tie below the chin. (Fig. 79.)

Four-tailed Bandage for the Chin.—Use a bandage 6 in. wide and 1 yd. long. Tear the ends from the centre to within 4 in. of the centre of the bandage, thus leaving a piece 8 in. long undivided in the centre. A slit 1½ in. long may (if advantageous) be made in the centre of the undivided portion to accommodate the tip of the chin. The lower ends are carried upwards in front of the ears and tied on the top of the head; the upper ends are carried round the neck below the ears and tied at the back of the neck. The four ends left over after

tying the knots are tied together, the two left ends and the two right ends respectively being tied together. The

Fig. 77.—Four-tailed bandage for top of scalp.

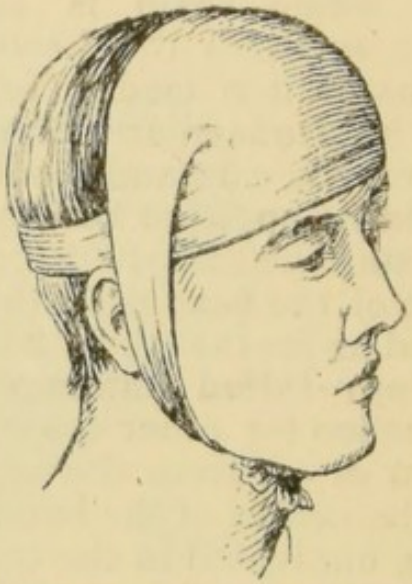


Fig. 78.—Four-tailed bandage for brow and front of scalp.

knots for the bandage ends should be made well up towards the top of the head, so that the patient may

Fig. 79.—Four-tailed bandage for back of scalp.

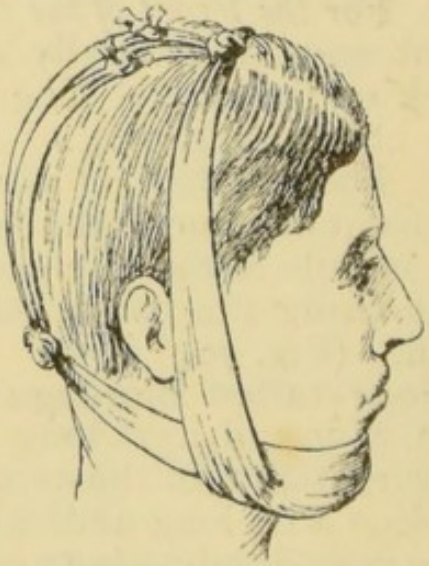


Fig. 80.—Four-tailed bandage for chin.

not be inconvenienced by them when the head is laid on a pillow. (Fig. 80.)

Bandages for the Abdomen, Chest, etc.

Bandage for the Abdomen.—To keep dressings upon the abdomen and lower part of the chest, flannel is the most comfortable material for the patient. Use a bandage 6 in. wide and 8 yd. long. The abdomen must be bandaged from above downwards—that is, commence above. If commenced below, the bandage will push the contents of the abdomen up against the diaphragm, and thus impede breathing and the action of the heart; if it is commenced above, the ribs prevent this discomfort and danger. Carry the bandage round the trunk in descending simple spiral turns, each turn leaving half (not one-third as for the limbs) of the previous turn exposed. See that the pin fastening the end of the bandage is fixed in front, so that the patient need not lie upon it.

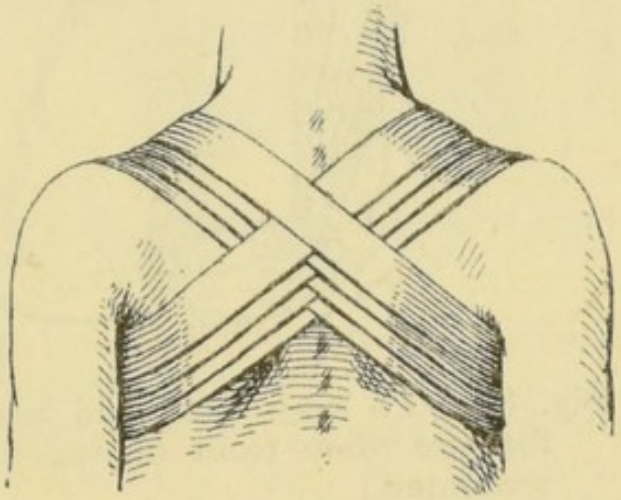


Fig. 81.—Figure-of-8 bandage applied to the shoulders.

Bandage for the Chest.—In bandaging for broken ribs, etc., commence over the lower ribs and bandage upwards, covering the half of each turn with the succeeding turn.

Bandage to Keep the Shoulders back.—This is sometimes used in fracture of both collar-bones and for stooping shoulders. It should be applied in figure-of-8 fashion, as in Fig. 81. Both armpits are to be protected by cotton-wool.

Bandage to Keep the Head bent forward.—This bandage may be required for wounds in the neck. Lay the bandage end on the front of the body (Fig. 82), carry the head of the bandage upwards to the right temple, and then horizontally round the head to the right temple again, where a twist is made. The head of the bandage is then carried across the top of the head and down the left side of the neck to the chest. A pin is placed on the left side to

secure the vertical and horizontal parts of the bandage on the head. The bandage is now carried round the chest three or four times, covering over the end originally applied. By pulling on the end of the bandage on the right, and slipping the head of the bandage through the strip coming down from the head on the left, the head is bent forward and by fixing the end on the right and the strip on the left by half hitches with the head of the bandage, the head can be pulled well forward and maintained there beyond all the efforts of the patient to straighten the neck. In cases of delirium or attempted suicide, it is well to tie both upper limbs to the side of the body to prevent the head bandage being torn off.

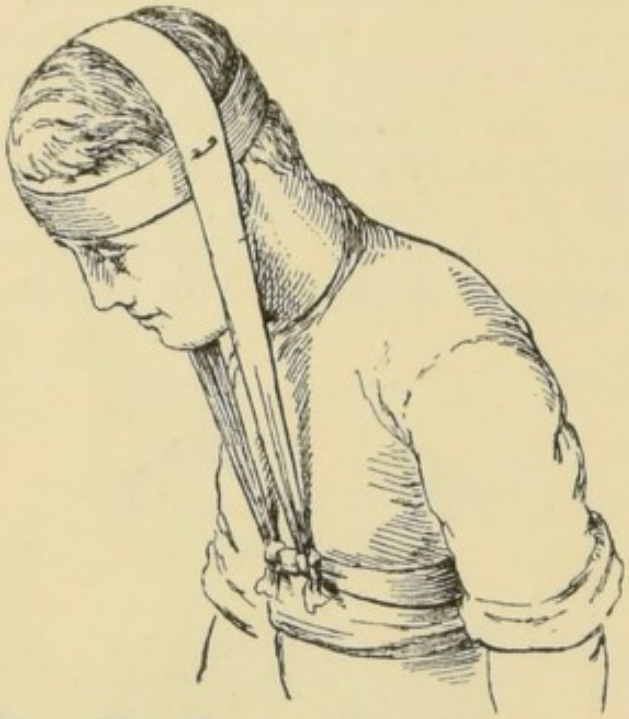


Fig. 82.—To keep the head bent forward when front of neck is wounded.

Bandage for the Breast.—1. To support *one breast* (say the right) take a bandage 3½ in. wide and 8 yd. long. Commence the bandage (outside of bandage next the skin) below the breasts (Fig. 83), and carry the head first to the right, and round the body horizontally twice. At the third turn carry the bandage upwards beneath the right breast and over

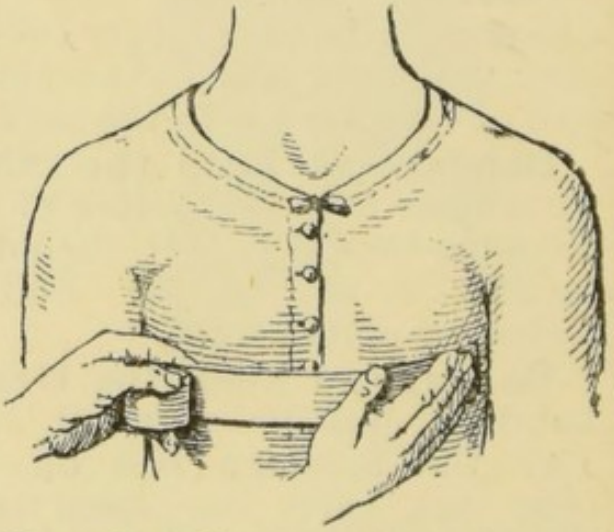


Fig. 83.—Commencing bandage for right breast.

the top of the right shoulder, then down the back round the body. These turns are continued, making one turn round the trunk and one beneath the breast and over the right shoulder alternately until four, five, or more turns are made, when the breast will be supported as in a cup of bandage. (Fig. 84.)

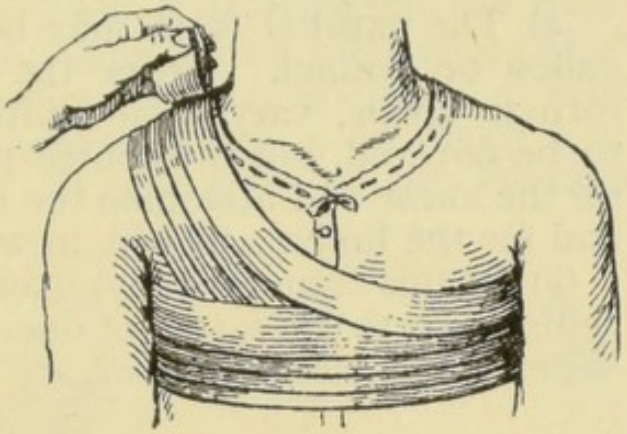


Fig. 84.—Bandage to support right breast.

2. To support *both breasts*, commence the bandage beneath (say) the left breast, carrying it to the left and round the body twice, upwards beneath the left breast, over the top of the left shoulder, down the back, round the right side of the chest, across the front, round the left side of the chest, then up the back, over the top of the right shoulder, across the chest beneath the right breast, round the left side of the chest horizontally, across the back, round the right side of the chest, up beneath the left breast, over the top of the left shoulder, and repeat these turns until four or five turns are passed beneath each breast. (Fig. 85.)

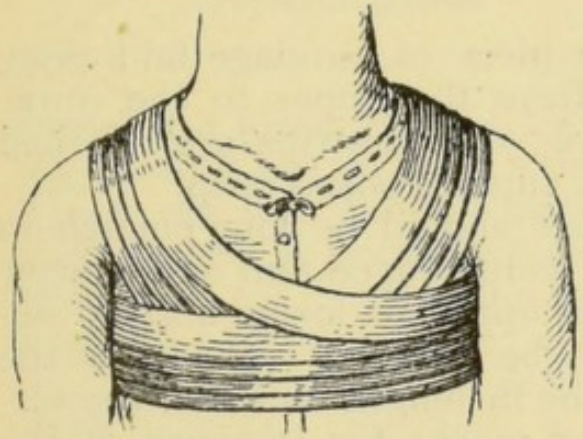


Fig. 85.—Bandage to support both breasts.

N.B.—It is impossible to follow the written description of this bandage (and many others) unless the dresser has a model to practise on and systematically follows the steps in the text as he proceeds.

Many-tailed Bandage.—A convenient bandage for retaining dressings on several parts of the body, such as the abdomen, chest, or thigh, when it is desired to

reach a wound or change a fomentation, poultice, or dressing without moving the patient, is named, on account of its numerous ends, the many-tailed bandage. The bandage may be with either (*a*) parallel (Fig. 86) or (*b*) overlapping (Fig. 87) tails.

(*a*) The parallel form may be made from a piece of calico or flannel. From the edges the bandage is torn in strips, varying in width according to the part to be covered, but the centre part remains undivided; for the chest and abdomen the tails should be 3 to 4 in., and for the limbs 2 to 3 in. in width.

(*b*) In this form (Fig. 87) each strip overlaps the preceding one, to the extent of one-third on its lower border. When a sufficient number are laid down the whole is

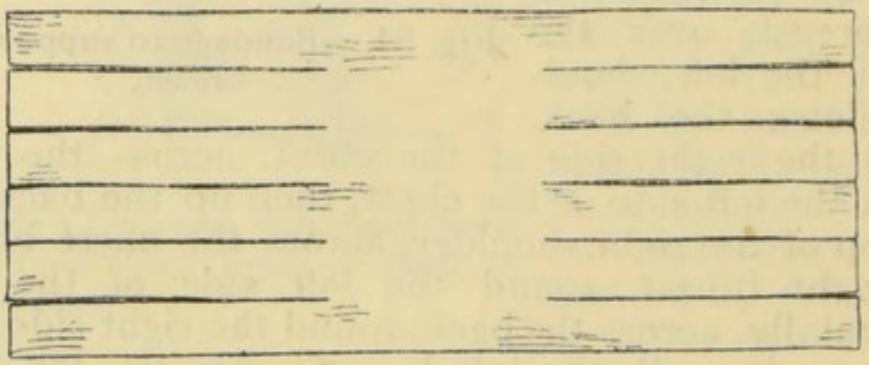


Fig. 86.—Many-tailed bandage with parallel ends.

fixed together, either by a piece of bandage laid along the centre of the strips from the upper to the lower borders and stitched there, or the strips are stitched along the centre without a superimposed strip.

The many-tailed bandage should be long enough to go once round the part to be bandaged and one quarter more, and its depth (from upper to lower border) according to the amount to be covered. Thus, for the chest the bandage should be in length equal to the circumference, and a quarter more; for instance, if the chest circumference is 36 in., the length of the bandage strips is 45 in., and the depth of the entire bandage from the level of the armpits to half-way down the waist. The same rule applies to the abdomen, the thigh, etc.

In applying the bandage to the chest and abdomen the lower ends should first be crossed over each other

in front; the next secures the first, the third the second, until the last turn of all is made, when a safety-pin is used to fix the ends. To keep a dressing on the thigh the lower ends may be applied before the upper, but as a rule it is better to bandage from above downwards.

The T-Bandage.—To keep a dressing on the lower part of the body, as after operation for piles or for other purposes: Use flannel, calico, or other material. 1. With a *single-headed roller bandage*, choose a bandage 4 in. wide and 5 yd. long. Take a turn of the bandage

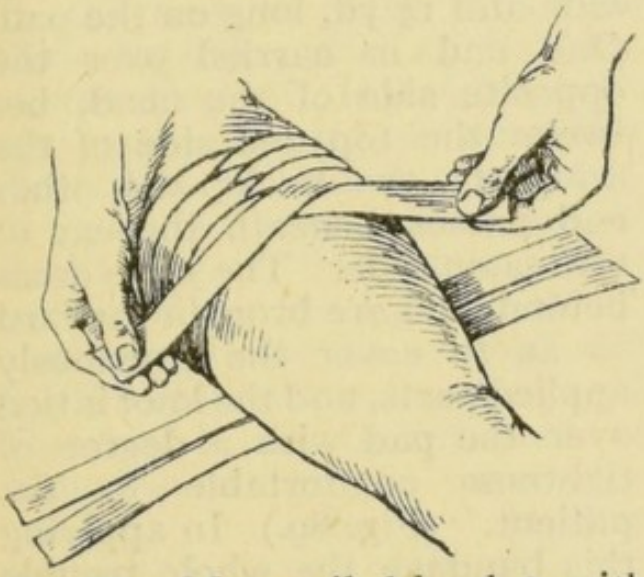


Fig. 87.—Many-tailed bandage with overlapping tails.

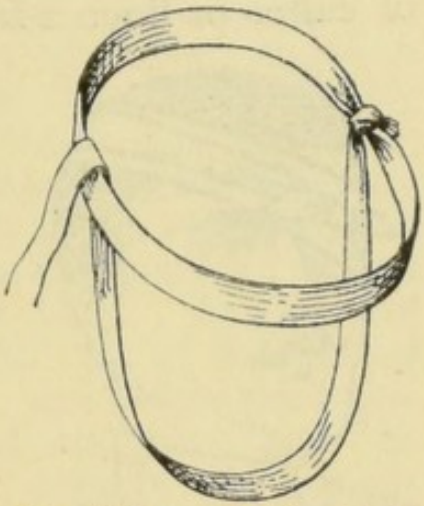


Fig. 88. — T-Bandage. The circular turn is carried round the waist; the loop passes between the thighs.

round the lower part of the abdomen and tie a knot in the middle line in front; carry the bandage down between the legs and up behind between the hips, pass the head of the bandage beneath the turn at the back, then forwards between the legs and beneath the bandage round the trunk in front; repeat these turns backwards and forwards until four are made, and tie off the bandage in front. (Fig. 88.) 2. With a *prepared T-bandage*, take a strip of bandage 4 in. wide and 1½ yd. long; this piece is intended to encircle the body. To form the T-piece, (*a*) sew one end of a piece of bandage 4 in. wide and 1 yd. long, behind, and tear (or cut) from the centre of the free end to the extent of half its length; or (*b*), behind, lay the centre of a bandage 4 in. wide

and 2 yd. long across the centre of the strip which encircles the body. To apply the T-bandage, tie the part intended to go round the body with the knot in front ; bring the T-piece forwards between the hips and thighs, and tie the ends to the bandage in front, one on either side of the knot.

Bandage for the Eye.—To keep a dressing or pad on the eye the bandage requires careful adjustment. After placing the pad or dressing on the eye, put the centre of a triangular bandage, or the centre of a strip of calico or linen 2 in. wide and 1½ yd. long on the pad. One end is carried over the opposite side of the head, between the top and side of the scalp, to the back ; the other end passes beneath the ear of the same side. The ends cross behind, and are brought forward so as to cover the previously applied parts, and the knot is tied over the pad with a degree of tightness comfortable to the patient. (Fig. 89.) In applying this bandage the whole trouble is to prevent the turn over the side of the head from slipping ; unless it is kept well up above the temple it is sure to slip.

Fig. 89.—Bandage for the eye.

Plaster of Paris Stiffening for Bandages.—Plaster of Paris or other stiffening material is used with roller bandages : (1) as splints for fractures ; (2) as a means of supporting a limb after splints have been removed ; (3) as a jacket to support the spine when it is curved ; and for several other purposes. To apply a plaster-of-Paris bandage to the leg, proceed as follows : Obtain two roller bandages of muslin, crinoline, or, if nothing else is handy, calico, 3½ in. wide and 6 yd. long ; a flannel bandage 3 or 3½ in. wide and 6 yd. long ; a quantity of plaster of Paris quite fresh and dry on a tray or dish, and a basin of cold water. Protect the bed with sheets or newspaper. Roll up the muslin bandages in the midst of the mass of plaster of Paris, so that they become

thoroughly impregnated with the plaster; place the bandages in the basin of cold water, standing them first on end (see that they are thoroughly immersed in the water), afterwards lay them on their sides. Wash the limb with soap and water and dry thoroughly. Apply the flannel bandage from the toes to just below the knee, avoiding reverses as the bandage is being carried up the calf. In place of a flannel bandage some lint may be used, or, again, a long stocking may be put on the limb in place of a bandage. One plaster of Paris bandage, after all bubbles of air have ceased to escape from it, is removed from the water, slightly squeezed to get rid of superfluous water, and applied in the ordinary manner, care being taken to make plenty of figure-of-8 turns round the ankle so as to strengthen the bandage at this point. The second bandage is then continued up the leg to below the knee. The plaster bandages should be so applied that 1 in. of the flannel is left uncovered at the toes, ankle, and below the knee. The heel is usually left uncovered, and here also the flannel should project beyond the edge of the plaster bandage. In order to strengthen and smooth the bandage, some plaster of Paris is made into a cream and smeared upon the folds of the plaster bandage as it is being applied, and the whole surface should be made to appear quite smooth by the cream. The heel should then be raised on a jar or pad and the part left uncovered, when it will set and dry in the space of an hour or two.

Particular care must be observed when this bandage is being applied that the toes are not pointed, but that the foot is kept at a right angle to the leg; if this is not done the patient cannot put the sole of the foot to the floor in walking.

In place of plaster of Paris, *water glass*, or *silicate of soda*, may be used to stiffen the bandage. This substance requires a long time (24 hours) to harden and dry, but it has the advantage of being much lighter than plaster of Paris.

To remove these stiffened bandages it is necessary to use a strong knife or even a surgical saw; a special form of scissors is made for the purpose.

CHAPTER XX

MOVING WOUNDED OR INJURED PATIENTS INDOORS—LAYING OUT THE DEAD

In Nos. 1 and 3 of the British Red Cross Society's Manuals minute instructions are given as to the carriage of patients from the street, or from the field of battle, to shelter in a tent, house, or hospital, by road or by rail. When the sick or wounded person arrives at his journey's end he has to be placed in bed; this may necessitate his being carried up stairs, often quite narrow, and taken from the stretcher under awkward circumstances. Unless these movements are carefully carried out, all the care, skill, and labour that were bestowed upon the patient whilst being conveyed to the hospital may go for nothing; a simple fracture may be made compound, or an arrested hæmorrhage may break out afresh.

On arrival at the tent, house, or hospital (temporary or permanent) a survey of the obstacles likely to impede the entrance of a loaded stretcher or other means of conveyance to the bedside must be made.

In the case of a tent, these points have been fully dealt with in Manual No. 3. When a loaded stretcher is brought to a private house, or when the occupants of the house have been informed that a severely injured person is being brought for admission, all obstacles likely to obstruct entrance must, as far as possible, be removed. If the door is double, both sides must be opened; in the hall, chairs, the hat stand, the "grandfather's clock" if present, must be removed. If there is likely to be great difficulty in getting the stretcher upstairs, part of the balustrade may have to be removed; if it is impossible to get the stretcher upstairs, a room must be prepared on the ground floor. The bedroom must be made as much like a hospital ward as possible by the removal from it of all unnecessary

furniture. Some basins, bowls, etc., should be scalded and covered over with clean towels, in case they may be wanted; boiled water should be poured into several scalded jugs, which must be covered over with towels or clean handkerchiefs to keep out the dust; if the case is of a surgical nature, appliances such as lint, cotton-wool, strapping plaster, bandages, scissors, etc., should be looked out; carbolic or some other disinfectant lotions should be laid out ready for use.

The bed should not be more than 3 ft. 6 in. in width; it is to be placed with its head towards a partition wall, and so that it is possible to get at both sides of it. If the accident is known to be a fracture of a lower limb, a fracture bed is made up, as described at p. 20. A mackintosh should be spread beneath or laid upon the under sheet and covered by a draw sheet if necessary; the bed should be warmed with a warming-pan or hot bottles, and a sufficiency of blankets provided according to the season of the year; a fire should be lit if the weather is cold.

To get a stretcher into a room or up a staircase is always attended by some difficulty, which the bearers, by exercise of their ingenuity, may contrive to overcome. If it is impossible to get a stretcher upstairs the patient may have to be removed to a carrying-chair improvised for the occasion (*see* Manual No. 3, p. 85), should no regulation carrying-chair be at hand. If the entrances are narrow the traverses of the stretcher may have to be undone, so that the poles may approximate more closely; the V.A.D. improvised rope stretcher, being but 20 in. wide, will be more easily manipulated than the wider and heavier regulation stretcher; or it may be necessary to transfer the patient to a blanket stretcher. On the other hand, a "human stretcher" (*see* Manual No. 3, p. 84) may be found the most suitable means of carriage, or the patient may have to be carried by three bearers standing on one side of him.

In carrying a stretcher up steps or a staircase, certain principles must be adhered to: (1) The stretcher must be kept as level as possible, so that the patient is kept in a horizontal position. (2) The patient should never be

raised so high that the bearers cannot see him. (3) As a rule the patient is to be carried head first, but if a lower limb is fractured he must be carried feet first, so as to prevent the ends of the broken bone from being pushed violently against each other, or perhaps driven through the skin (compound fracture).

On arrival at the bed the stretcher (1) should be laid on the floor in a line with the bed (if there is room), the head of the patient towards the foot of the bed. The bearers then "stand to stretcher," Nos. 1, 2, and 3 on one side and No. 4 on the other side, opposite No. 2, as in "Unloading Stretchers" (*see* Manual No. 3, p. 33), and on the patient being raised they move by a side pace until over the bed, when the patient is lowered. If unfortunately the bed is a wide one, say a double bed, No. 4 will have to fall out as the bed is approached, and the carrying is left to Nos. 1, 2, and 3, standing as they do on one side of the patient. (2) Should there be insufficient space in the room to allow of the stretcher being placed in line with the bed, it must be brought alongside and parallel to the bed and lowered, with the head of the stretcher alongside the head of the bed. Nos. 1, 2, and 3 take post on the side of the stretcher away from the bed, lift the patient, and rise to the upright position, while No. 4 pulls the stretcher away from beneath the patient, Nos. 1, 2, and 3 then advancing and gently laying the patient on the bed.

In *moving a patient from an operating table to bed*, Nos. 1, 2, and 3 bearers stand upon whichever side of the patient will bring them, when the bed is reached, parallel to one side of the bed with the patient's head towards the head of the bed. When the operating table is parallel to the bed, or can be turned round to occupy this position, the procedure is simple: the three bearers place themselves on one side as in loading and unloading stretchers, and by a side pace the bed is reached, with the patient's head at the head of the bed. If, however, the operating table cannot be moved, as when it is improvised from, say, a biscuit box and flat (ironing) boards, a door, etc., or even if the table is made up of two placed together, as

often happens when operating in a private house—under such conditions, especially if the room is small, a little planning will be necessary before lifting the patient from the table and placing him on the bed, otherwise the bearers will find themselves on the wrong side of the bed.

Laying Out the Dead

When a person dies, remove the blankets and throw the sheet over the corpse, covering the face as well as the body. After an interval pass a bandage or handkerchief beneath the lower jaw and tie off on the top of the head, so that the mouth is closed. Spread a mackintosh beneath the corpse to protect the bed, and proceed to wash the whole body with soap and water; dry thoroughly; shut the eyelids and place a pad of cotton-wool on either eye to ensure the lids being kept closed. Push a piece of cotton-wool up the bowel for a short distance. Put on stockings or socks, and pyjamas or nightdress; tie the feet together.

A clean sheet is spread beneath the body, which is then covered completely by another clean sheet

APPENDIX

RED CROSS FIRST AID AND NURSING CERTIFICATES

1. By the War Office requirements all candidates for Men's Voluntary Aid Detachments, with the exception of pharmacists, ex-soldiers Royal Army Medical Corps (Regular, Special Reserve, or Territorial), ex-sick berth attendants Royal Navy, persons who hold the certificate of the Medico-Psychological Association for Great Britain and Ireland, cooks and carpenters (the two latter not to exceed four and two respectively per detachment), should be in possession of a First Aid Certificate, or undertake to produce such certificate within 12 months from the date of enrolment. Should they fail to do so they will be liable to be removed from the detachment.

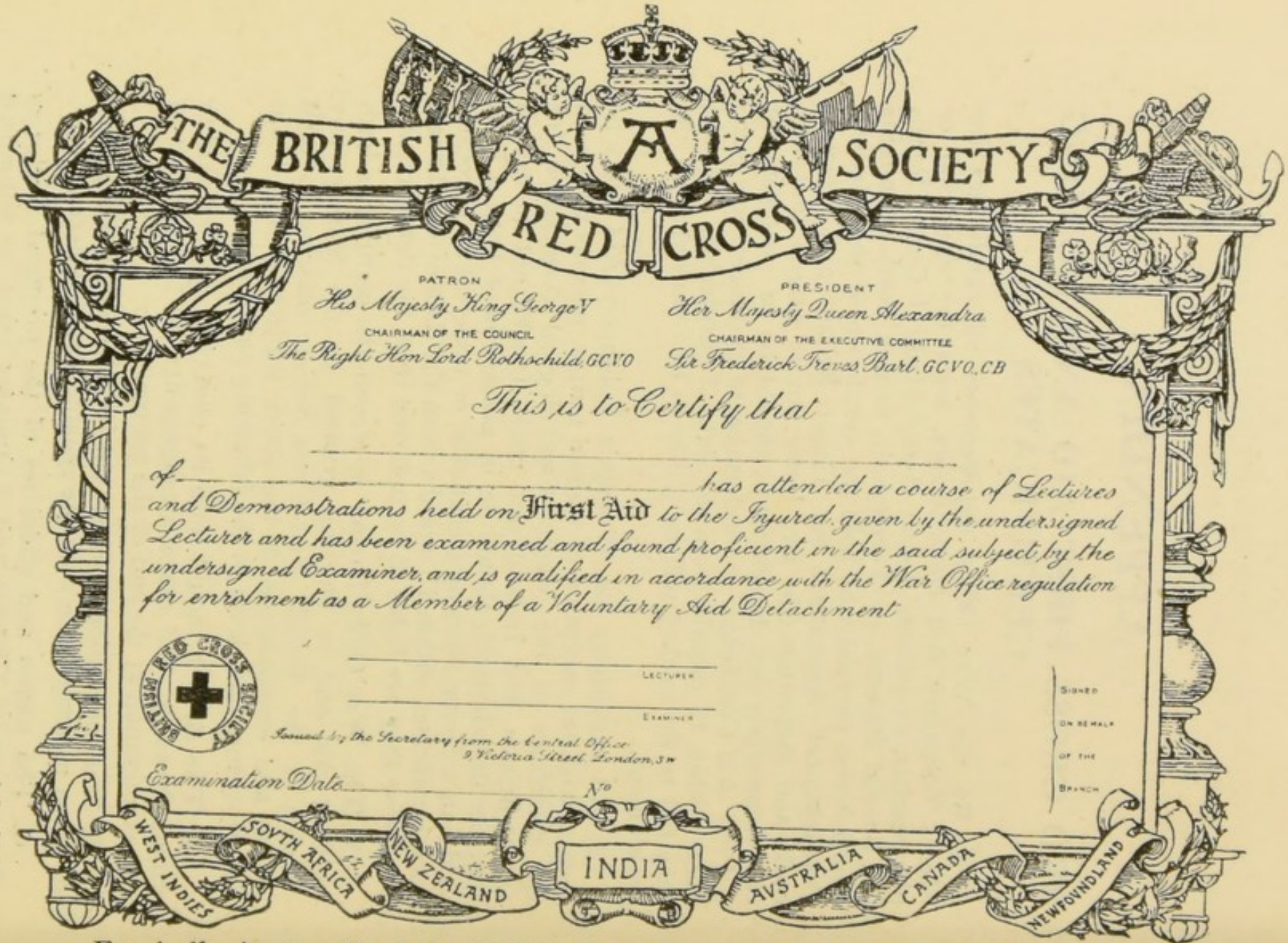
2. All candidates for Women's Voluntary Aid Detachments, with the exception of trained nurses, persons who hold the certificate of the Medico-Psychological Association for Great Britain and Ireland, and cooks (cooks not to exceed four per detachment), should be in possession of both a First Aid and a Home Nursing Certificate, or undertake to produce such certificates within 12 months from the date of enrolment, otherwise they are liable to be removed from the detachment.

3. The War Office having approved the certificates both in First Aid and in Nursing granted by the Society, any Branch of the British Red Cross Society desiring to hold classes and examinations in the above subjects should adopt the procedure laid down in the following paragraphs.

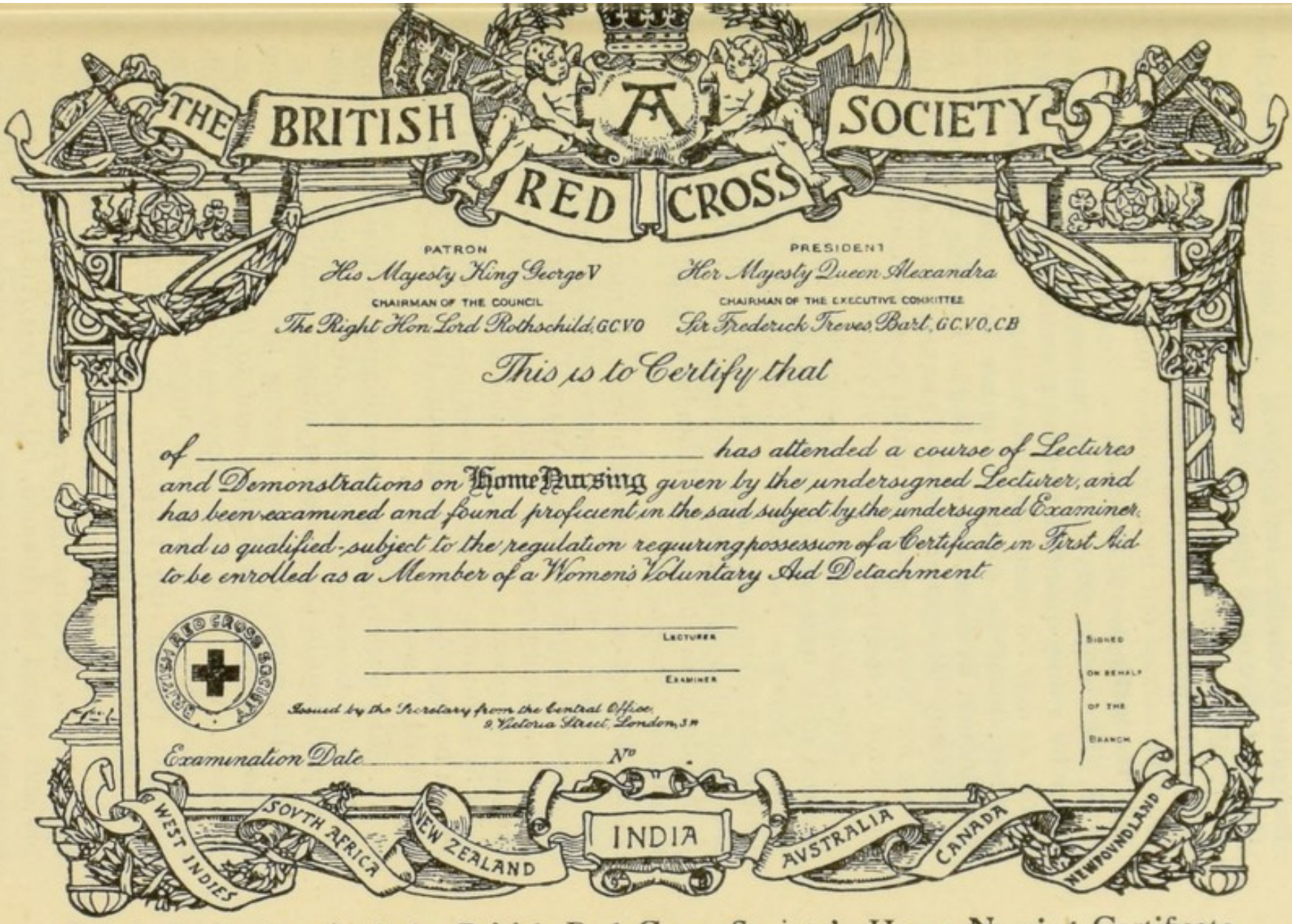
4. The Branch should form its own class in First Aid or Home Nursing, and make arrangements for the conduct of the examination at the end of the course.

5. The instruction in First Aid or in Home Nursing must be given in accordance with the syllabus detailed hereunder.

6. The names and addresses of the proposed Lecturers (Instructors of Classes) and Examiners must be submitted through the County Red Cross Branch to the Central



Facsimile (reduced) of the British Red Cross Society's First Aid Certificate.



Facsimile (reduced) of the British Red Cross Society's Home Nursing Certificate.

Executive Committee for approval. A list will be kept at the Central Office of all approved Lecturers and Examiners.

7. The course of instruction in First Aid must be given by a duly qualified medical practitioner, and the examination must be carried out by a qualified medical practitioner other than the instructor of the class.

8. The instruction in Home Nursing must be carried out either by a duly qualified medical practitioner or by a trained nurse, as may be found most convenient. The examination, however, must be conducted either by a qualified medical practitioner, by a matron of a Nurse Training School, or by the County Superintendent of Queen Victoria's Jubilee Institute for Nurses, either of whom must be distinct from the instructor of the class.

9. The Army Council has extended the definition of a matron of a training school as laid down in paragraph 12 of the "Scheme" to mean, "a lady actually employed at the time of the examination as a matron of any hospital, provided she fulfils the requirements necessary for a 'Trained Nurse' as laid down in the second footnote on page 6 of the above-mentioned 'Scheme.'"

10. By the term "trained nurse" is meant a nurse who has completed a three years' course of training in the service of a general hospital having a Nurse Training School attached, and who, having qualified in the examinations of the institution, has received a certificate to this effect.

The minimum number of beds in a general hospital which should be regarded as coming under the term "Nurse Training School" is one hundred.

11. The Society will grant certificates to those who, having attended its courses of instruction, are found on examination to be proficient in the subject or subjects dealt with.

12. The names of those passing the First Aid or Home Nursing Examinations shall be sent to the County Red Cross Secretary, who will then apply to the Secretary, British Red Cross Society, 9, Victoria Street, London, S.W. (using Form D (5) for the purpose), and obtain from him the necessary number of certificates for issue.

13. Should a Red Cross Branch not hold its own classes in First Aid or in Nursing, certificates of proficiency in those subjects should be obtained, (*a*) in First Aid from one of the recognised certificate-granting Bodies approved by the War Office, a list of which may be obtained from the Secretary, 9,

Victoria Street, London, S.W., (*b*) in Home Nursing from some certificate-granting Body under whose direction the examination has been conducted, provided that the requirements above set forth in paragraph 8 have been strictly complied with.

14. It must be clearly understood that certificates in First Aid and Home Nursing granted by the British Red Cross Society are for the **sole purpose** of entitling the holders to enrolment in a Voluntary Aid Detachment.

The certificates will be issued in the form of a document (in size about 12¼ in. by 9¾ in.). A facsimile of the First Aid and Nursing certificates will be seen at pages 188 and 189.

RIBBON AND BAR

15. The Society will grant a Ribbon Bar and Pendant as a recognition of Special **proficiency in Red Cross Work** under the following conditions :—

16. The Ribbon Bar and Pendant shall be granted for (i) three successes at **Red Cross First Aid** examinations, provided that an interval of at least twelve months has elapsed between each examination, and subject to the alternative contained in paragraph 18, or (ii) a success at both a **Red Cross First Aid** examination and a **Red Cross Nursing** examination, subject to a third success at a further examination in First Aid or in Nursing held by the Red Cross Society and taken at a period of not less than twelve months from the date of the previous examination. As an alternative the provision contained in paragraph 18 may be adopted.

17. Additional Bars shall be granted for each further success at a **Red Cross First Aid** or a **Red Cross Nursing** examination, provided not less than twelve months shall have elapsed between each of such examinations.

18. Members of Red Cross Detachments already holding valid certificates, acquired otherwise than from the Society, in **First Aid** and in **Nursing**, shall be allowed to count one such First Aid certificate and one such Nursing certificate towards a Ribbon Bar and Pendant; the necessary additional certificate or certificates must be obtained after instruction and examination held by the Red Cross Society.

19. The Ribbon shall be white, attached to a gold-gilt enamelled red and white bar and pendant similar in design and colour to the Society's Badge. The Bar shall contain the words "**Proficiency in Red Cross Work.**"

RED CROSS RIBBON AND BAR

Granted for further successes at Red Cross Examinations (p. 191)

Full-size design without additional bar

Full-size design with additional bar

20. Additional Bars granted under paragraph 17 shall bear the year in figures.

21. Ribbons Bars and Pendants shall be issued through the County Branches on the names of those entitled to receive them being added to Form D (5) with particulars of the examination successes.

22. The prices at which Ribbons Bars and Pendants complete, as detailed in paragraph 19, will be issued are as follows :—

Metal gilt	1/6 each
Silver	4/– ,,
Gold, 9-carat	24/6 ,,
Gold, 15-carat	36/6 ,,
Gold, 18-carat	41/6 ,

ADDITIONAL BARS BEARING THE YEAR IN FIGURES

Metal gilt	–/9 each
Silver	1/6 ,,
Gold, 9-carat	4/– ,,
Gold, 15-carat	6/6 ,,
Gold, 18-carat	8/– ,,

23. The **Society's Textbooks** should be used in connection with the subjoined courses, viz.: "First Aid Manual," No. 1, by Colonel James Cantlie, M.A., M.B., F.R.C.S., price 1/–, post free 1/2, and "Nursing Manual," No. 2, by Colonel James Cantlie, M.A., M.B., F.R.C.S., price 1/–, post free 1/2, and may be obtained of the Society.

24. SYLLABUS OF LECTURES ON RED CROSS FIRST AID

Lecture 1

Regions of body.—Head and neck, chest, abdomen, and limbs.

Skeleton.—Bones: composition and general description.

Joints.—How formed, varieties.

Muscular System.—Voluntary and involuntary muscles.

Digestive System.—Position and functions of organs.

Respiratory System.—Position and functions of lungs.

Lymphatics or Absorbents.—Bearing on blood poisoning.

Excretory Organs.—The part played by the intestines, lungs, kidneys, and skin.

Wounds and Bruises.—First Aid treatment of same.

Practical training in the use of the triangular and roller bandages.

The forming of hand seats.

Lecture 2

Sprains—their treatment. Dislocations—description and treatment. Fractures—how caused, varieties, diagnosis from dislocations, dangers of unskilled help. First Aid treatment of fractures—treatment to be confined to immediate relief. Gunshot injuries. Improvising splints.

Practical training in the use of the triangular and roller bandages.

The fireman's lift.

Lecture 3

General description of circulation of blood and mechanism by which it is carried on. The heart. The pulse. External hæmorrhage—difference between arterial, venous and capillary, and general treatment of hæmorrhage. Arrest of hæmorrhage from (1) the armpit; (2) the forearm and hand; (3) the thigh; (4) the ham; (5) the leg; (6) the foot; (7) the head and neck. First Aid in (1) bleeding from the nose; (2) spitting of blood; (3) vomiting blood. Internal hæmorrhage—arrest of hæmorrhage from ruptured varicose vein, and socket of (extracted) tooth.

Practical training in the use of the triangular and roller bandages.

Description of stretchers.

Lecture 4

Respiration—objects and mechanism. Suffocation or Asphyxia—causes and effects; immediate First Aid treatment in cases of: (1) apparently drowned; (2) suffocation by (*a*) hanging, (*b*) poisonous gases or smoke, (*c*) choking, (*d*) scalds and stings of mouth or throat. Sylvester's, Schäfer's, Howard's, Laborde's methods of artificial respiration. A short account of the nervous system; common affections of nervous system and their relief; concussion and compression of brain, apoplexy, epilepsy, bites from animals; sunstroke; shock or collapse.

Practical training in the use of the triangular and roller bandages.

Stretcher practice.

LECTURE 5

Treatment of burns and scalds, frost-bite, burns by electricity and First Aid in electric shock. Treatment of foreign bodies in the throat, ear, stomach, nose and eye. What to do when the dress catches fire. The management of clothes in street accidents. General treatment of cases of poisoning. Preparation of the bed and bedroom in case of accidents.

Practical training in the use of the triangular and roller bandages.

Stretcher practice and improvisation of stretchers.

25. SYLLABUS OF LECTURES ON RED CROSS NURSING

LECTURE 1

Accommodation for sick persons. Ward, room or tent. Sunlight and aspect. Space required. Estimation of cubic air capacity. Ventilation—Bird, Louvre and Tobin methods. Evils of insufficient ventilation. Emptying, dusting, and washing room. Heating and management of fire. Position of bed. Bedding, blankets, &c. Practical training in the use of the roller bandage.

LECTURE 2

Infectious cases. How infection is spread. Value of isolation. General course of infectious fevers. Stages through which they pass. Quarantine. Management and nursing of typhoid fever. Care in convalescence. Disinfection of patient, clothes, and room, according as room is occupied or unoccupied. General observations on nursing in the open, in temporary shelters, in ambulance trains. Practical training in the use of the roller bandage.

LECTURE 3

Taking pulse, respirations and temperature. Clinical thermometers and charts. Filling in charts. Meaning of variations in temperature. Making beds. Changing sheets. Draw sheet. Fracture bed. Warming beds. Bed-rests and cradles—means of improvising. Practical instructions in bed-making, changing sheets, &c. Practical training in the use of the roller bandage.

Lecture 4

The nurse—dress, duties, and rest. Changing patient's night-dress. Washing and sponging patients. Feeding patients—exact details of amounts, kind, and times of feeding to be followed. How different kinds of food are to be given. Feeding-cups. Utensils and their cleanliness. Digestion of food in mouth, stomach, and intestine. Absorption and excretion. Practical training in the use of the roller bandage.

Lecture 5

Administration of medicines. Medicine glasses. How to give pills, powders, oil, etc. Administration of enemata. Application of hot fomentations, poultices, blisters, and leeches. Baths — cold, tepid, warm, and hot—and their effects. Stimulants. Practical training in the use of the roller bandage.

Lecture 6

Keeping record of patient as to sleep, rest, coughing, vomiting, delirium, action of skin, amount and character of excretions. Dressing wounds. Bed-sores.

Practical details of making beef tea, chicken tea, raw meat juice, and suitable drinks. Convalescence. Practical training in the use of the roller bandage.

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26. Lecturers are reminded that each lesson is to be made as practical and as elementary as possible, and that a non-technical graphic treatment of the subject is essential.

27. In instructing these classes the object must be to show how things that are ready to hand may be utilised in any emergency. The pupils should be taught to adapt their methods to their surroundings, to utilise domestic appliances, and to make the best of what lies to hand.

28. Candidates for Red Cross examinations should not be under 17 years of age.

29. The following instructional equipment is suitable for use in connection with the Red Cross First Aid and Nursing courses respectively, and can be obtained from the Society at the prices hereunder quoted. A remittance should in all cases accompany the order.

30. RED CROSS FIRST AID INSTRUCTIONAL EQUIPMENT

All the following equipment is of British manufacture :—

		PRICE. £	s.	d.
1. Stretcher, British Red Cross (closing) pattern, as follows :—	each	1	5	0
Length { Ash poles ... 7 ft. 9 in. / Brown canvas ... 6 ,, — ,,				
Width, total... ... ... 1 ,, 11 ,,				
Height ... ... — ,, 6 ,,				
2 Folding ironwork traverses.				
4 Ironwork loop legs.				
Slings for stretcher, webbing... ...pair		0	4	0
Two rope handles fitted to middle of stretcher for two extra bearers ...pair		0	1	6
Two iron handles fitted to middle of stretcher for two extra bearers ...pair		0	1	0
2. Large set of 6 (mounted on linen and rollers) Diagrams on First Aid as adopted by the Admiralty and War Office :— Human Skeleton—Bones and joints ... ... Heart and circulation of the blood ... ... Hæmorrhage — Digital compression of arteries ... ... Hæmorrhage and wounds—Compression of arteries by tourniquets, forced flexion, &c. ... ... Dislocations and fractures ... Fractures—Treatment of ...	Per set	0	18	6
3. Bandages, Triangular (per doz. 3/-)	each	0	0	3½
do. do. illustrated (per doz. 4/-)	each	0	0	4½
4. Do. Roller, 2½ in. (per doz. 2/-)	each	0	0	2½
5. Splint, Liston's Thigh, not jointed, 48 in. ... ...each		0	1	3

		PRICE. £	s.	d.
6. Splints (common), suitable for— (*a*) Arm (*b*) Forearm (*c*) Small Thigh (*d*) Finger ... (*e*) Large Thigh (*f*) Leg... ...	Per set	0	3	0
7. Bandage Winder (Tunstall's)	...each	0	2	0
8. Tow for padding splints ...	per lb.	0	0	4
9. First Field Dressing, latest authorised Army Pattern (Nov. 1911) ...	...each	0	0	8½
10. Field Tourniquet, Army Pattern consisting of a strong web with buckle and cork pad...	...each	0	1	0
11. Red Cross First Aid Manual, by Colonel James Cantlie, M.A., M.B., F.R.C.S., the official Textbook for the Red Cross First Aid Course Price 1/- ; post free		0	1	2

Goods, except Manuals, over 5/- in value will be forwarded carriage paid.

31. RED CROSS NURSING INSTRUCTIONAL EQUIPMENT

All the following equipment is of British manufacture :—		PRICE. £	s.	d.
1. Bandages, Roller (per doz. 2/-)	...each	0	0	2½
2. Bandage Winder (Tunstall's)...	...each	0	2	0
3. Fluid Measure Glass, graduated in minims, drachms, and ounces	...each	0	0	10
4. Clinical Thermometer, lens front	...each	0	1	0
5. Sick-room Thermometer ...	...each	0	0	9
6. Bath Thermometer	...each	0	0	7
7. Temperature (Sick-room) Charts	per doz.	0	0	3
8. Plain Gauze for poultices (6 yds., 8d.)	per yd.	0	0	1½
9. Red Cross Nursing Manual, by Colonel James Cantlie, M.A., M.B., F.R.C.S., the official Textbook for the Red Cross Nursing Course Price 1/- : post free		0	1	2

Goods, except Manuals, over 5/- in value will be forwarded carriage paid.

32. Sets of instructional equipment suitable for use at each course of lectures may be hired of the Society at a charge, including carriage, as follows :—

33. HIRE OF RED CROSS FIRST AID INSTRUCTIONAL EQUIPMENT

1. The equipment enumerated in the following list can be obtained from the Society on hire (eight weeks) (carriage paid) for a single course of lectures at a charge of 21/3; or
2. The same equipment, without stretcher, can be hired for a similar period (carriage paid) at a charge of 15/3; or
3. The set of six large First Aid diagrams for the lecturer's use at a single course (eight weeks) may be hired (carriage paid) for an inclusive charge of 5/-.

(*a*) Stretcher, Red Cross (closing) Pattern.

(*b*) Large set of 6 (mounted on linen and rollers) Diagrams on First Aid as adopted by the Admiralty and War Office :—

- Human Skeleton—Bones and joints.
- Heart and circulation of the blood.
- Hæmorrhage—Digital compression of arteries.
- Hæmorrhage and Wounds—Compression of arteries by tourniquets, forced flexion, &c.
- Dislocations and fractures.
- Fracture—Treatment of.

(*c*) 1 Bandage Winder.

(*d*) 1 Liston's Thigh Splint.

(*e*) 1 Set Common Splints, suitable for—

(*a*) Arm. (*d*) Finger.
(*b*) Forearm. (*e*) Large Thigh.
(*c*) Small Thigh. (*f*) Leg.

(*f*) Field Tourniquet, Army Pattern, consisting of a strong web with buckle and cork pad.

Together with the following articles, which may be retained :—

(*g*) 12 Triangular Bandages.

(*h*) 12 Roller Bandages, 2½ in.

(*i*) 1 lb. of Tow for padding splints.
(*j*) First Field Dressing, latest authorised Army Pattern (Nov. 1911).

34. HIRE OF RED CROSS NURSING INSTRUCTIONAL EQUIPMENT

The equipment enumerated in the following list can be obtained from the Society on hire, carriage paid, for a single course of lectures (eight weeks) at a charge of 6/6.

(*a*) 1 Bandage Winder.
(*b*) 1 Fluid Glass Measure, graduated in minims, drachms, and ounces.
(*c*) 1 Clinical Thermometer, lens front.
(*d*) 1 Sick-room Thermometer.
(*e*) 1 Bath Thermometer.

Together with the following articles, which may be retained :—

(*f*) 12 Roller Bandages, 2½ in.
(*g*) Temperature (Sick-room) Charts.
(*h*) Plain Gauze for poultices.

35. *It is important to note that equipment must be returned from hire (carriage paid) complete and undamaged, with the exception of those articles which may be retained. A charge will be made for any article soiled or returned damaged.*

36. A detailed price list of Red Cross appliances, which may be obtained from the Society, can be had on application to the Secretary, 9, Victoria Street, London, W.

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