Hints and helps for home nursing and hygiene : a handbook for all who have to do with sickness arrange acording to the syllabus of the second (or nursing) course of lectures / by E. MacDowel Cosgrave.


THE ST JOHN AMBULANCE ASSOCIATION

St. John Ambulance Association.

HINTS AND HELPS

FOR

HOME NURSING AND HYGIENE

A HANDBOOK FOR ALL WHO HAVE TO DO WITH SICKNESS; ARRANGED ACCORDING TO THE SYLLABUS OF THE SECOND (OR NURSING) COURSE OF LECTURES.

BY

E. MacDOWEL COSGRAVE, M.D., CH.M., F.R.C.P.I.,

HONORARY LIFE MEMBER OF, AND LECTURER AND EXAMINER TO, THE ASSOCIATION.

WITH A CHAPTER ON THE APPLICATION OF THE ROLLER BANDAGE, BY R. J. COLLIE, M.D., HONORARY LIFE MEMBER OF, AND LECTURER AND EXAMINER TO, THE ASSOCIATION.

(REVISED BY A COMMITTEE OF THE ASSOCIATION, 1908.)

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LECTURE II.

INFECTION AND DISINFECTION.—Infectious and Non-Infectious Cases—Quarantine of Patient—History of a Fever Case—Disinfecting and Disinfectants—The Roller Bandage and its Application.

LECTURE III.

DETAILS OF NURSING.—The Nurse—Regulation of Visitors—Management of Nurse's own Health—Washing and Dressing Patients—Bed-making—Changing Sheets—Lifting Helpless Patients—Sick Diet—Administration of Food, Medicines, and Stimulants—The Roller Bandage and its Application.

LECTURE IV.

DETAILS OF NURSING (*continuea*).—Observation of the Sick—Rigors—Sleep—Pain—Posture—Skin—Appetite—Vomiting—Cough—Expectoration—Effects of Remedies, &c.—TakingTemperature—Baths—Bed-sores—Delirium—Nursing Sick Children—What to Prepare for Physician's and Surgeon's Visits—The Roller Bandage and its Application.

LECTURE V.

APPLICATION OF LOCAL REMEDIES.—Poultices—Fomentations—Blisters—Ointments—Leeches—Padding Splints—Bandaging—Personal and Family Hygiene—Management of Convalescents.

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NOTE.

The Home Nursing course can be commenced by the successful candidates in the First Aid course as soon as the result of the examination is published, and those pupils who pass the Home Nursing examination at the end can count the same as equivalent to the FIRST RE-EXAMINATION towards the Medallion.

Similarly when the Home Nursing Course is taken first the First Aid course can be commenced by the successful candidates as soon as the result of the Home Nursing examination is published, and those pupils who have passed *both* examinations can count the First Aid one as the FIRST RE-EXAMINATION towards the Medallion.

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In all cases the third examination for the Medallion must be on First Aid, and subsequent re-examinations for the Label must also be on that subject, on the conditions named in paragraph 4 of Paper 62.

Home Nursing Classes for men (only) can be arranged in the same manner as for women, this Syllabus being used by the lecturer.

MIXED CLASSES OF MEN AND WOMEN ARE ON NO ACCOUNT PERMITTED.

No Lecturer may examine his own class for Certificates.

N.B.—A CANDIDATE FOR EXAMINATION MUST HAVE ATTENDED AT LEAST FOUR OUT OF THE FIVE LECTURES.

A modified Syllabus for "Junior Classes" has been authorised. Copies can be obtained from the Chief Secretary. Reference "No. $\frac{40}{1900}$."

Full particulars as to the work of the Association can be obtained from

ST. JOHN'S GATE, CLERKENWELL, LONDON, E.C.

LECTURERS instructing a HOME NURSING CLASS, and Local Secretaries, can obtain further particulars on application to the Chief Secretary, for "Paper Reference No. 80."

The following may be obtained on hire for a Nursing Class for a fee of two shillings and sixpence: One Clinical Thermometer, One Invalid Feeding Cup, and One Bandage-winder. Roller bandages cannot be lent on hire.

To

COLONEL FRANCIS DUNCAN, C.B., M.P., R.A.,

M.A., D.C.L., LL.D.,

WHO FIRST LED THE AUTHOR

TO ENGAGE IN AMBULANCE WORK,

THIS BOOK

IS GRATEFULLY DEDICATED.

PREFACE.

THIS book is written in the hope that it may be of assistance to all who have to nurse the sick.

The arrangement is in conformity with the Syllabus of the Home Nursing Lectures of the St. John Ambulance Association.

Although arranged in this form, it is more than a book of lectures, as the subjects are dealt with in fuller detail than could be done by a lecturer in a short course.

It is felt that what the members of ambulance classes should have in their hands is, not a book of lectures to compare with those they are listening to, but a book of reference, where they can find out what they have forgotten, and get further particulars when desired.

To the St. John Ambulance Association this book is given in the hope that it may do even a very little to further the noble work it is carrying on so successfully.

Pro Utilitate Hominum.

E. MACD. C.

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HOME NURSING TEXT-BOOK.

CHAPTER I.

THE FUNCTIONS OF THE LIVING BODY.

WHY THIS CHAPTER IS WRITTEN.

In the first course of lectures in connection with the Ambulance department of the Order of St. John of Jerusalem, those on "First Aid to the Injured," a general sketch of the structure and functions of the human body is given. These details are supposed to serve as a sufficient introduction to this course on Home Nursing and Hygiene.

However, such a wide subject can be dealt with only cursorily as part of a short course of lectures, and facts so new to many, and of such varied import, can hardly be remembered from a single hearing. Also "Nursing" is something more than "First Aid." A nurse's duty often begins before the doctor's arrival, and after his departure its interest grows and its value increases. For these reasons the first chapter will be devoted to a sketch of those points in the living subject with which every nurse should be familiar if she wishes to understand as well as to obey, and if she is anxious to make herself smart, capable, and trustworthy.

The points include: the *Circulation* of the blood; *Breathing*, and how the oxygen of the air enters into

the blood; *Digestion,* and how the digested food passes into the blood; *Oxidation,* or how the air and food burn together, giving heat and power; *How the heat of the body is regulated;* and how the *Nervous system controls all these processes.*

First, it must be understood that through all the tissues of the body there is a network of the smallest pipes or vessels that can be thought of. They are much finer than the finest hair, and they are called *capillaries* (*capillus,* a hair). They are invisible to the naked eye, and their walls are so thin that the fluid parts of the blood and the white corpuscles can escape through them. They are so numerous that the body may almost be said to be full of them. Muscle, bone, lungs, heart, &c., are a close net-work of them; they are like the system of small irrigation canals which renders a dry tract of land fertile. They are *pipes,* however—not open canals—and when the blood is passing through them it allows that which each tissue needs to soak out to nourish it. The nourishing part of the blood which has thus soaked into the tissues came originally from the food which the man ate, and this nutriment undergoes a slow and quiet "burning up," as do the tissues themselves, and the fluid ash which results from this burning soaks back into the capillaries, and is slowly but surely carried away by the returning gentle stream in the irrigation canals.

CIRCULATION OF THE BLOOD.

The blood is changed in character where the vessels have such thin walls that fluid can pass through them —that is, in capillaries.

The blood reaches the capillaries by being pumped to them in closed tubes called arteries, and the force which sends it along is a hollow muscle, the *heart*. The arteries divide and subdivide as they travel along, and so grow smaller and smaller, until by the time they reach the capillaries they are scarcely visible to the naked eye. The impure blood which drains away from the tissues by the slow capillaries, flows on into larger, sewerlike vessels called *veins*, which take the blood back to the heart. Thus the blood leaves the heart by the arteries to flow through the capillaries and to return by the veins. It passes in a sort of circle, and the making of the whole journey is spoken of as "circulation of the blood." The blood is much changed in its course; it leaves the heart bright red and clean, and comes back to it darkened in colour and loaded with impurities which it has brought from the tissues.

It would serve no purpose if when the impure blood had come back by the veins the heart should at once pump it round again. Before it can be sent on its round again to nourish the tissues it must be purified by being passed through the lungs. As it passes through the thin-walled capillaries of the lungs the oxygen gas of the inspired air makes it pure and active once more, and it hurries back to the heart bright and clear and ready to make a fresh start.

Thus, after *leaving the heart*, the blood passes through three kinds of vessels, *arteries*, *capillaries*, and *veins*. There are, therefore, two kinds of circulation for the blood: the *greater circulation*, which is of pure blood passing through the arteries and capillaries and returning impure by the veins, and the *lesser circulation* of im-

pure blood leaving by other arteries which take it to the lungs, so that it may be purified and return to the heart fresh and pure by another set of veins.

The *heart*. We said just now that the heart was a hollow muscle, but if it were merely a muscle hollowed out into a single chamber it could not manage to drive the pure blood to the thirsty tissues and at the same time pump the impure blood through the freshening net-work of the lungs.

It would be better, therefore, to say that the heart is a couple of hollow muscles packed side by side and laced together. They might be called the *left heart* and the *right heart*, but as they are so close together and seemingly parts of the one organ, they are spoken of as the left side of the heart and the right side.

The work which the left side has to do is much the harder; it has to pump the blood through the thirsty tissues as far off, for instance, as the crown of the head and the soles of the feet, and through all the tissues which lie between them, whereas the right side has only to pump the impure blood through the lungs, which are very roomy and close handy. It is like comparing the work of the blacksmith with that of the tailor. The left side of the heart having so much more work to do is ever so much thicker and stronger than the right side.

Roughly, the heart is about the size and shape of the clenched fist. It is placed in the chest, behind the left breast, where it is protected from violence by the springy ribs and the breast-bone.

In the *greater circulation* the blood leaves the heart by the large main artery, the *aorta*. This gives off

smaller trunks which again divide and sub-divide, until they finally branch into capillaries throughout the entire body, even including the substance of the lungs which could not be nourished by the impure blood from the right side of the heart. These capillaries join, branch off, and communicate, forming a regular net-work, finally running together and forming small veins, which soon unite to form large veins, these again uniting until at length two main veins are formed, which open into the right side of the heart, one collecting the blood from the upper, and the other from the lower part of the body.

Each side of the heart is divided into two chambers, or cavities; the upper ones are called *auricles*, and the lower ones *ventricles*.

The walls of the auricles are thin, but the walls of the ventricles are thick and strong. The auricles do little more than collect the blood, whilst the ventricles have to force the blood onward. The right ventricle has only to pump the blood through the lungs, but the left ventricle has to force it through the entire body.

If the heart were merely a hollow organ, alternately contracting and expanding, the blood would be alternately driven from and drawn to the heart, and there would be no circulation. The circulation depends in a great measure upon certain structures called *valves*, which allow the blood to move only in one direction.

There are four of these valves, two on each side of the heart, one being placed between each auricle and ventricle, and the other between each ventricle and the main artery leaving it. These valves are folds of membrane attached to the walls of the heart and

of the great blood vessels where they leave the heart. They are pushed back against the walls when the blood is flowing in the right direction, whilst if it tries to move in the wrong direction it gets behind the valves, thrusting them out so that they meet in the middle and so stop the backward flow of the blood.

The heart contracts some 60 to 80 times a minute, forcing the blood into the arteries and causing that little throb known as the pulse. First, the auricles contract, driving the blood into the ventricles, then the ventricles contract, driving the blood into the arteries, then there is a pause, during which the auricles are filled by the blood poured in from the veins. When the auricles contract, the valves open, letting the blood into the ventricles (the pressure of the blood in the veins prevents the blood going back that way). Then, when the ventricles contract, those large valves close, preventing the blood returning to the auricles, and the small valves are thrust open by the blood passing out into the main arteries. As soon as the ventricles cease contracting, these small valves are closed by the pressure of the blood in the arteries, for the walls of the arteries are elastic. And as the blood cannot leak back into the ventricle the elastic walls of the arteries squeeze it onwards to the tissues. The ventricles remain closed and empty until the auricles contract and fill them.

The course of blood, then, is as follows:—It passes to be purified and enriched from the *right auricle* to the *right ventricle*, from that into the main *artery*, which conveys it to the lungs; this artery is called the *pulmonary* artery, because it goes to the

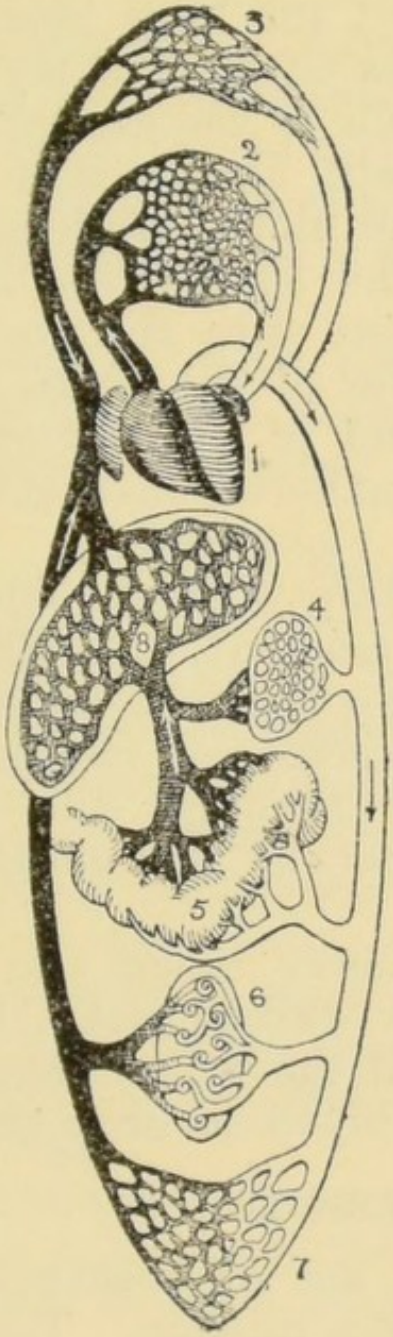


FIG. 1. DIAGRAM OF THE CIRCULATION.

1. Heart. 2. Lungs. 3. Head and Upper Extremities. 4. Spleen. 5. Intestine. 6. Kidney. 7. Lower Extremities. 8. Liver.

lungs, the Latin word for lung being *pulmo*. In the lungs the blood passes through a myriad of *capillaries running round the walls of the air cells*. It then passes into *veins*, which join finally into four *pulmonary veins*, which bring the blood, fresh and pure, into the *left auricle*. From the *left auricle* it passes into the *left ventricle*, from that into the *aorta*, thence to the arteries and capillaries of the head, trunk, limbs, tissues of the lungs and of all the other parts of the body, being finally gathered into the two large *veins* which open into the *right auricle*.

The two auricles empty their blood into the ventricles at the same moment, and the two ventricles pump it into the two main arteries directly afterwards; the two ventricles also contract together, and thus the circulation through the lungs and that through the body generally are going on at the same time.

The heart beats slower when the person is lying down, and still slower during sleep, because the muscles, the brain, and all the other tissues being at rest, do not need so much blood to keep them in repair.

RESPIRATION.

Respiration, or the act of breathing, is performed about seventeen times a minute. The entire act consists in air being drawn into the lungs (*inspiration*), air being given out (*expiration*), and a very slight pause between these two acts.

The object of respiration is to bring the oxygen of fresh air into contact with the blood as it passes through the capillaries of the lungs.

When the air is inspired it passes through the mouth or nostrils into the back of the mouth (pharynx); here it passes through a narrow chink between the vocal cords which are enclosed in the larynx (Adam's Apple). It then goes down through the windpipe, which finally splits into two smaller tubes, one of which goes to either lung.

As soon as these tubes reach the lungs they divide and sub-divide until they form thousands of little tubes, each of which ends in a dilated bladder-shaped extremity, or *air-cell*.

These air-cells have very fine walls, which are covered by a close network of capillaries, into which the dark, impure blood is quietly flowing. The walls of the air-cells are very thin, and the walls of the capillaries being thinner still, it is quite easy for the oxygen gas of the air to pass into the blood, to purify and brighten it, and for the unwholesome material of the blood to find its way out of the capillaries and into the air-cell, and thence to be breathed out and got rid of. As a result of this changing the blood hurries back to the left auricle bright and pure, whilst the air is expired loaded with impurities.

Thus, a change takes place in air when it is breathed. When many people have been for a short time in a small room, the air becomes close, unpleasant, and poisonous, and if some of that air were shaken up with fresh lime-water, the water would become cloudy. If a person breathed through a glass tube into lime-water the same thing would occur. But if fresh air were passed through lime-water, the water would remain clear and unaltered.

The appearance of this cloudiness shows the presence of carbonic acid gas. It is the gas that makes mineral waters effervesce, and is a poison that acts injuriously when breathed, but not when swallowed. If the air that is inspired is pure, and the air that is expired is impure, it is manifest—since the change occurs in the body—that the impurity must be given off from the body. It is the venous blood which gives off the carbonic acid gas; it brought it to the lungs as a waste-product from the tissues.

The blood in the lungs is separated from the air by the thin walls of the capillaries and by the thin walls of the air-cells, and it is necessary to refer to a natural law to explain how the carbonic acid gas escapes from the blood to the interior of the air-cells. This law is called the law of *diffusion of gases*. When two gases are separated by a moist membrane they will gradually pass through the membrane and mix, the lighter gas passing through the more rapidly. It is this that prevents balloons staying up an unlimited time, even when the silk is varnished and waterproof. The light gas escapes from them rapidly, the heavy atmosphere air slowly taking its place.

The walls of the capillaries being formed of thin membrane, and kept moist by the blood, the gases of the blood easily change places with the air in the cells of the lung.

Atmospheric air is composed of four parts of nitrogen to one of oxygen gas. The oxygen is the useful active principle; the nitrogen merely acts by diluting it.

The *blood is formed* of a clear, nearly colourless, fluid, containing certain *white* particles or *corpuscles*, and myriads of *red corpuscles*. It is the latter that give blood its red colour. These red corpuscles always contain some oxygen; when they contain a great deal they are of a bright red colour, but when they contain only a little they become darker. They are red in the arteries, and purple in the veins. The change from red to purple takes place all through the body in the capillaries. The change from purple to red takes place in the capillaries round the air-cells of the lungs.

The *carbonic acid gas* leaves the venous blood as it passes through the capillaries in the lungs, and enters the air-cells; the *oxygen* of the air at the same time leaves the air-cells and enters into the red corpuscles.

As will be seen later, the *oxygen* gas which the red corpuscles took up in their course through the capillaries of the lungs leaves them as they pass through the capillaries of the other parts of the body, for it is required for the nourishment of the tissues. On the other hand, the carbonic acid gas, which is a waste-product from the tissues, enters the blood, and is carried to the lungs to be got rid of there.

The carbonic acid gas is not got rid of the instant that it escapes into the air-cells. The lungs contain a good deal of air, and only part is changed at each inspiration. If all of it were emptied out at each expiration, the gas could not pass out from the blood until the lungs were filled at the next inspiration; but as the lungs are only partly emptied, even at the deepest expiration, the gases are able to enter and leave the blood all the time.

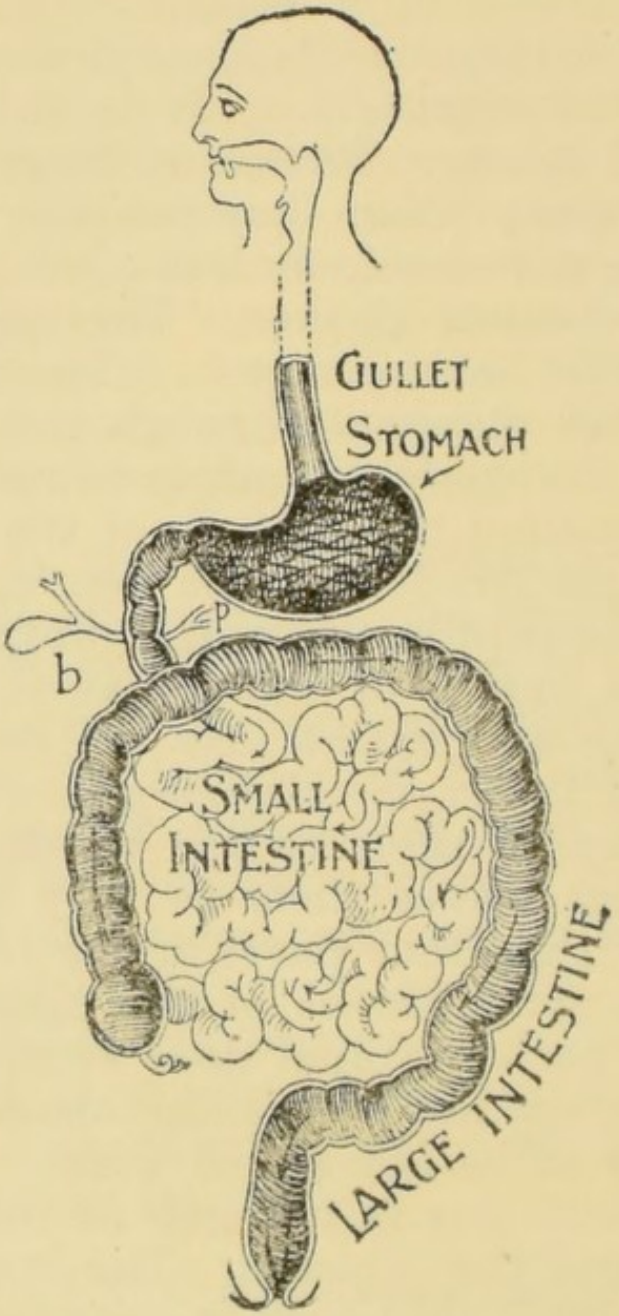


FIG. 2. ALIMENTARY CANAL.

b. Duct bringing Bile from the Liver. *p*. Duct bringing fluid from the Pancreas.

It is by means of the diffusion of gases before mentioned that the fresh air reaches the air-cells, and the foul gas in the air-cells escapes, to be discharged with expiration. Each breath taken draws fresh air some distance down the windpipe; here it meets the carbonic acid, and changes places with it. The oxygen thus gradually diffuses its way down to the air-cells, and the carbonic acid gradually works its way out.

The chest generally contains about 200 cubic inches of air; only 20 to 30 are breathed in or out in ordinary respiration, and this, because of its ebb and flow, is called tidal air.

A double process thus goes on in the lungs. The air is taken in with plenty of fresh oxygen in it, and is discharged foul with carbonic acid: the blood reaches the lungs laden with carbonic acid, and leaves it with a cargo of pure health-giving oxygen.

DIGESTION.

The two great ends achieved by digestion are, that it renders food soluble, and that it makes it capable of being absorbed into the blood-vessels. It is easy to imagine a gas passing through the wall of a capillary, but it is not so easy to think of fluid food soaking its way through living tissues, the wall of the stomach, for instance, and so into the blood. Fluid food does so pass, however, and the process by which it passes is called *osmosis* ("forcing a passage").

Osmosis is to fluids what "diffusion" is to gases (p. 24). If two ordinary fluids are separated by a moist membrane, they will gradually pass through the membrane and mix. The rate at which they will pass

depends upon their density. The less the density of a fluid (*i.e.*, the lighter it is) the more rapidly it will pass. Thus, if a bladder of water were placed in a vessel containing salt and water, the bladder would become gradually emptied, owing to the water passing out quicker than the salt and water could pass in.

There are some fluids, however, which cannot undergo osmosis; watery mixtures of meat and starch are examples of this. In the process of digestion, certain foods are simply dissolved, whilst others need to be entirely changed in character before they can be absorbed.

Working under the influence of the heat of the body, the chief *agents of digestion* are the *fluids which are secreted by various organs.*

These fluids are, the *saliva,* formed by glands in the neighbourhood of the mouth; the *gastric juice,* which is abundantly poured out into the stomach; the *bile,* which comes from the liver; and *pancreatic juice,* which comes from the pancreas or sweetbread, and the *intestinal juice,* which is poured into the whole length of the bowel from the membrane which lines it. Each of these fluids has its own work to do, and is not able to act equally on every article of diet.

Foods are of five classes. (1) *Lean meat,* which contains a large proportion of *nitrogen,* besides *carbon, hydrogen,* and *oxygen.* Nitrogen also occurs in certain parts of milk and of some vegetables such as oatmeal and lentils. (2) *Fats* contain *no nitrogen;* they are compounds of carbon, hydrogen, and oxygen only. (3) *Starches* also contain only

carbon, *hydrogen*, and *oxygen*. They have less hydrogen than fats, and do not give off so much heat in the body, as all their hydrogen is already joined with oxygen in the form of water, and so is not available for "burning" in the body with the oxygen taken in by the lungs. (4) *Sugars*, which are similar in composition to starches. (5) *Salts*, several of which enter into our food, either combined with it or, as common table-salt *(chloride of sodium)*, taken in separately.

In order to understand digestion one must know how the various foods become dissolved, and are rendered capable of undergoing osmosis.

The *salts* may be dealt with first. They are dissolved either in the mouth or in the stomach. They then soak into the capillaries of the stomach by osmosis, much as the oxygen does into the capillaries which wall in the air-cells (p. 25).

The fate of the *sugars* is the same as that of the salts.

The fate of *starch*, *lean meat*, and *fat* has still to be dealt with.

In the *mouth* food is cut up and ground by the teeth, and intimately mixed with the *alkaline saliva*. The *saliva* contains a principle (ptyalin) which has a peculiar action on starchy food, turning it into sugar. This explains the sweet taste which bread gets when it is kept in the mouth longer than usual.

The food, thus minced and moistened, is then swallowed; when it reaches the *stomach* the acid *gastric juice* checks the change into sugar of any starchy material that may be in it, but the sugar already formed out of starch is absorbed into the blood.

The *gastric juice* acts on the lean meat, gradually breaking it up and rendering it soluble—in fact, changing it quite as much as starch is changed when it is turned into sugar.

The *gastric juice* contains a trace of *hydrochloric acid* ("spirits of salts"), and a principle called *pepsin*, which has the power of changing lean meat, white of eggs, &c., into *peptone*, a material which is able to pass through moist membrane by osmosis. Some of this *peptone* is absorbed by the capillaries of the stomach and the rest is taken up by the capillaries in the wall of the intestines.

The only effect the *gastric juice* has on fat is to break it up into very small particles, by dissolving the fibres which hold them together.

When the food is reduced to an evenly fluid mass *(chyme)* by the action of the *gastric juice*, and by the movements of the stomach which churn it up, the muscular fibres closing the outlet of the stomach relax, and the food passes into the intestine.

In the *intestine* it first meets with *bile* (secreted by the liver) and the *pancreatic juice* (secreted by the pancreas or sweetbread). These fluids act chiefly on the fat, breaking it up into minute particles and mixing them with the fluid contents of the intestine.

Milk, if examined under a microscope, is seen to consist of a clear fluid, with numbers of little greasy particles floating in it; the whiteness is due to the light being reflected back by these particles of fat. The intestinal contents, after the action of the *bile* and of the *pancreatic juice*, is in the condition of milk. It is now called *chyle* ("juice").

The food is next acted upon by *intestinal juice*, which, with the help of the pancreatic juice, repeats the effect of the *saliva* and *gastric juice*. As the *chyle* passes through the intestine, any remaining starch is reduced to sugar, and the lean meat and other substances containing nitrogen are converted into *peptone*. All the food that is suited for nourishing the body is now fitted for its task.

ABSORPTION.

As already mentioned, some of the food in solution is absorbed by the capillaries in the lining of the stomach; more is taken up by the capillaries of the intestines, but the chief part is absorbed by a system of vessels called *lymphatics*. The lymphatic vessels are very much like capillaries (p. 16), but they differ from them in that they are connected neither with the arteries nor veins.

The lining of the intestine is like velvet, being thickly covered with minute projections representing the pile. These little projections, or *papillæ* (so called because they are nipple-shaped), contain lymphatic tubes connected with similar tubes at the base.

As the remains of the fluid food pass along the velvet-like membrane of the intestine they are absorbed by the vessels of the papillæ; the peptones and sugars pass into the capillaries, the fat passes into the lymphatic vessel.

When the lymphatics are taking up the finely-divided fatty particles they look as if they were filled with milk, and are then called *lacteals*.

The lymphatics pass out at the bases of the papillæ and run together into a coarse network, and pour their contents into a main lymphatic trunk, which ascends through the chest, or *thorax*. The main lymphatic, called the *thoracic duct*, passes up in front of the spinal column and pours its contents into the junction of two main veins at the root of the neck on the left side. The opening is protected by a valve, so that the blood cannot get down into the duct.

Thus, we have shown how food gets into the system, and how the blood receives the substances necessary for nourishment.

Food, then, is thus digested:—Salts and sugar are dissolved in the mouth or stomach.

Starch is changed into sugar in the mouth and intestines.

Lean meat and other foods which contain nitrogen are turned into peptone in the stomach and intestines.

Fats are broken up so small in the intestines as to turn into a milk-like fluid.

Food is thus absorbed:—Partly by the capillaries in the lining of the stomach and intestines, but chiefly by the lymphatics in the velvety walls of the intestines.

The body receives nourishment through the blood thus:—The venous blood returning to the right side of the heart brings up the dissolved food from the lymphatics and from the capillaries. The blood is then pumped through the lungs, where it receives oxygen from the air, and parts with some of its burden of carbonic acid gas. It then returns purified to the left side

of the heart, and from that is pumped all through the body, bearing the food and oxygen necessary to nourish the body and keep up the temperature.

OXIDATION.

How do the oxygen gas and the food combine so as to nourish the body and keep up the temperature?

In a steam-engine new metal parts are needed to replace those which are worn out. Plenty of fuel is also required. Thus, fresh steel and much coal are necessary to maintain an engine in repair and to keep it going. In the living body the same two ends have to be served, but the materials used cannot be divided into two such distinct classes. The terms "flesh-formers" and "body-warmers" are indeed often applied respectively to the foods with and without nitrogen, but both classes of food act sometimes as flesh-formers, and sometimes as body-warmers. For as the tissues of the body are used up or worn out they are slowly being "burned." All food is therefore capable of giving heat. A little of it may be burned up at once, but even the part that is formed into tissue must be such that when the time comes, it too burns, giving out, it may be, force, but always with the accompaniment of heat.

The process of burning, or combustion, is known in chemistry as *oxidation*. It takes place whenever any element combines *with oxygen*. If the process of oxidation is very slow, it is accomplished quietly, as when iron rusts; but when it takes place rapidly, both light and heat are evolved, as when a fire burns. The coal which is shovelled into the furnace combines with the oxygen of the air to produce heat; the carbon

of our food combines with the inspired oxygen exactly in the same way, but the combining, or *combustion*, takes place all through the body and not only in the lungs, and it takes place so quietly that there is neither flame nor smoke, though heat (animal heat) is evolved.

The body is always changing, and the harder it is worked the greater the change, just as it is with an engine, the harder it is driven the more fuel is consumed in it, the more the machinery wears. The used-up tissue which is got rid of is what has been burned up with the oxygen taken in at the lungs and conveyed through the body by the blood. So that the power and heat of the human body are formed by the burning of tissues—built up out of food—with the oxygen got from the air.

The power given off in the body arises from the burning. Just as the furnace of an engine affects the water in the boiler, causing it to expand into steam and drive the machine, so in the human body, fuel is burned up, muscles contract, and movements result.

The process of burning changes complex materials into simple. Most foods are composed of elements mingled in a complicated manner, but the products which result from their burning are of simple construction. For instance, fats and sugars, which are composed of carbon, hydrogen, and oxygen, break down by burning into carbonic acid gas and watery vapour, which are got rid of by the kidneys, the lungs, and the skin.

Men and other animals are all the while taking in oxygen and giving out carbonic acid, whilst the plants,

under the influence of light, are breathing in this same carbonic acid gas by their leaves, and, retaining the carbon, to store up as wood, giving out the oxygen for man once more to use. Certain animals consume vegetables, and obtain heat and energy by changing the complex vegetable forms into water and carbonic acid gas. Plants grow by taking up water and carbonic acid gas, and, with the aid of the sun, changing them into their own substance, forming them into complex bodies, and thereby storing up sun-heat, which is to be set free when the vegetables, as food, are "burned" in the bodies of animals.

REGULATION OF TEMPERATURE.

Different as are the circumstances in which the body is placed as to climate, clothes, food, &c., its normal temperature remains constantly at about 98 degrees Fahrenheit, which is marked on the thermometer as "blood-heat."

One part of the body is always at or about the same temperature as another, because wherever heat is generated it is at once carried by the blood through the body. As the blood completes the entire circulation, returning to the heart again in about half a minute, any increase of heat is rapidly spread over the body.

It is chiefly by means of *evaporation* from the surface of the body that the temperature is maintained at a constant height, no matter what the heat of the atmosphere or how much heat is being produced in the body. The more heat formed, and the hotter the surrounding air, the greater the amount of perspiration and evaporation.

Evaporation produces cold, and it takes place most freely when fluid is exposed to hot and dry air. So, to keep down the temperature of the body some fluid has to be close to the surface, whence it may evaporate into the air.

The fluid which fulfils this condition is the blood, the capillary vessels of the skin bringing it near the surface when required. From these capillary vessels perspiration exudes through minute glands, of which over two million exist in the human skin. This perspiration by its evaporation cools the blood in the skin, which, mixing with the rest of the blood, reduces the temperature.

The *regulation of the temperature* is managed thus:—Cold affects the nervous system, causing the vessels of the skin to contract, whilst heat allows them to relax. When the vessels are contracted very little evaporation goes on, but when they are dilated, so that a large amount of blood is passing through them, exudation and evaporation go on briskly.

The pale, chilled skin on a cold day shows that the blood has been driven into the interior of the body to preserve its warmth, and very slight evaporation is taking place, but the redness and warmth of the skin on a hot summer's day show that blood is flowing briskly near the surface, and the moisture of the skin shows the abundant evaporation.

If it were not for exudation and evaporation the body-heat would be unduly raised by exercise, for the energy of the muscles is obtained by the combustion of the food (p. 34). But when one takes violent exercise the quickened action of the heart sends more blood

through the dilated capillaries of the skin, and sweating and evaporation take place. At the same time more blood is being pumped through the lungs where it gets rid of more carbonic gas than usual, and where a larger amount of watery vapour is expired. Evaporation from the lungs is the cause of much loss of heat.

Evaporation is always taking place from the skin, even though it may not be perceptible. Thus, if the dry hand is placed upon a cold slate a damp patch is caused by the condensation of the moisture, just as if one had breathed on the cold surface.

The skin is the chief medium of feeling; in it is a fine network of delicate "nerve-endings," and so the more blood it contains the greater the *feeling* of warmth. Alcohol is popularly supposed to give heat, but in reality it has a cooling effect, for the greater fulness of the vessels of the skin, which it produces, allows heat to escape, so that the thermometer shows a fall in temperature shortly after alcohol has been taken.

HOW THE VITAL PROCESSES ARE CONTROLLED.

The *nervous system* is the means by which all parts of the body are enabled to act in harmony. From the brain and spinal cord, nerves, first large but dividing and sub-dividing until they form minute white threads, pass to every part of the body. Some go to the skin, others to the muscles, and others to the organs of special sense, such as the eye and the ear. But wherever they go they are the medium through which the work of that particular part is performed.

The *nerves* may be divided into two great classes. If we "will" to move a hand, the message is carried *from the brain* to certain muscles, which contract and so cause the hand to move. If we touch a table and recognise that it is flat and hard, it is through the information carried by nerves from the hand *to the brain* that we gain this knowledge.

The first group of nerves is called "*motor*," as they give rise to motions; the latter "*sensory*," as they convey sensations. Their combined action is seen, for instance, when we touch something hot, and withdraw the hand to escape being burned; the sensory nerves conveying the sensation of heat to the brain, and the motor nerves setting the muscles in action to avoid the hot object. The rapidity of nervous action can be seen from the promptitude with which the hand is withdrawn.

Motor nerves have all the one function, namely, to cause muscles to contract. Sensory nerves have different functions, according to the part from which they come. Those coming from the skin convey the sensation of touch; those from the tongue, touch and taste; those from the eye, sight; those from the nose, smell; those from the ear, sound.

Most of the involuntary actions of the body, such as breathing, the circulation of the blood, and digestion, are controlled by the *sympathetic nervous system*, the minute "brains," or centres *(ganglia)* of which are found in front of the spinal column. They are connected, and act in concert, with the nerves from the brain and spinal cord. The sympathetic nerves regulate the temperature of the body.

CHAPTER II.

THE SICK-ROOM.

A good deal depends upon the *choice* of a *sick-room*, as patients will recover more rapidly in a large airy room with a sunny aspect than in one where the opposite conditions prevail. Recovery may be retarded by faulty surroundings, and in some illnesses want of ventilation and sunlight may lead to a fatal termination.

When possible, a *large* room should be chosen. It should be *lofty*, to assist proper ventilation; a low ceiling has an oppressive effect, particularly in cases where respiration is difficult, as pneumonia or bronchitis. It should have a fireplace and chimney. A fire is generally wanted in a sick-room; it looks cheerful and insures ventilation. In the British Isles there are few months when it is not desirable, and just before dawn the temperature is apt to be very low.

Just as a plant grown away from the light is white instead of green, so a human being deprived of light becomes pale, listless, and "out of sorts." Light is a necessity of life. In illness the necessity is still greater.

To obtain sufficient *light* a large window and good aspect are necessary. The aspect should be south, or, better, south-west, so that the sun may enter it during

the chief part of the day. A northerly or easterly aspect should be avoided. The early morning light is of no use to invalids, but is rather a disadvantage, as it may lessen the hours of sleep, some people being unable to sleep when the room is light. The morning sunshine is also sometimes made an excuse for barricading the window until not only the light but the air is excluded. The evening light is, however, of the utmost importance. The afternoon generally wearies and depresses an invalid, and with the fading light chilliness comes on. Now is the time to draw up the blind, and make the most of the bright gleam that so often comes before sunset. Unless the sick-room has a south-*westerly* aspect this cannot be done.

For the room to be sufficiently *airy* the window must open at the top and bottom, and the chimney must be free. The top of the window and the chimney are the two important channels for ventilation. Unfortunately illnesses have sometimes to be got through in rooms without chimneys, but no one would *choose* such a room.

PREPARATION AND CLEANING OF THE SICK-ROOM.

If the room chosen for the patient has not been used for some time, it ought to be carefully examined before he is moved into it. It should be seen to be thoroughly clean, airy, and dry. The walls should be dusted, and the floor and wood-work wiped with a cloth wrung out of hot water; a little Condy's fluid may be added to the water with advantage. If necessary, the floor can be washed, but it is better not to do this if the patient is at once to be moved into the room.

It should be seen that the chimney is clear. A fire should be lit and the air of the room brought to about 60 deg. Fah. If the chimney does not draw well, holding a lighted newspaper a little way up will assist by heating the column of air, and will often save many of those disagreeable downward puffs which are apt to irritate the eyes and temper.

All furniture which is not absolutely wanted should be removed from the room, and a small table or two and an easy chair may be brought in. A large planned carpet had better be taken up, and when the floor has been cleaned some strips of carpet or rugs may be laid down where wanted. The room should not be made too cheerless; but if nicely arranged, a vase of flowers and a picture or two will be enough to make it look both pleasant and comfortable.

THE BED.

The bed for a sick-room may be of wood or iron, but it should not be more than 3ft., or, at the most, 3½ft. wide. For a tall man it should be 6½ft. long. The full length is required, so that the patient can be easily lifted or moved, to allow the sheets to be changed, &c. The narrowness saves the invalid and his attendants much fatigue. A wide bed gives continual trouble, as every attention—such as raising up an invalid's head and re-arranging the pillows—is done at arm's length, and consequently at a disadvantage, or else it is done kneeling on the bed, which shakes the patient and tries the nurse.

THE BEDDING.

The feather bed is, happily, a thing of the past. It was bad enough in health, but in serious illness it was dangerous to the invalid and troublesome to the attendants. The patient sank into it, and so it was difficult to move him, whether to attend to injuries, to dress wounds, or for any other purpose. It soon became uncomfortable, and could not be arranged without greatly disturbing the patient. If it got wet the trouble was great indeed!

A *hair mattress* is best, but an evenly-packed straw or chaff one is nearly as good. One great advantage of a chaff bed is, that if it is spoiled it can be emptied and the cover washed and re-filled.

A satisfactory mattress is one stuffed in two horizontal layers, the upper one being composed of horsehair and the lower of some kind of coir. It is used on iron bedsteads, without any palliasse, and is cheap and comfortable. No palliasse of any kind should be used.

A wire mattress, as now generally used, has many advantages as compared with the palliasse; in surgical cases, however, it may be necessary to stiffen it by laying boards evenly over it below the hair mattress.

The *bed-clothes* should be warm and light. Fine cotton sheets and new blankets are best. A heavy cotton counterpane should not be used; it shuts in perspiration, and is not as warm, weight for weight, as a blanket. A light counterpane or a sheet can be used over the blankets; the latter gives the bed a neat appearance. In some hospitals where the bed-clothes are changed on regular days, a clean sheet is first used

as a counterpane; at the next change it is placed as top sheet, and finally it becomes the bottom one. There is no objection to a light down quilt if it is ventilated by means of a number of small holes. One of this pattern should always be selected.

An under-blanket need not be used except in winter; it should then be large enough to tuck in at both sides so as to keep it smooth, as, if wrinkled, it may help to cause bed-sores.

Except in acute rheumatism, sheets are better next the skin than blankets, as blankets become moist and sodden, and so may cause bed-sores. The feet should be kept warm. As little weight as possible should be over the chest. Shiverings and complaints of chilliness may indicate feverishness, and do not always call for additional bed-clothes or a hotter room. A hot-water bottle or a hot brick to the feet is often the best treatment, but it should be very securely wrapped in a flannel or blanket. *Terrible burns may be caused by placing a hot-water bottle near the skin of a patient whose sensations are dulled.*

FURNITURE OF THE SICK-ROOM.

The *furniture* of a sick-room should be simple, and only just what is necessary. The nick-nacks found in many bed-rooms collect dust and add to the trouble of cleaning the room. All articles of furniture should be such as can be easily cleaned.

As woollen materials hold smell and infectious particles longer than cotton or linen, they should, as far as possible, be avoided. If the room looks bare without *window-curtains*, a bright chintz or some Notting-

ham lace may be used, but heavy woollen curtains should not be allowed. It is better not to use *bed-curtains;* they prevent the air freely circulating round the bed, and valances are also objectionable, as air should pass *below* as well as above. *Carpets* should be used as little as possible in sick-rooms. They certainly must never cover the whole floor, or go under the bed or under any heavy piece of furniture, as they ought to be easily removable when the room is being cleaned. A few strips are generally sufficient to deaden the noise of footsteps and to keep the room from having a look of discomfort.

The *bed* should be placed between the door and fireplace, that the air may pass over it, and so carry away impurities. If the case be an infectious one, the nurse should keep to the side next the door. By this means she will be in the fresh air, and avoid that which, having passed over the sick-bed, may be contaminated with infectious germs.

If the room will not admit of this arrangement, the bed should stand between the fireplace and window. The nurse should then keep to the side next the window, as it is the best position for seeing the patient, and avoids needless risks of infection. If necessary, screens can be arranged to prevent draughts striking the bed.

For the sake of ventilation and for the convenience of the attendants, the bed must be kept away from the wall. In many cases it is advisable to keep even the head of the bed away from the wall, as that arrangement allows of free circulation of air round the bed, and opens a passage by which the attendants may

move quickly and quietly from one side of the room to the other, and, moreover, it affords the easiest position from which to help a feeble patient to sit up, lie down, or turn over.

The foot of the bed should not be towards the window, so that the light may not come straight on the face of the patient.

It is useful in long illnesses to have a *second bed* or a comfortable couch in the room, on which the patient may be laid whilst his own bed is being aired or made.

In infectious cases the *chairs* should be of plain wood or cane-bottomed, without cushions, so that they may be cleaned all over with disinfecting solutions. A comfortable chair and *foot-stool* should always be provided for anyone who has to sit up at night.

A *wash-stand* on wheels is a great convenience, as it can be easily moved over to the bedside.

Coal ought never to be thrown on the fire. An old pair of gloves may be kept for putting it on piece by piece, or, better still, it may be brought into the room in paper bags, which can be put on cleanly and noiselessly when required. Peat is noiseless and not liable to go out; it also has a pleasant and antiseptic smell. A piece of wood makes a quiet and efficient *poker*.

There should be a good-sized *table* in the bed-room, and a smaller one at the bedside.

When an invalid is able to sit up in bed, his meals may be given to him on a *bed-table*. This should be two feet long, one foot wide, and one foot high. It is placed

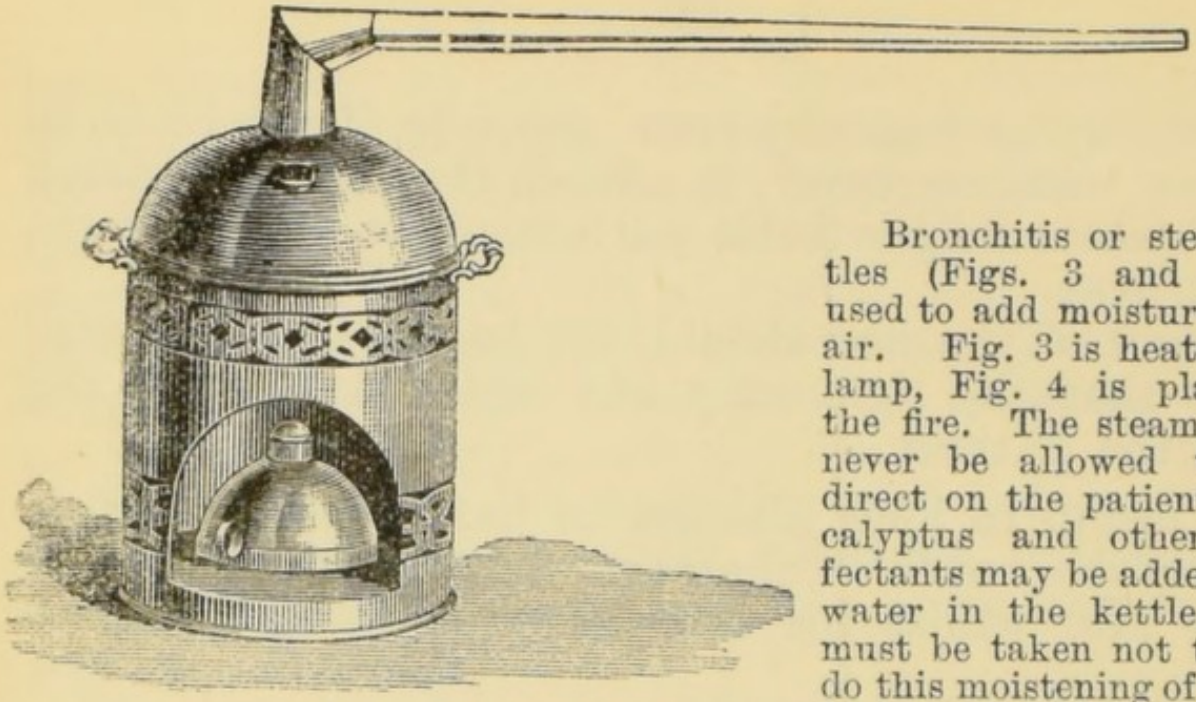


FIG. 3.

Bronchitis or steam kettles (Figs. 3 and 4) are used to add moisture to the air. Fig. 3 is heated by a lamp, Fig. 4 is placed on the fire. The steam should never be allowed to play direct on the patient. Eucalyptus and other disinfectants may be added to the water in the kettle. Care must be taken not to overdo this moistening of the air. It is inadvisable to place a "tent" around a patient, as he is thus robbed of a needful supply of fresh air.

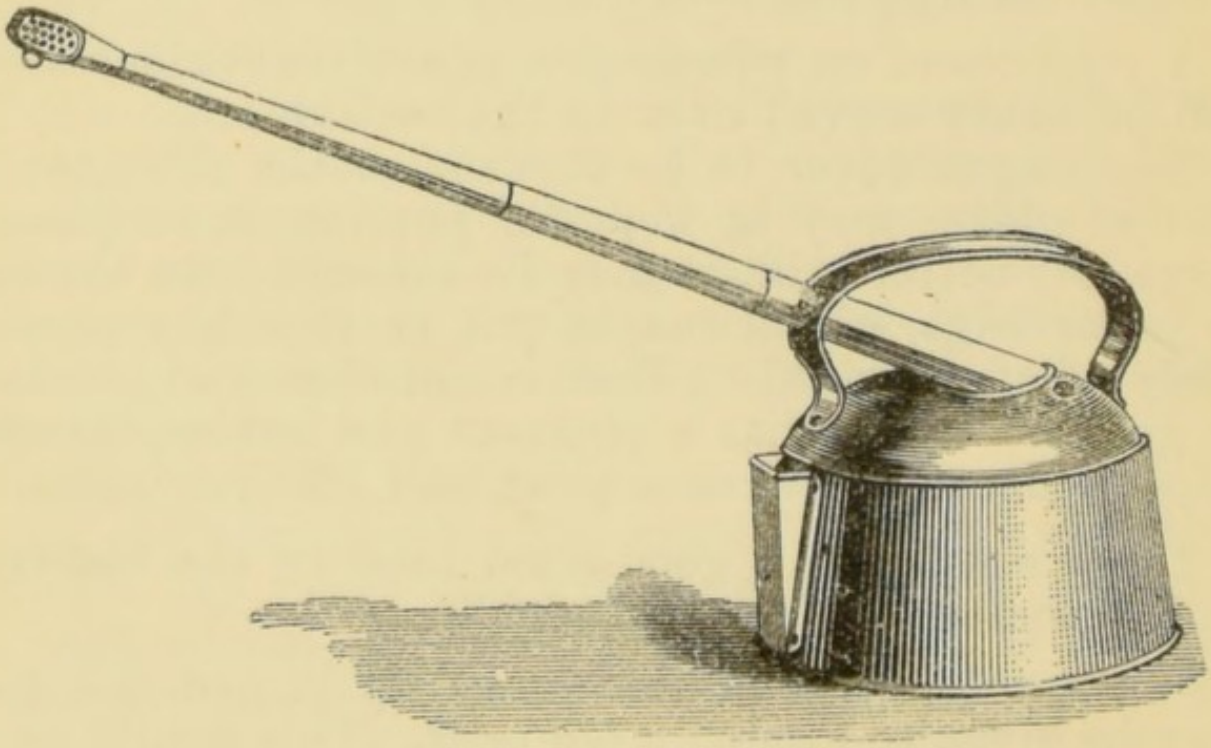


FIG. 4

across the bed, the legs resting on each side of it. If the front is slightly hollowed out, the table can be placed closer to the patient's chest.

In infectious cases wardrobes and chests of drawers should have been removed from the sick-room, and the few articles mentioned above should be the only ones allowed. Anything that is not wanted or could be easily injured is quite out of place, as *everything that has been in the sick-room will have to be thoroughly disinfected* later on.

DECORATION OF THE SICK-ROOM.

Whilst everything in the sick-room should be light and easily cleaned, still the room need not be ugly. All should be arranged with the object of soothing and interesting—but not tiring—the patient. A *picture* placed opposite the foot of the bed will occupy his attention and supply him with thoughts; whilst a number of pictures scattered about the room might tire him. Variety can be obtained by changing the picture every two or three days.

The *pattern* of the wall-paper and of the window-curtains should not be such as to attract undue attention. When a man is lying in bed day after day, especially if feverish, his mind will be active, and the colours and shapes around will be apt to take on the appearance of other and generally disagreeable things. If an important operation is shortly to be performed in a bed-room, it might be well to have the paper stripped off and the wall distempered.

Flowers—cut or growing—always brighten a sick-room, and are harmless as long as they have not an

oppressive or sickening smell. A little Condy's fluid may be added with advantage to the water that flowers are placed in.

When a patient is *convalescing*, his bed should be placed where he can see out of the open window, as anything will be of service that withdraws his attention from the sick-room and its contents. But he must not be overtasked with visitors. Visitors to a convalescent should not come into the room with a rush and a joyous greeting. They should enter quietly, talk gently, and leave quickly—and without shaking the bed or banging the door. They should not talk to the nurse outside the door nor ask a lot of questions.

WARMING THE SICK-ROOM.

The *temperature of the sick-room* should not be allowed to go above 65 deg. F. or below 55 deg. F. Old people generally require the former temperature, and this is also needed in diseases of the chest. In ordinary cases 60 deg. F. is as warm as a room need be. The heat should be maintained by means of a fire, and *not* by shutting out fresh air. Sick-rooms are often too warm in the evening and too cold in the early morning and forenoon.

The coldest part of the twenty-four hours, and the time when the vital functions are at the lowest, is from 2 a.m. until sunrise. A hot bottle near the feet, an extra blanket, or a little warm milk or soup, is often of benefit about this time.

A *thermometer* must hang on the wall of the sick-room at the level of the patient, but not too close to the window or over the fireplace. It should be consulted

frequently, and must be the guide by which the temperature of the room is regulated. The nurse's own sensations are not to be depended on.

VENTILATING THE SICK-ROOM.

Purity of air is always an important consideration in connection with in-door life, but in case of illness its importance cannot be over-rated. To sleep in a vitiated atmosphere is always bad, but the evil is somewhat neutralised by drinking in copious draughts of pure fresh air during the day-time, and by the fact that in ordinary bed-rooms the air becomes changed whilst they are empty and at rest. In the sick-room, however, there is no rest or change. The same conditions as to occupation exist day and night, continual calls for oxygen are being made, and no intervals are allowed for obtaining fresh stores. Fresh air is more needed in sickness than in health, owing to emanations from the body requiring immediate dilution and speedy removal.

As explained on page 23, when breathing is going on a supply of oxygen is continually taken in, and poisonous carbonic acid gas given off in its stead. Two things, therefore, are necessary—that the carbonic acid should be steadily removed and that oxygen should be supplied. These results are to be gained by *ventilation*, and no system of ventilation can be successful unless it accomplishes the two ends, the *removal of the used-up air*, and the *supply of fresh air* in its place.

The average amount of carbonic acid in pure air is four parts in 10,000. In the air we expire there are 400 parts in 10,000. In the air of a room 150 parts in 10,000 may cause severe headache, whilst 500

parts in 10,000 are sufficient to produce fatal results. In a room where the carbonic acid is the result of breathing, much less will be poisonous, even 20 parts in 10,000 causing giddiness and headache. This is because of the presence of the organic matters in the expired air and because the oxygen (which can neutralise the carbonic acid if increased equally with it) is partly used up.

During the twenty-four hours about sixteen cubic feet of carbonic acid gas are given off into the air by each person, and a corresponding amount of oxygen is absorbed. To keep the air in a satisfactory condition, with not more than, say, six parts of carbonic acid in 10,000, 3,000 cubic feet of fresh air should be supplied per hour for each person. In illness more will be required, and additional air will be needed to feed artificial lights, each cubic foot of coal gas that is burned giving off two cubic feet of carbonic acid, and so each gas light defiles the air as much as several people would. It is said that an ordinary fish-tail gas jet takes up as much oxygen as eight persons. If, therefore, gas is being burnt in the sick-room there should be free escape for the burnt air.

Suppose there is one person in a room which holds 3,000 cubic feet of air (one, for instance, 17 feet long, 14 feet wide, and 12 feet high), to keep the air pure it should be entirely changed once in each hour. Whilst if the room contained only 1,500 feet it should be changed twice; if 1,000, three times, and so on. It is found by experience that the air of a room cannot be changed more than three or four times an hour in a cold country, such as ours, without causing a percepti-

ble draught, so that *each* person should have at least 1,000 cubic feet of space, even when the ventilation is perfect.

The size of the *inlet* for the fresh air is of great importance, but the inlets to ordinary rooms are too often only the crevices round the windows and doors—especially the latter. The *rapidity* with which air enters depends upon the size of the inlets; when they are large it enters slowly, but should they be small the air must rush in to be in sufficient quantity. Upon the speed with which air enters—and consequently upon the size of the apertures—depends in a great measure the presence or absence of a *draught*. When air at an ordinary temperature moves faster than three or four feet a second, it gives the sensation of draught, and cold air moving even slower has the same effect.

If the air is allowed to enter *directly towards* the occupants of the room, the inlets should be twenty-four square inches for each person. If the air is directed *upwards* it may enter more quickly, and so a smaller aperture will do. The smaller the inlets the more rapidly the air has to enter, and the more rapidly it enters the more sensation of draught there is. A draught caused by air entering through a limited space, such as the chink under a door, may often be cured by making a larger opening, as by letting down the upper window sash, or by making a long slit in the bottom of the door and shielding it by a deep wooden flange, so arranged as to cause the air to rush upwards. It is often a difficult matter to ventilate a room without creating a draught. But it can generally be done.

There are three ways by which *ventilation* takes place:—

I. *Diffusion.*—Where two gases or atmospheres meet they have a natural tendency to mix. By diffusion the products of respiration are borne away from the vicinity of our lungs. The bad air we breathe comes in contact with the outer air, and the more different the two are the more rapidly they mix. By diffusion the bad air of a room changes place with the outside air if the door or window be open. Air also diffuses itself through the crevices of doors and windows, and through the chimneys. Air can even diffuse itself through an ordinary plaster wall, and through the floor and ceiling.

II. *Winds.*—The wind blowing against a window forces its way in through the crevices, or passing over a chimney-top sucks the air up the chimney—especially if the chimney has a cowl.

III. *The difference in weight between hot and cold air.*—It is by taking advantage of this that success in ventilation is best attained.

Air on being heated expands, and consequently becomes *lighter;* on cooling it contracts again and becomes heavier. Carbonic acid gas is heavier than ordinary air. Expired air is nearly at the temperature of the human body—98 deg. F. On leaving the lungs it first ascends, but when cooled it falls, owing to the heavy carbonic acid it contains. Therefore, *if expired air can be carried off at once it can be best done from above,* but if, as is generally the case, the arrangements are not perfect enough to effect this, the ventilation must be done from below. The removal of foul air *from above* is accomplished in buildings lit

by a "sunlight." The air heated by the combustion of the illuminating gas escapes through a tube above the burners, and in doing so causes an upward current, which sucks out the air in the upper part of the building. Thus the foul, expired air is got rid of before it has time to cool and fall. This can be done in a sitting-room by making holes in the ceiling over the chandelier, the burnt air finding its way into the space between the ceiling and the floor of the room above; from this it will escape through a perforated brick or plate of zinc let into the outer wall.

In ordinary cases the foul air must be removed *from below*, and the best and most convenient channel for this is the chimney and a grate with a fire in it. An *open chimney* is a necessity for the sick-room. The nurse must see that it is *really open*, for unfortunately the majority of bedroom chimneys are anything but open—newspapers, band-boxes, old dresses, or boots, birds'-nests, straw, or boards, having to be removed before the passage of air is secured. Sometimes one has only to open the register. At any rate, *the state of the chimney must be one of the first points noted in the sick-room.*

The usefulness of the chimney as an *outlet* for bad air depends upon the fact that heated air is lighter than cold. The chimney contains a column of air. When a fire is lighted the lower part of this column becomes heated, and, consequently, lighter. It, therefore, passes up the chimney and out at the top. Its place below is taken by the air of the room, which in turn is heated and ascends. Thus a stream of air continually passes up the chimney, and a fire in the grate

is an excellent ventilator, even in summer. If fresh air be admitted to the room in sufficient quantities through the door or window, there will be only one current in the chimney; but if all the other apertures be closed, there will be a *down draught* at the sides of the chimney, as well as an *up draught* in the middle; and the chimney will "smoke." The reason of this is plain. When heated air leaves the room its place must be taken by more air, and if no other way is open it must come down the chimney. The presence of this *down* draught can be recognised by occasional puffs of smoke into the room; it can generally be cured by opening the door or the top of the window.

Even when there is no fire, a chimney acts as a ventilator. The air in a room is generally warmer than the air outside, and so the air in the fireplace passes up and out. The current will, however, not be so strong as if a fire were lighted.

The removal of foul air by the chimney is hindered if the outside atmosphere, heavy and damp, is sinking down the chimney by its weight. This can be overcome by lighting a fire to heat the column of air and establish a strong *up draught*. If when the fire is first lit it refuses to burn it may be started by burning some paper above it to warm the air and start the up draught.

The best inlet is the window. The door opens off a passage or staircase that communicates with the lower parts of the house, and so cannot be depended upon as an inlet for *pure air*. Indeed, in some cases the fires throughout a house have been found to draw such

a strong current of air from the basement that even the air in the sewers has been sucked in past the traps.

The bottom of the window does not, as a rule, make a good inlet; the air passes directly across to the chimney, and so causes a draught. The *top of the window* may generally be used, as it is free from this disadvantage; indeed, it should never be closed day or night all the year round.

Sometimes, as in windy weather, or where the bed, in a small room, has to be placed between the window and the fireplace, opening the top of the window causes a draught, the air falling directly on the invalid. This may be remedied by directing the incoming air towards the ceiling. Wire gauze (which must be frequently cleaned, or it becomes clogged) over the open part of the window, or an ordinary window-blind, will break up the current. Ordinary gauze may be strained over the open part; it will not only break the draught, but will retain dust and damp. It must be frequently washed, however.

The current can be directed upwards by various means. If the lower sash of an ordinary window be opened a little way, and the opening be filled in with a board, a space will be left between the sashes, through which fresh air will enter with an upward movement. (*See* Fig. 5.) In one way or another a curtain or screen can generally be arranged to check a draught, and it sometimes happens that opening a window a little wider will stop a draught.

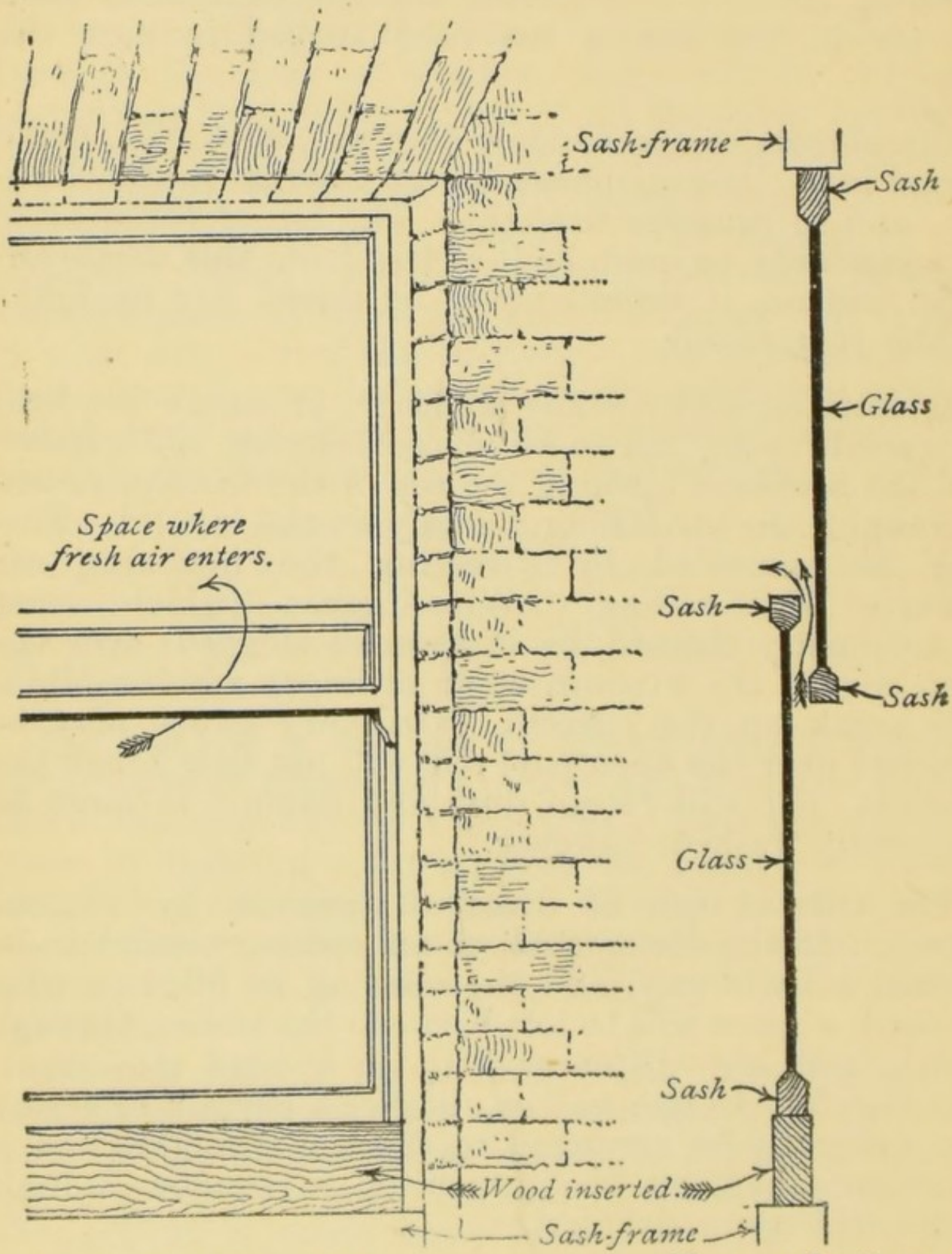

Sash-frame
Sash
Glass
Space where
fresh air enters.
Sash
Sash
Glass
Sash
Wood inserted.
Sash-frame
Front View from Outs'
View on Section
(Side View).

FIG. 5.

One reason why the air of sick-rooms is often so stuffy is because many people fail to distinguish between the conditions produced by heat and by impure air. The best test for the ventilation of a room is to enter it from the fresh air, and to notice if it seems stuffy. If it does, it is either over-heated, or not properly ventilated: if the thermometer is not too high the latter is the case, and means should be taken to freshen the air, either by increasing the inlet for good air or the outlet for bad. It must be remembered that *to purify the air it is not necessary to chill the patient.*

Many people have a prejudice against admitting night air into their rooms. This arises from its being colder, and so more perceptible. It is, however, only a prejudice. Night air is not injurious, except in water-logged soils, where miasmas may rise, and in many cases it is purer than day air. *At any rate, fresh air is just as much needed by night as by day.*

CHAPTER III.

INFECTION AND DISINFECTION.

CONTAGION AND INFECTION.

The word *contagion* at one time meant the communication of a disease by direct contact with the diseased part, whilst *infection* was used to denote the communication of a disease by exhalations from the body. At the present time the two words are used in both senses.

Many diseases occur in "outbreaks"—that is to say, a number of cases are met with at the same time and in the same neighbourhood. Sometimes this arises from general causes, such as the time of year, the variations in temperature, the peculiarities of locality; but in other cases the disease spreads directly, or through some medium, as, for instance, invisible microbes or germs, from person to person; so that in some illnesses there is a common cause for all the cases, whilst in others one case is the cause of more. The latter class are said to spread by *contagion* or *infection*.

Infection spreads in many ways. In some cases it is necessary for the substance or germs in which the poison resides to be brought into close relation with capillary vessels in the tissues in order that absorption may take place. This occurs easily in the eye and throat, where the vessels in the mucous membrane quickly absorb infectious particles. In the skin, however, it is generally necessary for the epidermis, or

outer horny layer, to be broken or destroyed, in order that the germs may reach the vessels beneath. Infection in lockjaw is conveyed in this way.

In other cases the poison passes off into the air, and may be inhaled or swallowed, or it may pass into the pores of the skin. The poison may also get attached to the wall-paper, furniture, clothes, &c., and so may be the means of originating its particular disease, even after considerable periods, as in the case of scarlet-fever. Drinking-water and milk are mediums for conveying the poisonous germs of tuberculosis, cholera, and typhoid fever, in consequence of their having been contaminated by germ-laden materials. Water that has stood in the sick-room may become contaminated by absorbing the particles in the air, and may be the means of giving the disease to others. Water in cisterns is liable to contamination if the over-flow pipe opens directly into a drain, as gases may pass up and be absorbed. Probably there is no fluid which so quickly takes up disease germs as milk.

FEVERS.

Fevers may be divided into Endemic, Epidemic, and Sporadic.

Endemic ("among the people") is applied to any disease that occurs within certain limits of locality, and seems incapable of spreading beyond them, *e.g.*, *ague*.

Epidemic ("upon the people") is applied to any disease that attacks a number of people together, and also travels from place to place, *e.g.*, *scarlet-fever*.

Sporadic ("scattered") is applied to diseases which occur in isolated cases, here and there.

The same disease may sometimes appear in one of the above classes, and sometimes in another. Thus *typhus* may occur sporadically, giving rise to a few scattered cases, or it may rage endemically in the poor part of a large town, or it may spread epidemically in all directions.

Fevers are also divided into *Idiopathic*—those in which the feverish symptoms are the leading feature—and *Symptomatic,* where the fever is only a symptom occurring in the course of some disease, *e.g.*, inflammation of the lungs.

The word *Zymotic* includes all those diseases which are "preventible," the continued existence of which is a reproach to civilisation.

Another division of fevers is into *eruptive* and *continued.* The *eruptive* are those in which the climax of the disease is the appearance of the eruption, *e.g.*, *scarlet-fever* and *measles.* The *continued* are those in which the fever continues in spite of the outbreak of the rash, *e.g.*, *typhoid* and *typhus.*

STAGES OF FEVER.

The course of a fever may be divided into stages:—

I. *Incubation.* The time that elapses between taking the infection and the development of the disease—whilst the germs are, as it were, "hatching" in the blood. This period varies in different diseases, and even in different cases of the same disease.

II. *Invasion.* This is the first manifestation of the attack. The rise in temperature generally begins with this stage.

III. *Eruption* is marked by the appearance of the rash. This is sometimes—but rarely—wanting; the absence of rash is often a dangerous symptom.

IV. *Defervescence.* The period during which the temperature falls to normal.

V. *Convalescence.* The patient becomes gradually restored to health.

WHAT HAPPENS IN FEVER.

The fever germs enter the blood and multiply there. This more or less paralyses the nervous system, and checks its power of regulating the vital processes. The heart, being relieved from control, beats more rapidly; the power of assimilating fresh material is lessened; the living tissues are consumed; the body wastes; the used-up materials are not removed from the body, but, circulating in the blood, give rise to headache or delirium, thirst, dryness of the skin, and local inflammations. These conditions may go on increasing until death takes place, or the poison set free by the germs may become weakened, and the body gradually resume its healthy actions.

COURSE OF FEVER CASES.

After the infection is taken, but before the fever actually commences, there is an *incubation stage* which is generally marked by a train of warning symptoms, simple of themselves, but significant when occurring together, and when gradually increasing. The patient is listless, and unwilling to make mental or bodily exertion; he loses his appetite, and he feels slight aches and pains. He is drowsy by day and restless at night, his sleep being broken and unrefreshing.

Then comes the *invasion*. This may be marked by a gradual increase of the warning symptoms, or it may be sudden and sharp. In the one case the patient steadily becomes weaker and more ill; in the other he changes almost in a moment from comparative health to severe disease. As a rule, the beginning of the attack is marked by peculiar symptoms, strong shiverings (*rigors*) being the commonest. Severe headache (especially across the forehead) is another common symptom. The temperature rises, and thirst comes on, the tongue being clammy, or dry, and furred. The pulse becomes quick, and prostration increases. Then the *eruption* appears, and in continued fevers the symptoms increase in severity; the temperature rises higher, the pulse becomes faster and perhaps weaker, prostration increases, the furring on the tongue spreads, the teeth become discoloured, the mind is affected, first at night, but then both day and night, though still most marked by night; there may be giddiness and deafness; there may be restlessness, or the patient may lie in an apathetic state with half-closed eyes. These symptoms are due to the circulation in the blood of the germs, or the poison (toxin) set free by them.

If the issue is to be recovery, there is now a change for the better, and *defervescence*, or the return to normal temperature, begins. Sometimes the temperature drops suddenly, this is called *crisis;* sometimes it falls slowly, this is called *lysis*.

Convalescence lasts until a normal state of health is regained.

NOTES CONCERNING INDIVIDUAL FEVERS.

TYPHUS FEVER is *infectious* through the exhalations from skin and lungs; its *incubation* period is about nine days; *invasion*, gradual or sudden; *delirium* begins about the end of the first week; *eruption*, mulberry spots and a mottling, the latter seen, as it were, *through* the skin, it appears about the fourth day, and disappears at the end of the second or third week; *temperature* may reach 106° F.; it is continuously high; *complications*, affections of the heart or lungs; *defervescence*, by rapid crisis; *quarantine* is from end of first week until convalescence is complete. *Special precautions:* to avoid the patient's breath, and to keep the head turned away when moving the bed-clothes. Free ventilation and disinfection are very necessary.

TYPHOID. *Infectious* through discharges from the bowel and the bladder; *incubation*, probably one to two weeks; *invasion*, gradual and generally accompanied by headache; *delirium*, from end of second week; *eruption*, small rose-coloured spots, coming out in crops, appear in the middle of the second week, and last a fortnight; may be absent in children; *temperature*, generally lower in the morning than at night; *complications*, inflammation of the bowels and lungs; *defervescence*, slowly; *quarantine*, danger through the excreta from almost the beginning of the attack until convalescence is completed. *Special precautions: to disinfect all vessels before and after receiving the excreta*, to empty them as soon as they have been disinfected, and to disinfect copiously the place where they are emptied. Although the symptoms may

be but slight there must be no departure from the doctor's ruling as regards diet and other matters.

SCARLET-FEVER. *Infectious* through branny scales from skin, and probably from breath; *incubation*, five or six days, often attended by vomiting and sore throat; *invasion*, well-marked; *delirium*, a little at night, perhaps; *eruption*, appears on second day on neck, belly, thighs—bright red points that spread and join; *temperature* runs high; *complications*, kidneys, throat, ears, or lungs may be affected; *defervescence*, generally rapid; *quarantine*, until the skin has *peeled*—six weeks at least. *Special precautions:* to disinfect thoroughly everything to which the bran of the skin might stick; to protect the patient from cold.

Outside the infected room there should be a long cotton overall and a cap for anyone entering the room to put on. The nurse, too, should take every precaution against carrying infection about with her.

MEASLES.—*Infectious* through exhalations; *incubation*, about a week; *invasion*, sudden, with sneezing and watery eyes suggestive of a "bad cold"; *eruption*, yellowish-red, appears on the fourth day upon the forehead, face, and neck; *temperature*, up to 103° F.; *complications*, diseases of the lungs; *defervescence*, by rapid crisis; *quarantine*, chiefly whilst eruption is out. *Special precautions:* to protect the chest, keep the room about 60° F., and if the air is dry to introduce steam into the room.

ROTHELN.—In this disease the characters of measles and scarlatina are combined, sometimes one and sometimes the other predominating. It is often difficult to be sure of the diagnosis.

SMALL-POX.—*Infectious* by exhalations,&c., from lungs and skin; *incubation*, nearly a fortnight; *invasion*, sudden, with pain in the back; *delirium*, may begin almost at once; *eruption*, appears on the third or fourth day in spots, they enlarge, become like a small blister, a depression forms on the top, the contents turn into "matter," they break, or dry into a scab, which falls off, about the end of the second week; *temperature*, high at the beginning, and again when the "matter" is forming; *complications*, lungs, parts affected by rash, as skin, eyes, &c.; *defervescence*, gradual; *quarantine*, from the first appearance of the attack until some time after the disappearance of the rash; the greatest danger is when the matter is formed in the pocks. *Special precautions:* all attendants and neighbours should be re-vaccinated.

VACCINATION.—The natural course of vaccination is that on the fourth day a red pimple appears, turning on the fifth day into a blister (vesicle). On the eighth day a red, inflamed ring forms round it; by the tenth or eleventh day it is depressed in the centre. The ring then gradually fades, and about the nineteenth day the scab falls off.

DIPHTHERIA.—*Infectious* through deposit on throat and through breath; *invasion*, gradual; *special seat of attack*, the air-passages; a grey deposit forms on and in them; *quarantine*, for some time after convalescence. *Special precautions:* to wipe away all secretions from the nose or mouth with pieces of rag, and to burn the rags immediately; to keep away from the patient's breath, especially when he is coughing; to disinfect the room and everything in it. Injection with anti-

diphtheric serum. In all suspicious cases medical aid should at once be sought—a remark which applies also to the foregoing short notices of diseases.

Disinfectants.

Asepsis means freedom from poisons or microbes—perfect cleanliness. *Antiseptics* or *disinfectants* are chemical agents which wage war against *sepsis* or *impurities*.

Disinfectants may be divided into three classes:

Class I.—*Those which attack impurities in the air.*

Sulphurous Acid Gas, got from the fumes of burning sulphur, unequalled in convenience and efficiency for unoccupied rooms. The Local Government Board advise 1½lbs. of sulphur to be burned for each 1,000 cubic feet of space. The sulphur can be used in the form of "candles," or the sulphurous acid gas can be procured compressed in cylinders.

Formalin is also used for the same purpose, the vapour being given off by the heat of a lamp.

Chlorine Gas, got from moistened chloride of lime. As the gas is heavy, the lime should be placed high up.

Class II.—*Those which act on the infectious body or on the discharges therefrom.*

A variety of reliable proprietary disinfectants, such as those produced from coal tar, can be purchased. The doctor should be asked to recommend what he considers most suitable.

Corrosive Sublimate is a valuable disinfectant, but it is very poisonous, and it acts injuriously on metals. It is used in solution of the strength of one part to 1,000 or 2,000 of water. Convenient tablets are sold, one of

which, added to a pint of water, makes a solution of one in 1,000; they are, however, not safe in an ordinary household. Aniline blue is added to corrosive sublimate to give it a distinguishing colour.

Carbolic Acid also is useful, but poisonous. A solution of one part to 60 of water, or one part to 30 of oil, may be used—the former for receiving excretions and for flushing, the latter for applying as a dressing. Carbolic acid cannot be used without great risk. If the strong acid is being made into a lotion it should be thoroughly stirred up in the hot water, otherwise it may lie at the bottom of the basin, undissolved.

Chlorinated Lime is very useful for flushing foul drains. A large quantity of a solution containing from one to two ounces in each gallon of water should be used.

Permanganate of Potash. An ounce added to three pints of water makes a solution of a suitable strength. This is a safe, but not a powerful, disinfectant.

Condy's Fluid is also a useful disinfectant.

Earth. Substances covered with dry earth, or buried, are harmless, as long as they are not near a well or source of water supply.

Class III.—*Heat, Air, and Sunlight.*

Heat. Boiling is the best means of disinfecting bedclothes, surgical instruments, clothing, &c.; it acts by destroying the germs on which sepsis depends. Bedding may be conveniently disinfected by dry heat or by superheated steam; the latter is by far the best.

Air. Fresh air, abundantly supplied, so dilutes and oxidises infective matter as to destroy most microbes. The infective matter of typhus, for example, is rapidly killed.

Sunlight. Exposure to sunlight is fatal to many microbes; even such hardy forms as the tubercle bacilli die after a few hours' exposure. If people could live all the time in sunlight and pure air there would be little need for disinfectants.

USING DISINFECTANTS.

I.—*During illness.* During an infectious illness only the necessary furniture should be allowed in the sick-room, and it should be cut off from the rest of the house by nailing a sheet, kept moistened with a suitable disinfectant, over the door. The wood-work of the room should be cleaned with a cloth wrung out of disinfectant solution. All clothes—bed and personal—before being sent to the wash should be dipped in disinfectant solution. All cotton for wiping up infected discharges, &c., should be previously wrung out of disinfectant solution, and should be burnt after use.

In scarlet-fever. During convalescence the patient should be well bathed. The clothes must be soaked in disinfectant solution and then boiled. They must not be sent to a public laundry.

In typhoid. The excreta are the agents of infection. They must be received into vessels containing a disinfectant solution, and immediately covered up and removed from the room. Typhoid excreta should be

disinfected and buried, or, if emptied into the drains, the drains should be subsequently well flushed with disinfectants.

II.—*After illness.* The patient should be well bathed, dressed in clean clothes, and removed from the room. All bed-clothes, garments,&c., should, if possible, be sent to a disinfecting chamber, and exposed to a high temperature. The room should then be disinfected. The wall-paper should be soaked with disinfecting solution, stripped off, and burned. The articles of furniture should be placed apart from one another, and the bedding and other articles arranged upon them. The crevices of the window and the chimney should be closed up. A bucket of water should then be placed in the middle of the room, and an old iron dish containing from half to one pound of sulphur should be supported over it by a pair of tongs; or else a couple of bricks may be put in the water, and the tray of sulphur placed on them. (Sulphur candles can be bought, and are convenient and safe in use.) Some hot coals are then to be placed on the sulphur, or spirits of wine may be poured over it and ignited, and the door is to be closed. In twenty-four hours the room may be entered cautiously and the windows and chimney opened. When after this the room has been well aired the ceiling and walls should be whitewashed, and the floor and furniture should be washed with a disinfecting solution and soft soap.

If time is not of much moment, it is best first to burn sulphur in the room immediately after the invalid is removed, and before anything is disturbed; and then

next day to arrange the contents of the room as described, and to burn sulphur for the second time. This lessens the risk run by the person who is managing the disinfecting.

POINTS TO BE NOTICED IN INFECTIOUS CASES.

Whether the patient has been exposed to infection. The length of incubation. The exact date of the first shiver or rigor. The nature of the *invasion*. The symptoms, and when they began. The temperature. The pulse. The respirations. Whether there is a rash, and, if so, where, and of what nature.

CHAPTER IV.

DETAILS OF NURSING.

THE NURSE.

In speaking of "home nursing," it is unnecessary to say much about the *choice* and *qualifications* of a nurse; for although no one should take up nursing as a profession without careful thought, and unless she feels sure she will be able to devote herself heart and mind to the work, all should know something of the rudiments of nursing, and should be prepared to undertake the duties of a nurse should necessity arise.

Good intentions alone are not sufficient, for with the best intentions it is quite possible utterly to fail. Still a little knowledge has often, with the aid of common sense and determination, formed good nurses out of those who had been thought quite unfit for the work.

Amongst those who make *bad nurses*, we find many classes. For instance, *the noisy*. These, although they may be kind and loving, are continual sources of disturbance to the sick. They wear creaking boots, or else thump along on their heels; they slam doors, rattle cups, stand at the bottom of the bed and shake it, talk to people just outside the door, knock over bottles, sneeze loudly, poke the fire, and add coals in the noisiest manner, and altogether keep the unfortunate patient in a state of nervous expectancy, wondering when the next crash will occur.

There is also an *ostentatiously quiet* class, who keep the patient quiet with the effect of making the quiet as injurious as noise. These steal about on tip-toe with finger on lip, and continually murmuring, "Hush—h—sh!" Everything is whispered, and the senses of the patient are kept at full tension, trying to find out what is going on. The cat-like step also keeps the patient continually wondering in what part of the room the nurse will turn up next. Such as these should remember that it is far better to speak low than to whisper loud.

Another class is *the fussy*. What might be arranged without a word, is made the cause of talk; what might be done slowly and quietly, or even left undone, is hurried into prominence, to the annoyance of the patient. Continual inquiries as to how a headache is, continual shifting of pillows when the only desire is to be left alone, repeated visits on tip-toe to see if asleep, when what is wanted is to be let fall asleep in quiet, are attentions most wearisome to the patient.

A nurse must always obey orders. No matter how accomplished or skilful she may deem herself to be, or how good her training may have been, she is not a doctor, and she can best display her knowledge and exercise her skill by faithfully carrying out the directions she has received. The nurse has received a very different training from that of the medical man, and many signs and symptoms which he perceives will be hidden from her. A nurse can have no excuse for not carrying out directions because they are not what she would expect; a remedy which would be useless in the

majority of a particular class of cases may be of great value in exceptional ones. The doctor, and not the nurse, is the judge as to what is best to be given or to be done. If the nurse has doubts she might modestly express them to the medical man, but on no account should she receive his orders in silence and when he is gone refuse to obey them.

The nurse should never hide anything from the doctor. Even if she has done wrong, and is afraid of blame, she should be perfectly open. Secrecy is only adding one fault to another, and it is a serious thing to think that life should be risked in order to conceal wrong-doing. It is far better to tell too much than too little. The doctor knows himself to be only human, and when a nurse has confessed her error to him, and expressed regret, he is unlikely to bear her a grudge. At any rate, disagreeable as the owning up may be, the nurse must go honestly through with it, whatever the issue.

The nurse need never be afraid of troubling the doctor; he will always be glad to hear anything that may help in the diagnosis or treatment of a case. An apparently insignificant change may herald a relapse or some dangerous complication, and if duly reported immediate measures may be taken to check it; but if, owing to the carelessless or reserve of a nurse, an undesirable symptom is allowed to run on unreported or undetected, no amount of skill may be able to undo the evil.

If the nurse has any suggestions she should make them to the doctor. In the few minutes a medical man can spend with each patient it is impossible for

him to think of everything. The nurse should make a note of all points on which she needs information, and should obtain full directions from the doctor before he leaves.

She should avoid appearing to set herself in opposition to the doctor, and must always uphold his authority. It is silly to attempt to increase her influence with a patient or his friends by seeking to undermine the influence of the doctor. A medical man and nurse in charge of a case should be respected and trusted in their proper spheres, and should strive to assist each other and maintain each other's position. Their interests, instead of being antagonistic, are practically identical. To shake a patient's faith in those around him is to cause needless distress of mind, and perhaps to lessen the chances of recovery.

Food should not be left in the sick-room, but brought in fresh when it is wanted, and removed directly it is finished with. The nurse must neither take, nor allow anyone else to take, food which has been left in an infected room. She must not let a patient drink milk or water which has been standing in the room, as it rapidly absorbs poisonous matter from the air. She must attend carefully to the heating and ventilation of the room, not confounding hot and foul air (p. 57), but opening the window when the air needs renewing (taking precautions to prevent the patient feeling a draught), and keeping a lesser fire when the air is too warm. She must watch the thermometer, and see that the temperature does not rise or fall beyond the proper limits (p. 48). She must see that everything about the room, including the bedding, is kept perfectly clean,

and must never let anything offensive remain in the sick-room, but must remove *all* excreta *at once*. She must see that due preparations are made for the visit of the medical man.

In infectious cases it is the nurse's special business to see that none of the rules adopted to prevent the spread of the disease are transgressed.

In her conduct towards a patient, a nurse must remember that his recovery is the one object to be attained, and, when necessary, should sacrifice her personal feelings and comfort to promote that end. She must, of course, take care of her own health, but in every other way, she must give herself up for the good of the patient. In critical cases it is sometimes even necessary to risk her own life for the sake of others. In infectious cases, this is of course always done, but the nurse gives no more heed to this than does the soldier to the chance of his being killed in action.

When the nurse has done what at first sight appears to be all that is required of her, she will probably find other ways in which she can be useful, and it is generally these extra little attentions that patients most value. A good nurse knows just what to do and when and how to do it.

A nurse must act firmly, but never unkindly. She must not impose worrying, useless rules, and she must be ready to explain the reason for necessary ones. She must win her patients' confidence, and make them trust her, and then she will easily get her own way. She must try never to deceive a patient. But on rare occasions she may, for the good of the patient, find herself

compelled to be a party to some act of deception. It is hard to win trust, but easy to lose it, and once a person is deceived the possibility of further deception will be always before the mind, and, instead of being trusted, the nurse will experience loss of faith, and with the loss of faith the recovery of the patient may be retarded.

A nurse should never give the slightest unnecessary pain in order to save herself trouble. She must be patient and gentle. No matter how trying or vexatious an invalid may be, no matter what his want of gratitude, she must remember that he is ill, and she must never be tempted to an angry word, look, or gesture. She must be sympathetic, and not attempt to cheer patients by telling them there are many others far worse. This is no comfort, but is often irritating. At the same time she should never speak despondingly, or magnify the dangers of a case, or tell of the wonderful and serious cases she has seen. If her experience furnishes anything bright or cheerful, let her tell *that*, but the relation of horrors is dangerous and inexcusable. A nurse should never talk of her patients outside the sick-room, and she should never tell of other cases to the friends of the present patient, and still less to the patient himself. One of the hardest things for a nurse to learn is to keep her own counsel.

A nurse must be always modest, but never prudish. Many things which would otherwise be repugnant are in serious illness done as mere matters of routine. But all this can be done without the slightest loss of modesty. Modesty of mind and modesty of speech should never be lost. No matter what a nurse's experience, no matter what she has seen, what she has done,

or what she has learned, she should always be careful in conversation. What may be commonplace to her may not be so to others, and neither she nor her patients can derive benefit from her saying or doing anything which may possibly be distasteful to others.

Great self-control is necessary, and a determination to accept all the duties of her calling with patience and good temper. Intelligence and knowledge are also requisite A good nurse must thoroughly understand all domestic duties, so that she may know when they are rightly done, and, if need be, explain how to do them.

A nurse's duty towards her patients might be summed up in the words that she must be *natural*, and that she should always do to others just what, in similar circumstances, she would like done for herself.

THE NURSE'S DRESS.

The *nurse's dress* should be such as not to interfere with her duties. All extra frills and adornments which are likely to be in the way had better be omitted. Washing fabrics are best. All rustling or otherwise noisy materials are out of place. The under-linen should be changed frequently.

Dresses should be made quite plain, with the skirt not long enough to be trodden on. Unbleached linen or brown holland should be used for infectious cases, also for summer wear in general.

Aprons should be of strong white calico, reaching nearly to the bottom of the dress and stretching well round behind, though not quite meeting. A bib should

cover the front of the dress. Pockets may be added; in nursing surgical cases they are indispensable.

Boots and shoes should be moderately thick, as far as is consistent with quietness. Patients as a rule do not like a cat-like tread, and so a gentle footstep is sufficient, except in cases where it is important not to disturb sleep. A creaking shoe is likely to cause great annoyance. High heels should be positively excluded from sick-rooms.

Caps. A white cap of clear muslin has a fresh and pleasant appearance, and keeps dust from the hair.

Collars and Cuffs. Plain, neat-fitting white linen are the most suitable, and, like the cap, they should always be clean.

Ornaments are out of place on a nurse, though a bright ribbon bow may be worn at the throat to give variety.

A *pin-cushion* and *pair of scissors* hung at the side will be useful.

MANAGEMENT OF NURSE'S OWN HEALTH.

The preservation of a nurse's health is of the utmost importance. Without a fair share of health and strength it is impossible for her to stand the bodily exertion and mental anxiety that are inseparable from her vocation. The fact that a nurse has to do many things which are far from pleasant, especially to refined and cultivated women, increases the risk of breaking down. All these disadvantages have to be borne for the seven days of the week, and often by night as well as by day, making it still more needful for the nurse to attend carefully to her own health.

Regular exercise in the open air is necessary, a walk of an hour's duration once a day is the *minimum* allowance. A few minutes spent in the open air every morning and evening is of great advantage. If she is tired a long ride on the top of a tram-car or omnibus will do her good.

A nurse's food should be nourishing and light, and her meals should be taken regularly, away from the sick-room. The state of the bowels must be carefully attended to. She should avoid constipation, but yet not resort to strong aperients. Any tendency to diarrhœa should be at once treated under medical advice. If soreness of throat occurs she should at once ask the doctor to advise her.

A nurse need not be expected to be a teetotaler, but if she finds that beer or wine makes her drowsy at her work she had better give it up entirely. Certainly she ought not to take it in order to make her sleep when going to bed. Of spirits she ought scarcely to know the taste.

Every nurse should wash the whole surface of her body, except the scalp and hair, once in twenty-four hours. This is best done in cold water, as it stimulates the system and lessens the liability to feel changes of temperature. Every woman, however, cannot stand such a rigorous measure, and such an one may have to content herself with warm water. Certainly she should not begin her work with cold hands or feet. A warm soap bath should be taken at least once a week. The hair should be kept well brushed. The action of the brush on the skin often relieves headaches of rheumatic, or even nervous, origin.

The teeth should be well brushed twice a day, or, better still, after each meal; this removes the smell of food from the nurse's breath, and relieves the patient of a possible source of annoyance.

A nurse should sleep in a room with plenty of air. If called at night she should put on a warm dressing-gown and thick felt slippers.

A nurse should carefully examine her hands for cuts and cracks before dressing a sore, covering any found with sticking-plaster. She should not put her hand near her eyes while engaged in dressing a case. She should never use a patient's towel, and should avoid, as far as possible, inhaling his breath or any effluvia.

REGULATION OF VISITORS.

In a severe case of illness restrictions must be put upon visitors, and the nurse will have strictly to attend to this under the directions of the medical man. If the disease be an infectious one, the fewer visitors that are admitted into the house the better, and it will be the nurse's duty in every way to minimise the risk of infection. If a visitor must be admitted into the room of an infectious case, he should be placed between the window and the bed, not between the bed and the fireplace. He should not go into the room fasting. In a case of diphtheria, &c., he should not be allowed to risk contact with the patient's breath, and in a case of scarlatina he should be dissuaded from touching the patient. Before leaving the room or anteroom the visitor should wash his hands in a solution of carbolic acid, biniodide of mercury, or of some other antiseptic.

In cases of ordinary illness (putting the question of business visits aside, as these must to a great extent be controlled by the patient and his friends), the rule for visitors must be to come only as often, to stay only as long, and to choose such times, as are not injurious to the patient. The good of the patient must be the great point insisted upon, and claims of relationship or friendship must be subordinate to this.

A visitor should not be ushered in suddenly, especially if the meeting is likely to cause emotion. At the same time, there should be no unnecessary delay; the visitor should be ready to enter the room as soon as the nurse has announced his coming. Expectant waiting is sometimes as upsetting as a shock.

The visitor should sit in full view, so that the patient can converse without having to screw his head round. He must never sit or lean on the bed. All people dislike shakes or jars, especially when ill and helpless and so unable to protect themselves against them. He should not tire the patient with talk, or allow him to do too much of the talking. Above all, a visitor should make up his mind when he is going to leave—and leave. When he seems to have gone and is just closing the door, to re-open it in order to say something else is especially aggravating. All this wavering and indecision is bad for the invalid. A good nurse can show much skill in managing the entries and exits of visitors.

To judge of the effect of seeing visitors, it is necessary to watch the patient closely for some time after they have left. During the visit the excitement

and the talking may arouse the patient, so that he seems much better, but later there must be a fall *below par* if there was a rise *above par*, and this will be seen in the half-hour after the visit. The liveliness and flush will go, and exhaustion will set in.

When an invalid is depressed, and wants rousing, the visit raises him to par, and so it is not followed by reaction. In these cases visits are useful.

If there is great weakness, or if excitement induces exhaustion, food should be given either before or after the visit, as is found best to suit the case.

Visitors should not be admitted either just before or just after the patient has had a meal, or just before the usual time of settling down to sleep.

A damp or frosty overcoat should not be allowed into the sick-room.

WASHING PATIENTS.

As a sick person's vital powers are low, it is important that they should not be wasted, so washing ought to be done at the time or times during the day when the patient is at his best. It may not be desirable to do all the washing at once, but at least the teeth, the hands, and the face should be washed before breakfast. The teeth should also be washed after meals. If the patient is unable to do this himself, they may be cleaned with a mop made of cotton wool twisted round a small piece of wood. In cold weather, or when a chill would be specially dangerous, the patient must be kept well covered whilst being washed. This can be done, and at the same time wetting the sheets be prevented, by slipping a dry, warm bath-towel

under the part to be washed. Sometimes it is advisable to keep a blanket or flannel next the patient until reaction sets in and all fear of a chill is passed. Fever patients are greatly refreshed by being sponged several times a day. Sponging, or washing the face and hands with warm water, may also induce sleep in a restless and wakeful patient. Brushing the hair has also a soothing effect, and can generally be well borne if properly done.

DRESSING PATIENTS.

Articles of dress should always be well aired before being put on, and if the garment has been hanging in front of the fire the warmth is comforting. In a surgical case affecting the limbs, in removing a shirt or other article of attire, it should be removed first from the sound side. In putting things on, the injured side should be done first. In cases of rheumatic fever the same rules hold good. When both sides are badly affected, the shirt should be opened right down the front, and, if needful, from the neck to the wrist. Tapes should be sewn on to fasten it by.

When a patient sits up for meals, a flannel jacket forms a better covering than a shawl, as it protects the arms and does not press on the chest; there are also no ends to dabble in the food. The jacket should have an outside breast pocket for the handkerchief. To be constantly losing his handkerchief in the bed vexes a patient. If the skin is tender, the flannel may be lined with silk or soft linen at the neck and wrists.

BED-MAKING.

The bolster should have a separate cover, so that the under-sheet can be easily changed. An under-blanket may be used in winter, and it should be wide enough to tuck under the mattress at each side, so that it can be kept smooth. The wrinkles are common causes of bedsores, especially if crumbs have been carelessly allowed to remain under them. A spare pillow should be kept in a cover. It is useful for raising the head, to replace a hot one, or for supporting the back when a patient is lying on his side. If the weather is hot, the under-blanket may be taken away, at any rate, during the day time. In the height of summer this under-blanket is apt to cause annoyance, even to a person who is not actually an invalid.

CHANGING SHEETS.

When an invalid cannot be lifted out of bed, and yet the sheets have to be changed, this can be done with hardly any disturbance of the patient.

To change the Upper Sheet.

The best way is to spread out the clean sheet, aired and warm, and to lay it on the top of the bed-clothes (which must have been previously loosened all round). One person then holds the clean sheet tightly by the upper and lower corners of one side; another person standing at the opposite side of the bed catches the bed-clothes by the upper and lower corners, and draws them gently from under the clean sheet. The rest of the bed-clothes are then separated from the soiled sheet, and replaced on the bed over the clean sheet.

A useful modification of this plan is to remove one of the blankets some time before the sheet is to be changed, and to lay it with the clean sheet on the bed. This lessens the risk of chill, and removes all idea of exposure.

To change the Under Sheet.

The patient must be gently rolled on one side, and the soiled sheet—having been loosened all round—is to be rolled up lengthwise until half of it forms a long roll just against his back. A similar roll is to be made of half of the clean sheet, and it is to be placed against the other one at the patient's back. The bed is then in this condition: one-half is covered by the clean sheet, the other by the soiled one, the unused halves of the sheets forming rolls running down the middle of the bed from head to foot, and the patient is lying near the middle on the soiled sheet. Now the patient is to be again gently rolled, first to his back and then to his other side. During this movement he passes over the two rolls, and so lies on the clean sheet. It is now only necessary to draw away the soiled sheet, and unroll and arrange the remainder of the clean one. The sheet is then to be pulled tight and flat and to be tucked in.

In cases where a splint or other apparatus has to be kept in position, it is impossible to turn a patient on to his side, however gently it might be done. In such cases the under-sheet must be changed by rolling from the top to the bottom. Two people stand, one at each side; all that is free of the soiled sheet is formed into a roll at the head across the bed; the clean sheet—rolled up—is placed above it. The patient's

shoulders are then raised, and the soiled sheet is rolled up, and the clean sheet unrolled, until the small of the back is reached. The shoulders are then lowered, the hips raised, and the rolling and unrolling process continued. Finally, the feet are raised.

If necessary, the body must be sponged or wiped before it is laid on the clean sheet.

All sheets must be well aired and warmed before being put on the bed. A cold sheet or shirt annoys a sick person.

It may be advisable to give a cup of beef-tea or some other food, either before or after changing sheets.

DRAW-SHEETS.

Draw-sheets are used in surgical and other cases to keep the under sheet from getting soiled. They are generally made by folding a sheet so that it reaches from just below the shoulder to the knee. Sometimes a piece of waterproof sheeting has to be placed between the folds of the draw-sheet.

The draw-sheet may be changed in the same way as the lower sheet. The patient is turned on one side, and the soiled draw-sheet is rolled up to his back; he is then sponged, dried, and powdered, and the new draw-sheet—half rolled up—is placed against the soiled one. He is then gently passed over the double roll on to his other side, the soiled draw-sheet is removed, and the clean one unrolled.

The patient may also be raised and the draw-sheet slipped away, his back can then, if necessary, be washed and dried, and the clean draw-sheet slipped under him. The draw-sheet must be kept smooth and, if

possible, dry. When the patient is being rolled over for the change of the draw-sheet, the nurse should wash and dry his back very carefully, powdering it if necessary. She should make sure that the skin is not becoming sodden, inflamed, and that there is no threatening of bed-sore (p. 122).

IRRIGATION.

Irrigation, or dropping of water, is sometimes used in the treatment of inflamed joints and in other cases. A can is placed at some height, and water is allowed to fall on the joint through a small tap, or a bunch of cotton threads dipping into the water are hung over the side, and allowed to act as syphons.

Here a waterproof sheet must be so arranged as to receive the water, and cause it to run into a vessel placed for the purpose on the floor, and thus prevent the bed getting wet. In these cases it is difficult to keep the bed dry, but the nurse must try her very best to do so.

MOVING HELPLESS PATIENTS.

There is a great knack in moving helpless patients, and two well-trained nurses who understand each other can do wonders at this work. A patient can be lifted by two people joining hands under his shoulders and hips. If there is any injury the injured part should be supported and attended to by a third person, who must be instructed not to press upon the tender spot. If a limb is broken it must not be held in a timid or nervous manner, but grasped firmly, supported on the palms of the hands and steadied with the fingers

and thumbs. One hand should be above and the other below the seat of fracture, and there must be no shaking.

If a patient is to be *changed from one bed to another* of equal height, the beds may be brought close together, and the patient drawn on the under bed-clothes from one to the other, or he may even bear to be rolled across. Sometimes a patient suffers pain on being touched, and yet ought to be moved. In such a case the following plan may be adopted:

Improvised hammock.—Pass a blanket beneath the lower sheet (this ought to be done some time beforehand); then take the sides of the blanket and sheet, and let them meet above the patient; form them into a long roll, and continue rolling until the roll comes nearly to the patient. If two people now take hold of the roll in different parts, they will be able to lift the patient. If a billiard cue or a couple of walking-sticks have been placed in the centre of the roll it will be easier to keep the roll extended. The sheet and blanket form a kind of hammock, and the even pressure on all parts of the body is not likely to cause pain.

Another method of making a lifting hammock is to take two broom-handles or other long poles, and roll one up in the lower sheet and under-blanket at each side; by raising them the patient can easily be lifted.

BED-RESTS.

Bed-rests are used to enable patients to sit up in bed. They are often a great comfort to convalescents, especially when taking food. Bed-rests with cane or canvas backs, and an arrangement for altering

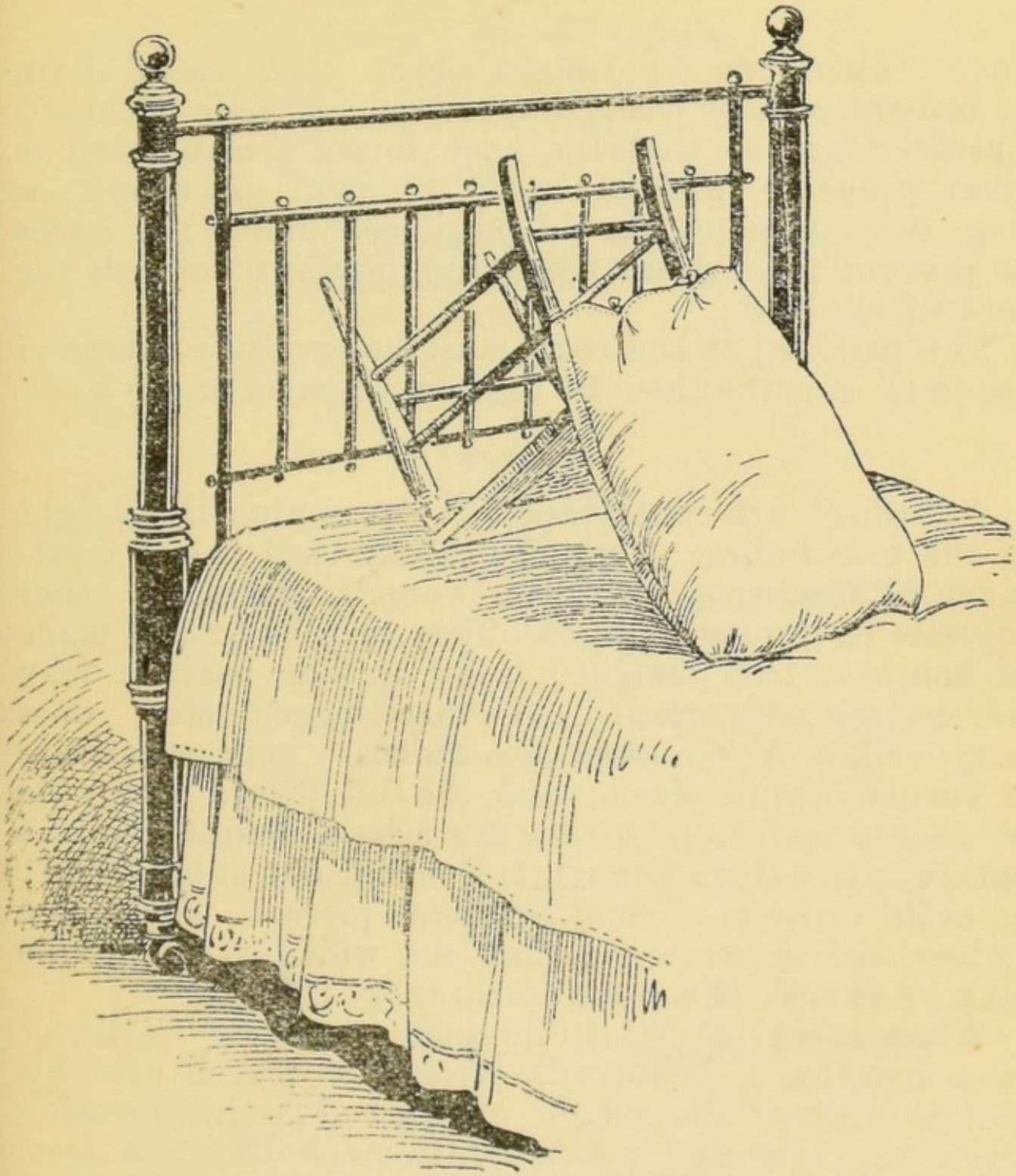


FIG. 6.—IMPROVISED BED REST.

(Additional pillows may be placed across the upper end of the pillow shown in the sketch.)

their angle, can be bought cheap. A useful form of bed-rest can be easily improvised: a chair is turned upside down, so that the back forms a slant, and is then properly padded with pillows, as shown in Fig. 6. A pillow should be placed under the knees to prevent the patient from slipping down towards the foot of the bed.

The padding of bed-rests must be carefully attended to, so as to make them fit against all parts of the back.

CRADLES.

"*Cradles*" are contrivances for removing the weight of the bed-clothes. They are chiefly used in the treatment of fractures, operation wounds, burns, or other injuries in the lower limbs. They may be bought made of hoops of iron fastened below to side bars, or may be easily improvised. A three-legged stool does very well. A band-box also makes a good substitute if turned upside down, and the lid placed upon the bottom to add to its strength; a hole, shaped like the entrance to a dog's kennel, is then cut out of each side; a child's hoop sawn in two pieces, which are joined with a screw, so that the width of the cradle may be varied, is a useful form (Fig. 10).

When a patient has to lie on his back for weeks, or even months, a firm cradle should be placed over his feet to prevent the weight of the bed-clothes pressing down the toes and permanently extending the feet. Every day, moreover, the nurse should gently bend the feet to a right angle, and gently rub the muscles of the leg in the direction from the ankle upwards. She should also see that the weight of the limbs is

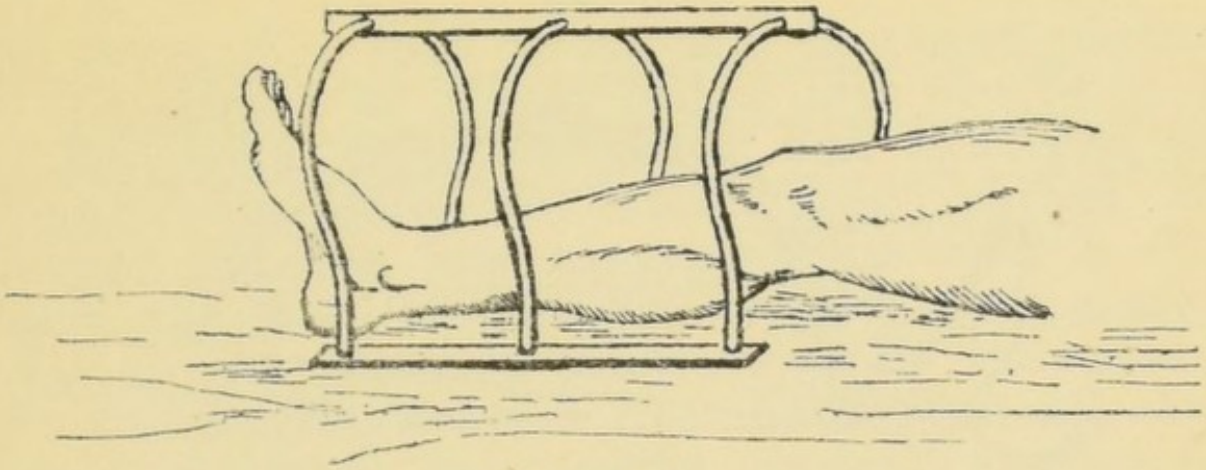


FIG. 7.

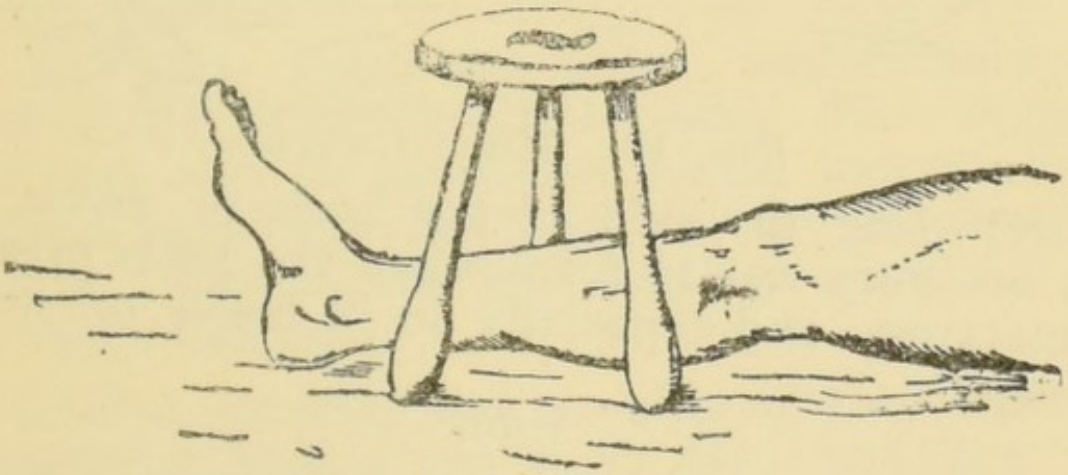


FIG. 8.

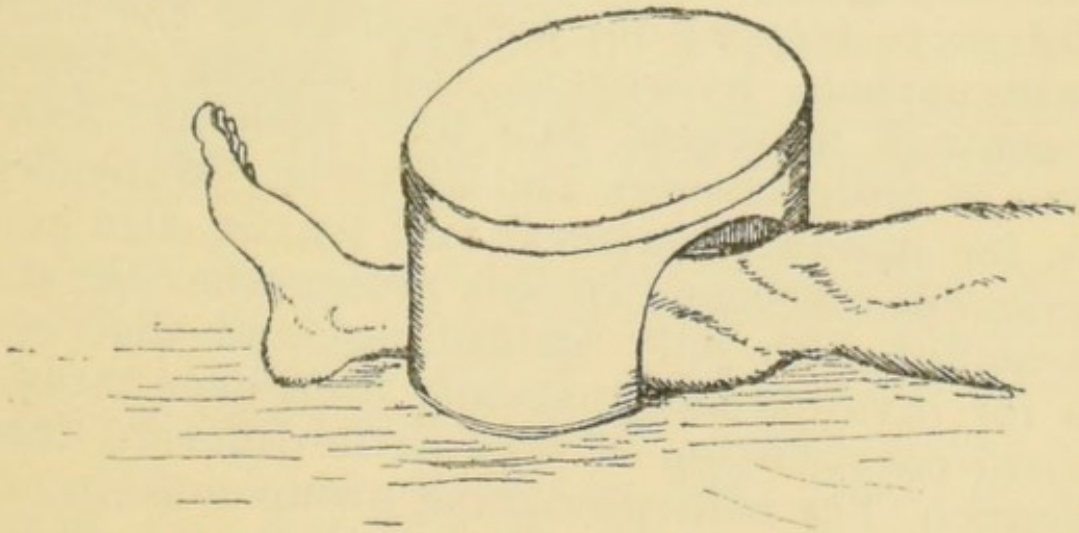


FIG. 9.

BED-CRADLES.

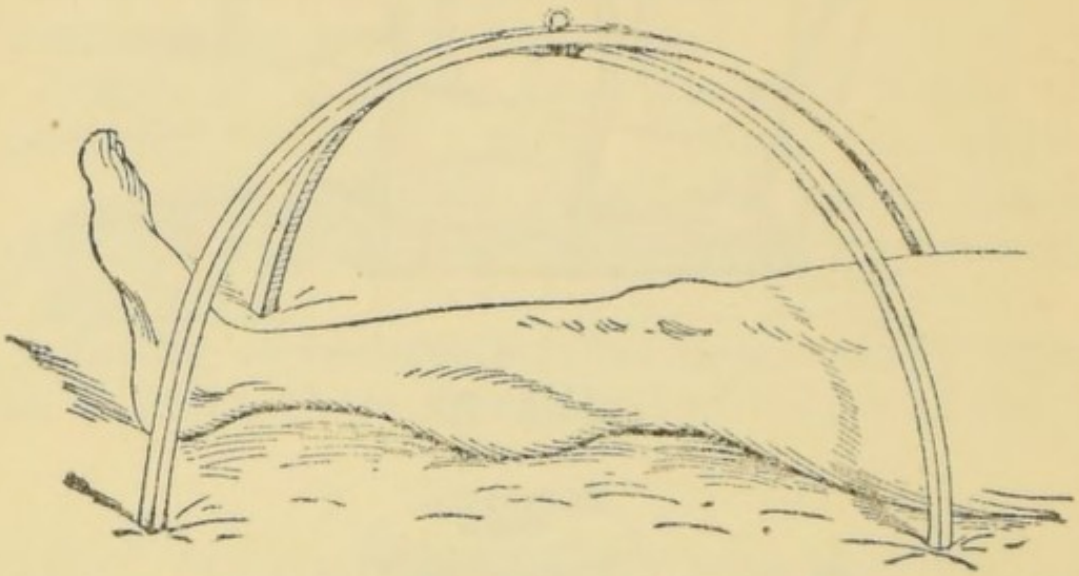


FIG. 10. HOOP CRADLE.

not irritating the skin of the heels or calves. Bed-sores are very apt to form when the heels press upon the mattress, and especially so in feeble or paralysed persons.

FOOD.

There are two great classes of *Organic Foods*—those that chiefly go to *build up* the tissues, and those that chiefly go to *keep up the temperature* of the body. All contain carbon, hydrogen, and oxygen; the former also contain nitrogen, and are such as lean meat, caseine of milk (cheese), and albumen. Many vegetable foods, for instance oatmeal and lentils, also contain a good deal of nitrogen. In this group occur the *gelatines*. They stiffen into jelly on cooling, and their value as foods for invalids has generally been over-rated. Their chemical constitution is very little different from that of albumen. The heat-producing group contain only carbon, hydrogen, and oxygen; they are subdivided into *fats*, *sugars*, and *starches* (see p. 28).

The power of a food to act as a *heat-giver* depends upon the amount of oxygen (taken into the blood by the lungs) with which its carbon and hydrogen can combine. Therefore, the more "free" carbon and hydrogen, and the less oxygen of its own a food contains, the more heat it can supply. *Fats* contain scarcely any oxygen, and are very useful heat-givers. *Sugars* and *starches* contain free carbon, but all their hydrogen is already balanced by oxygen. During the Boer war the great value of sugar and jam as a food was fully recognised.

The *Inorganic Foods* are water, and certain salts, most of which occur in other foods. The oxygen of the air may also be mentioned as an inorganic food. Chloride of sodium, or table salt, is the only salt used separately. Phosphorus and sulphur occur as phosphates and sulphates.

The needful quantity and varieties of food have been calculated, by finding out what diets and how much of them are required to keep an adult man in health and at work, without increase or decrease of weight. Nitrogenous food, fat, and sugar, *or* starch, are all needful. Hard work and exposure to cold render more food necessary; rest and warmth diminish the need for food.

It has been found that an adult man doing ordinary work in this climate requires each day 300 *grains of nitrogen and* 4,500 *grains of carbon.* (The hydrogen need not be considered.) These quantities can be obtained in $\frac{3}{4}$lb. of lean meat and 2lbs. bread, or in 1lb. lean meat, $\frac{1}{4}$lb. fat, and $\frac{1}{2}$lb. sugar. In practice such

simply-formed diets would not do as variety is necessary, and so we extract the needful amount of carbon, nitrogen, &c., from a larger number of substances.

A "*mixed diet*" is best, as the proper amounts of the different elements can be agreeably supplied by it. It would be injurious to live on meat alone (even putting the necessity for variety out of the question), for whilst enough nitrogen could be got from a single pound of lean meat, four and a-half pounds would have to be eaten in order to supply the requisite carbon, thus throwing much needless work on the stomach. On the other hand, to live on bread alone, nearly four pounds would have to be taken each day to get sufficient nitrogen, whilst two and a-half pounds would supply the carbon. Still, bread contains all the needful elements of diet, and if it is supplemented by cheese and butter and plenty of pure water a healthy man has all that he absolutely needs.

Milk is a perfect diet, and its elements are mixed in due proportions. It contains caseine (nitrogenous), fat (butter), sugar, salts, and water. It is the only food needed for young children, and is capable of supporting adults who from sickness or other causes are not capable of much exertion.

Oatmeal forms a sustaining diet. The necessary nitrogen and carbon can be got from about 1½lbs.

Diet has to be altered for invalids. It must be particularly attended to if the digestive canal is affected, or if there is special need of support, and so on.

The *method of cooking* used has a great effect on the nutritive value of food. As a rule two or three

minutes at boiling point, and then the continued application of heat slightly *below* boiling point, is the method of cooking which combines the maximum of nutrition and digestibility with the minimum of waste.

In roasting, broiling, or boiling, the first application of heat should be intense, to harden the outside. This prevents the loss of the juices; too long an application of intense heat would harden all through, so the heat should then be diminished.

In making soup the meat should be put into cold water and slowly heated up, as the object is to get the nutriment into the water.

Baking is not as wholesome as roasting, owing to the want of ventilation in the oven.

Frying is bad—it hardens the substances, and adds to them products of the decomposition of the fat used for frying.

SICK-ROOM COOKERY.

Cleanliness, needful in all cookery, is especially necessary when one is providing for the sick, for a delicate appetite is easily disgusted. So, all the articles used in connection with the cooking of food must be perfectly clean. The serving also must be cleanly—a messed drinking cup or sloppy saucer is uninviting, and soils the hands and clothes; everything should look nice and tempting.

Too much of anything should never be made. It is far better to make a little and have variety. The sight of a large bowl of beef-tea might destroy all appetite, while a small cupful would be welcome.

The bulk of everything should be as small as possible. A rice or custard pudding should be brought into the sick-room in a small dish; the invalid should not have his food ladled out of a bulky receptacle.

Something should always be in readiness, as the wish for food may pass away whilst it is being prepared.

Food must never be left in the sick-room. It should be brought at the right time, and, if any of it is left, it should be at once cleared away. No one should use food which has been in the room with an infectious patient. Water for drinking should always be drawn fresh; by standing about it loses its pleasant taste, and may be vitiated by particles absorbed from the air.

Sometimes, in cases of great prostration, food must be given at *short intervals*, but it is rarely necessary to awaken a patient in order to give him nourishment, for, as the saying is, sleep is as valuable as food.

It often happens that patients are *unable to eat solid food the first thing in the morning*, and yet if food is not taken the ability to take it will not return as it should. In such cases a little liquid food will be refreshing, and it may prepare the way for something more solid. People who are not quite strong often derive benefit from taking a cup of tea before rising.

No cooking is to be done in the sick-room. It takes a robust appetite to stand the odours of cooking. *Tea-making* is, however, an exception, as its fragrance is refreshing.

If the amount of liquid to be taken is limited, the exact quantity should be measured out, as many patients, and especially children, dislike to be stopped

in the middle of a drink. It is well to remember that the smaller the glass the larger the drink will appear.

In raising a patient to drink, the hand should be passed behind the pillow to support both the head and shoulders. If the neck is too much bent by the head being thrust forward, swallowing is difficult. If the head is not lifted straight, the fluid may escape at the corner of the mouth.

Every house should contain a *feeding-cup,* shaped somewhat like a tea-pot. When one is not to hand, an afternoon tea-pot makes a fair substitute, or a *syphon* may be made by bending a piece of glass tubing at an acute angle, so that one of the sides forming the angle is longer than the other. Glass tubing can easily be bent if heated over a flame. The patient can suck the fluid through the longer end, and then it will continue flowing of itself. When enough has been taken, the *shorter* end is to be lifted, otherwise the fluid will continue to flow, and make a mess.

SICK-ROOM DIETARY.

A sick-room dietary is given in the Appendix.

STIMULANTS.

Alcoholic stimulants are rapidly absorbed. They have an exciting effect on the heart, causing it to beat more rapidly; from this and from their having a paralysing action on the nerves controlling the supply of blood to the surface, they cause the skin to become flushed and give the sensation of warmth. Owing, however, to the heat being driven to the surface, the increased skin-heat soon gives place to a lowering of the tempera-

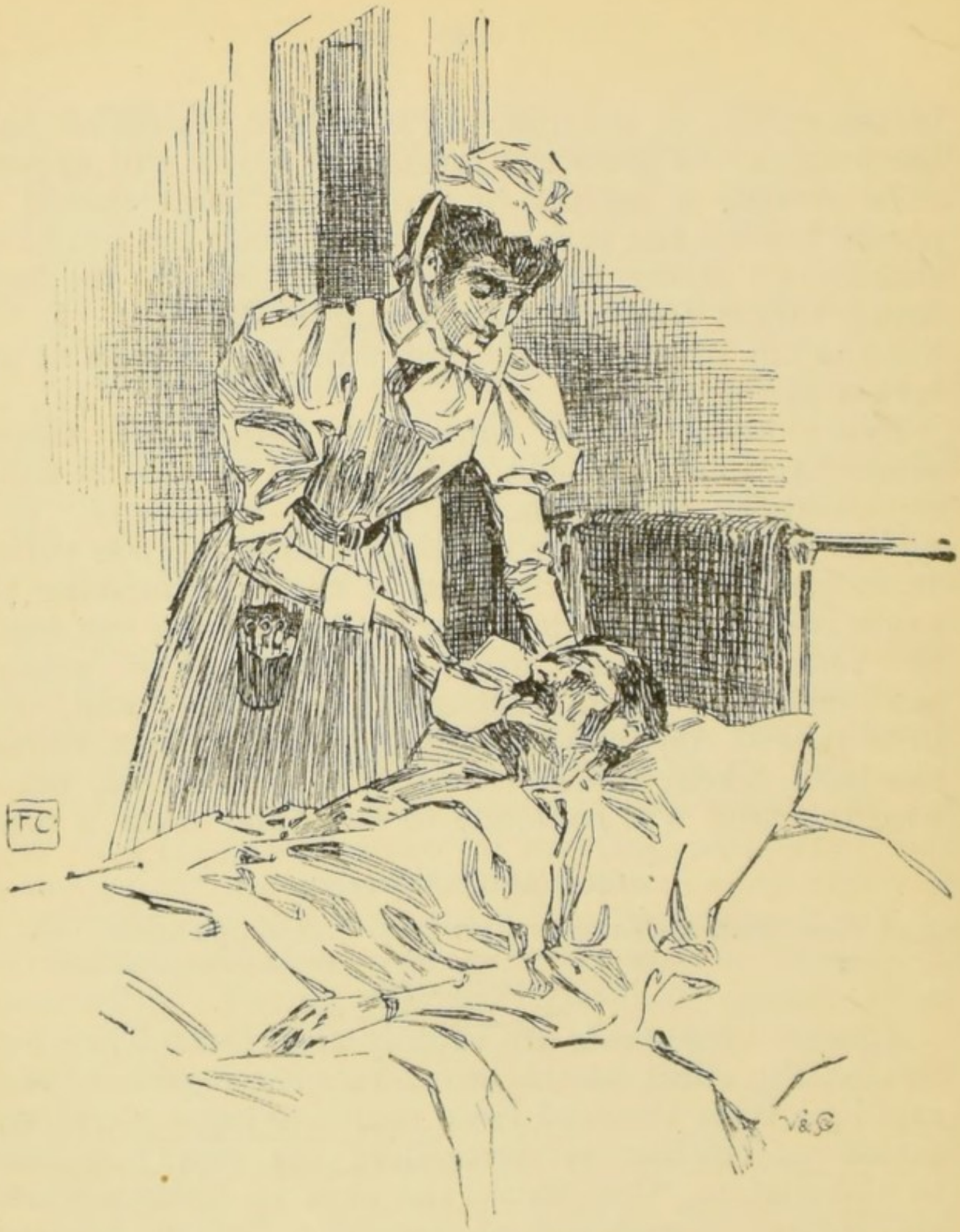


FIG. 11.

A patient taking fluid from the "feeder."

ture of the whole body. These effects are more or less masked by the patient taking food with the stimulants, and by his remaining in a warm room.

Alcoholic stimulants should not be given by a nurse, unless under direct instructions from the medical man. The habit of giving wine and such stimulants to the sick and weak may be injurious. Hot milk, a little soup, a cup of tea, a hot bottle, or mustard and water for the feet, are all safe and efficacious stimulants, and their use is not followed by depression.

When alcoholic stimulants are ordered, the nurse must find out the kind and amount intended, and exactly when they are to be taken. Unless specially ordered, they should never be given without food. The *exact* amount taken should be carefully recorded. If ordered during convalescence the nurse should inquire *how long* they are to be continued, for the custom of taking stimulants during convalescence has sometimes been indefinitely continued and greatly abused when health has been restored.

ADMINISTRATION OF MEDICINES.

Medicines should be given in as pleasant a form as possible. The bulk should be small, and any disagreeable taste or smell should be concealed. This is very important in the case of children; it saves tears and struggles, and in critical cases this may mean much.

Castor-oil can be best taken in strong milkless coffee. Some coffee is to be put into two cups; the oil is to be added to one and well beaten up; the mouth is then to be rinsed with some of the coffee in the other cup; the mixture of oil and coffee is to be swallowed, and the

mouth once more rinsed with the remainder of the plain coffee. By this means the castor-oil is absolutely untasted.

Castor-oil can also be given in orange juice. The juice of half an orange is to be squeezed into a glass; the oil is to be placed floating on it, and the rest of the juice is to be squeezed on the top. If a piece of orange-peel is chewed before any disagreeable medicine is taken into the mouth no bad taste is noticed.

Children will generally take castor-oil well when it is shaken in a bottle with warm milk, sweetened and flavoured. Cinnamon-stick is useful for flavouring it.

Cod-liver oil is sometimes best taken with a little salt. But a still better plan is to give it with sardines at breakfast. Even adults can take it in this way, provided they do not know that it is being so given. It can be taken quickly and cleanly when floating on the surface of any liquid, such as milk. If the milk be warmed and the oil shaken up in it, the taste will be much concealed, or it may be given in a warm spoon.

Effervescing medicine is divided into two parts, one acid and the other alkaline. The acid part generally contains citric acid or tartaric acid, or lemon juice; the other part is generally rendered alkaline by soda or potash. When the two parts are mixed, carbonic acid gas is given off, causing effervescence. The best way to give effervescing medicine is to pour the two parts into different glasses, and, giving the patient the larger one to hold, empty the other into it. By this means it effervesces at once, and can be taken whilst brisk. If the second part be added in a spoon and stirred up, the gas is lost and the medicine is flat when

taken. Carbonic acid gas is a poison only when breathed; when swallowed it is a gentle stimulant to the stomach.

Powders, if small, can be given in sugar or jam. For children the best plan is to put a little bread-and-milk in a spoon, put the powder (mixed with sugar) on it, and cover it over with some more bread-and-milk. An important point is not to let the child know that any medicine has been ordered for him.

Pills may be easily taken thus:—The pill is to be placed in the mouth and retained in the front of it with the tongue; some water is then to be taken, and the head thrown back, the pill being at the same time liberated. The water and pill reach the back of the mouth together, and are mechanically swallowed.

Old medicines should not be preserved, as they are apt to deteriorate, and what is good at one time may not be so at another. If medicine-bottles are allowed to stand about there is a risk of the wrong medicine being administered.

To the advantage of the community, much less stimulant and much less medicine are prescribed than was formerly the case.

CHAPTER V.

DETAILS OF NURSING—*continued.*

OBSERVATION OF THE SICK.

In dealing with the *observation of the sick* many points have to be considered. These include *symptoms*, and *means of diagnosis*.

With regard to symptoms, it is well to know their causes, variations, and teachings. With regard to means of diagnosis, it is necessary to know how they can be used. For both it is important to acquire a habit of close observation. Once the habit is acquired, its practice is easy; if not acquired, much will pass unnoticed, of which a mental note should have been made. Nothing is too trivial to observe. A very slight alteration in the condition of the patient may give warning of an approaching serious change. *It is better for the nurse to tell the doctor too much than too little.*

RIGOR.

The meaning of *rigor* is "stiff coldness." The word is applied in medicine to the shiverings which occur during the course of many illnesses. It is often one of the earliest visible symptoms. All fevers and inflammations are ushered in by rigors; in the intervals between the rigors a feeling of extreme heat is generally experienced. Sometimes rigors are well marked and often repeated, in other cases they are less noticeable. Inflammation of the lungs is generally ushered in by one long severe rigor.

A case of fever is generally considered to commence at the first rigor; the exact date of its occurrence should therefore be carefully inquired into and noted.

Before and during a rigor the patient has a feeling of extreme cold, particularly down the spine, and shivers violently. Notwithstanding this feeling of cold, the temperature of the body (as shown by the thermometer) is actually raised.

The best *treatment* is to cover him up warmly, piling on the bed-clothes, and to apply a hot bottle wrapped in flannel to the feet, and to give a warm drink. The patient soon breaks out into a profuse perspiration, and the temperature suddenly drops. Rigors must never be made an excuse for letting the air of the room get overheated and impure.

SLEEP.

Intervals of rest alternating with periods of work are the necessary condition for the healthy performance of the functions of the body. The heart, incessantly as it seems to work, spends half its time in a state of absolute rest—working for one-half second and resting for the next. It obtains its needful rest during sleep, its action becoming slow and quiet. In respiration the muscles that act in inspiration rest during expiration. When muscles have been used in violent exercise they become exhausted, and must be allowed an interval of repose.

Whilst consciousness lasts the brain is in a state of activity; to obtain rest for it unconsciousness is necessary. It would be manifestly inconvenient, however, if we underwent rapid alternations of consciousness and

unconsciousness, so the brain performs a long spell of work in the daytime, and takes a long rest in the night. At least it ought to do so.

In illness sleep is often deficient, the brain showing symptoms of being worn out. The return of sound natural sleep often marks the turning point of an illness.

The amount of sleep that patients have *should be noted;* also whether there are long intervals of wakefulness; whether the sleep is sound, or broken by dreams, movements, or talking; whether the talking amounts to delirium; and what the condition as to freshness of mind and body is on waking.

It is a great mistake to keep a house too quiet in order to help an invalid to go to sleep. If this is done, the slightest noise is apt to awaken him. In some cases, however, every precaution must be taken to ensure rest.

In cases where food or medicine is ordered to be taken at intervals of so many hours, the doctor should always be asked *whether the patient is to be awakened* to take it. Sometimes sleep is a sign of exhaustion, and death may ensue from want of food; whilst in other cases sleep is a sign of change for the better.

During sleep there is less blood in the brain than whilst the person is awake; so anything that drives an unusual amount of blood to the head is bad for sleep—for example, mental effort, exciting conversation or discussion, and coldness of the extremities.

Quietude and darkness generally encourage sleep. Cold applications to the head, and heat to the feet may be useful, and giving food so as to induce blood to

leave the brain and help the process of digestion may promote sleep. Therefore, a sandwich or a biscuit at the bed-side may prove very helpful to a bad sleeper. Sounds, such as the ticking of a clock, often prevent sleep.

Narcotics should never be taken without medical advice. Their use soon grows into a habit, injurious if persisted in, and hard to give up.

PAIN.

It is necessary to be guarded in judging of pain by a patient's description, as some people are more sensitive or bear pain worse than others.

The chief points to be noticed with regard to pain are:—

Situation.—A patient must be asked *where* the pain is, for "leading questions" often call forth misleading answers—whether it is *localised* and stationary, or whether it is widespread or shifting. Superficial pain is generally increased by slight pressure, deep pain by harder pressure. The situation of the pain does not always coincide with that of the disease, as pain may be *reflected* some distance by the nerves. Thus pain in the knee often accompanies hip-disease, and pain in the side of the face or in the ear may arise from a decayed tooth.

Intensity—whether severe or trifling; whether increasing or diminishing.—Most of the words used to indicate degrees of pain are misleading, as they are used according to the fancy of the sufferer. Thus, such words as "fearful," "unbearable," &c., are often used where "slight" or "rather bad" would do.

Character.—In *cancer* the pain is lancinating, in *neuralgia* darting, in *pleurisy* acute or cutting, in *rheumatism* aching or gnawing.

How it is *affected by movements, &c.*—In pain connected with the *chest or lungs,* respiration often increases it. In diseases of the *stomach,* food may bring on a fresh attack. In certain diseases of the *eye,* exposure to light excites pain. In many *brain* diseases, both light and sound increase the suffering.

What gives relief.—It is necessary to watch closely what gives most relief. Heat, cold, poultices, fomentations, cold lotions, rest, movements, rubbings, change of posture, elevation of the part, and numberless other simple things give relief in different cases, while in others it is only by watching that the best method of relief can be discovered. It often happens that an attentive nurse is a better judge than the sufferer of what *really* gives relief.

POSTURE.

The *posture* of a patient must be studied and reported to the doctor, as it is often an important guide to the progress of a case. In very exhausting diseases—for instance, towards the end of a *long fever*—an absolutely horizontal posture is natural. Here any tendency to lie with the head more raised is a good sign.

In diseases where the *breathing is difficult,* there is frequent inability to lie down, the respiratory muscles having most power in the sitting position. In such cases it is a good sign to see a patient lying down, *provided the strength keeps up.* Lying down might be a sign of collapse and impending death.

Lying on one side is often a sign of *local disease*. As a rule, in lung diseases the patients lie on the affected side, so as to leave the unaffected side free.

In *inflammation of the bowels*, lying on the back, with the knees drawn up, is the usual position. This relaxes the abdominal muscles, and so lessens pressure on the painful parts.

In *colic*, as pressure affords relief, the sufferer often lies on his face.

A patient should be helped to retain the easiest and best position. Pillows must be arranged if necessary to support not only the head, but also the shoulders and upper part of the back. If there is a difficulty in retaining a side position, a pillow laid against the back will be of assistance. If there is inability to lie down, a comfortable bed-rest must be got or improvised. Constant attention may be necessary; pillows soon get disarranged, and slip down. One of the most important points in connection with posture occurs in lengthened fevers, in which there is a tendency to lie helplessly on the back; this is dangerous, and must be overcome by the nurse. Lying continually in one position causes a congestion of the lungs, and in exhausting diseases this is a grave complication. It is best guarded against by altering the posture of the patient and changing him occasionally from side to side.

The tendency to slip into a horizontal position may sometimes be lessened by raising the lower feet of the bed on blocks of wood or thick books.

A "bed-rope" attached to the top of the bed, or to a hook in the wall or ceiling, is a great assistance to a

patient, either when he wants to change his position or to sit up.

In some diseases a sudden *change of posture* is dangerous. Lives have been lost in cases of inflammation about the heart by carelessly raising a patient to take food.

THE SKIN.

In making observations of *the skin*, the state of the observer's hand (whether warm or cold) must be taken into account; such observations are relative and of no great value.

The skin may be *dry* or *moist*. Acute feverish attacks are often ushered in by *alternate* dryness and moisture. Dryness generally accompanies increase of temperature, and a change from dryness to moisture is mostly a favourable sign. The sweats in consumption and in other cases of extreme prostration are, of course, exceptions. In rheumatic fevers there are copious sweats with an acid odour.

Perspiration is Nature's agent for reducing the temperature (p. 36).

Eruptions must be watched for and at once reported (See pages 61 to 66.)

The *colour* of the skin varies greatly in disease. In *fainting*, or collapse, it is pale, in *coma* it is bluish, in *fever* it is flushed. When the *breathing is much interfered with* it is dark and congested. In *bilious fever* and *jaundice* it is yellow.

Emaciation generally occurs in severe chronic disease. In children the fat which lies beneath the skin is often rapidly absorbed, leaving the skin flabby and in folds.

Name..... *Date*.....

Time.	Sleep.	Medicine.	Action of Kidneys and Bowels.	FOOD. Kind and Quantity.	Doctor's Orders.
A.M.					
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					
P.M.					
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
11					
12					

	M.	E.
Temp.		
Pulse		
Resp.		

FIG. 12.

This form affords a ready means of recording everything of importance, with the time of occurrence. Such a chart enables a nurse to give the medical attendant an accurate report of the patient's progress, and is a guide to a nurse coming on duty.

Enlarged copies may be obtained from the St. John Ambulance Association, St. John's Gate, Clerkenwell, London, E C.

THE TONGUE.

The condition of the *tongue* gives information as to the state of the digestive organs. It may be *pale; too red*, as in *scarlet-fever; furred*, as in indigestion; *dark-coloured and cracked*, as in some *low fevers; swollen*, sometimes so much so that the sides are marked by the teeth; *protruded with difficulty*, as in *low fevers* and *apoplexy; protruded to one side*, as sometimes in serious nerve affections; *tremulous*, as in *nervousness, low fevers, delirium tremens.*

The manner in which the tongue *cleans* after an illness should be noticed; the fur generally cleans off first at the tip and edges.

In *examining the tongue* it is important to notice the size and shape; the colour, especially at the tip and edges; whether it is dry or moist; whether it is furred, and whether it changes for the better or the worse.

The tongue should be inspected *before* food is taken.

APPETITE.

Appetite is nearly always *deficient* in disease, particularly if of an acute character. *Excessive* appetite may need to be checked, or the digestive organs become overloaded, and acute dyspepsia comes on. Instances of *perverted* appetite are occasionally met with. *Capricious* appetite is common in illness.

The amount of food taken, its nature, whether taken with relish, whether it satisfies, whether it is followed by pain, by eructations, or by vomiting, and whether digested should be noted.

THIRST.

The sensation of *thirst* is due to there being in the body an insufficient amount of liquid, the actual sensation arising from the state of the blood. It is relieved by liquid being swallowed, and absorbed into the circulation by the veins of the stomach. It may be also relieved by letting a small stream of hot water flow into the lower bowel.

Excessive thirst may arise from two very opposite causes—in fevers and inflammations when the blood is too stimulating and requires dilution; in cases of extreme exhaustion and want of blood. Loss of the watery parts of the blood, as by profuse perspiration, is a common cause of thirst; and alcohol, salt, and many other articles also induce it.

Slightly acid drinks are best for *quenching thirst*; they stimulate the glands of the mouth to form saliva, and so remove the dryness of the mucous membrane. Tepid drinks also remove thirst by softening the mucous membrane.

VOMITING.

The *mechanism of vomiting* resembles that of coughing. First, a deep inspiration is taken; next, the "glottis," or narrow part of the throat, closes, and the abdominal muscles contract. Here the processes differ, instead of the glottis opening as in coughing and letting out a sudden rush of air, the glottis remains closed, the lungs cannot be emptied, and so the stomach is pressed upon and its contents expelled.

The chief *causes of vomiting* are: I. *Local.* Irritating or altered food in the stomach, as in indigestion. Irritating secretions, as bile. Diseases of the stomach, as

inflammation, ulcer, cancer. Obstruction along the course of the bowels. Poisoning. II. *Distant*. Either through the action of nerves directly from the brain, or by "reflex action," *i.e.*, some irritation, as of worms, &c., being conveyed to the brain, and then being reflected to the region of the stomach. Vomiting often occurs in the course of illnesses, generally from the presence of irritating secretions.

The *chief points to notice* are when and how often vomiting happens. Whether before or after food. Whether there is much feeling of discomfort or pain. Whether accompanied by straining or retching. Whether it leaves much weakness. The nature of the vomited matters.

Gastric vomiting (caused by the state of the stomach or its contents) is usually preceded by a feeling of nausea; there are other symptoms pointing to a disordered state of the stomach, and the vomiting generally relieves them. In *cerebral vomiting* (caused from the brain) there is often no nausea, there may be other brain symptoms, and the vomiting may not relieve.

The *treatment* is to keep the patient lying quiet, to loosen the clothes, and to admit fresh air.

COUGH.

A cough occurs thus: A deep inspiration is taken; and the "glottis" or entrance to the windpipe closes; then comes an effort of forced expiration, by which the glottis is suddenly burst open, and the air rushes out.

The ordinary *cause of cough* is that there is *something in the air-passages which requires to be removed*, and may be carried out by the rush of air in a cough,

although ordinary breathing fails to move it. In such cases cough may be beneficial. The upper part of the throat is very sensitive, and so the slightest irritation is sufficient to excite a cough.

Sometimes cough is caused by the *irritable state of the mucous membrane*, as in inflammation; here the cough may do harm by keeping up the irritation. Cough may also be caused by affections of the stomach, by brain-diseases, &c.

The chief *points to notice* with regard to cough are: Its frequency. Its severity and duration. Whether brought on by some apparent cause, as change of posture, cold air, &c. Its characters: Whether dry and tight, as in early bronchitis, or soft and loose as in a later stage. Whether hacking, as often occurs in the earlier stages of consumption, or deep and distressing. Whether short and sharp, as in inflammation of the lungs. Whether hoarse, as in laryngitis and diphtheria. Whether in paroxysms, as in whooping cough. Whether dry, or attended with expectoration. The characters of the expectoration. Whether the cough terminates in vomiting, or in the relief of any previously distressing symptom.

EXPECTORATION.

In a state of *health* the exudation from the mucous membrane lining the air-passages is only sufficient to moisten and soften it. When, however, the mucous membrane is affected by disease, as in bronchitis, the amount and character of this exudation may vary greatly.

It is *lessened* in the early stage of bronchitis, causing a raw feeling. It is oftener, however, *increased* in quantity, as in chronic bronchitis, inflammation of the lungs, and consumption.

Its *character* may be:—*Mucous*, the ordinary secretion being merely increased, as seen in catarrh; *Purulent (mattery)*, as late on in bronchitis; *Bloody; heavy*, containing lung tissue, as in consumption; *Putrid*, in some rare diseases.

The fluid expectorated *(sputum)* should be received into a special vessel, and should be kept for the inspection of the medical man. *After* his visit the vessel should be cleaned. In infectious diseases some disinfectant should be put into the vessel.

The chief *points to notice* are:—The quantity, the ease with which the sputum comes up; whether it is watery or thick and viscid; the colour; whether it sinks in water; whether it is frothy and mixed with air; whether it is streaked with blood; whether it is intimately mixed with blood.

EFFECTS OF REMEDIES.

The effects of remedies must be carefully noticed. In *diarrhœa* or in *costiveness*, the number, character, and the quantity of the motions should be noted. In *typhoid fever*, for instance, this is a most important point. In *coughing*, whether it is alleviated; whether it is less troublesome at night; whether the attacks are less frequent and prolonged. In *vomiting*, whether decreased, and if so, whether in frequency or quantity. Whether occurring at longer intervals after food; whether more

or less of the food taken is returned; and whether accompanied by less pain. In *sleeplessness*, whether relieved, and if so, to what extent; whether the sleep is sounder and for longer periods. In *pain*, whether it is relieved, and if so, how.

The effects of remedies with *specific actions* must be carefully watched for, and any action other than that desired noted; for instance, strychnia causes twitching of the muscles and stiffness; arsenic, pain in the abdomen and weak, watery eyes; quinine, headache, singing in the ears; mercury, soreness of the mouth, profuse flow of saliva; belladonna, dryness of the throat, red rash, dilatation of the pupils; opium and morphia. progressive stupor, contraction of the pupils.

If the nurse observes any of these undesired effects she should tell the doctor of them, but not unburden herself to the patient or his friends.

THE PULSE.

The pulse is a valuable guide in most diseases, as the heart and blood vessels are affected by nearly all illnesses.

The pulse shows to a certain extent the force of the heart, its condition, the excitability of the nervous system, and the fulness of the blood vessels.

In *fever* the pulse is quick and strong. In *inflammation* it is quick, hard, and full. In extreme *debility* it is very rapid and small, or "thready." A compressible pulse is one that disappears under slight pressure. There may be irregularity, either of strength or of interval between the beats. A hard pulse is when the artery at the wrist (radial) rolls under the finger like

a solid cord. It is met with in disease of the kidneys, when the heart has difficulty in pumping the blood through those organs. In that case, all the arteries remain full and incompressible.

The *number of beats* per minute should always be counted. Regular notes may be required on this subject by the medical man.

To take the pulse, the tip of the first finger of the right hand is laid on the front of the wrist, about half an inch from the outer border. As soon as the pulse is felt, the number of beats during a minute should be counted by means of a watch with a "seconds hand." In restless patients or children it need only be counted for half-a-minute.

The pulse should be taken whilst a patient is as tranquil as possible, as exercise or excitement causes it to beat faster. In nervous cases the knowledge that it is being taken may increase its rate.

The *average rate of pulsation* per minute is:—In adults, 70 to 80; in infancy, 100 to 120; in childhood and youth, 80 to 100. In old age it is sometimes very slow.

RESPIRATION.

Count the *respirations* without letting the patient know that you are doing so, or the rapidity will be altered involuntarily. It can often be done whilst pretending to count the pulse. In the case of a young child, the respirations may be counted by laying the hand upon the abdomen.

An adult breathes about seventeen times a minute.

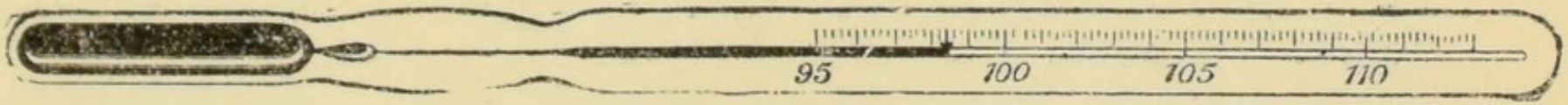
TEMPERATURE.

The temperature in health, taken in the armpit, averages 98.4 deg. F. If it remains more than a degree above or below this, it is a sign of disease.

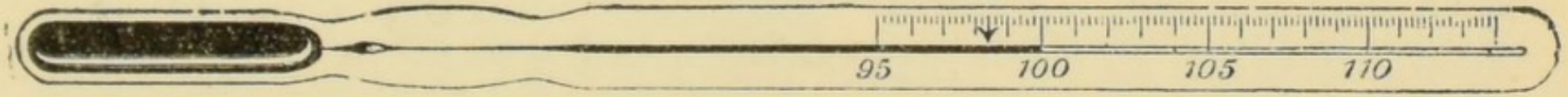
To measure the exact temperature a *clinical thermometer* is used. This differs from an ordinary thermometer in being small, self-registering, and showing only temperature between 90 (more frequently 95) and 110 deg. F.

By "self-registering" is meant that the thread of mercury (the index), unlike that of an ordinary thermometer, remains stationary when the temperature to which the instrument is exposed falls. Before using the clinical thermometer the index is to be shaken down until the part furthest from the bulb is not above 95 deg. The operation of shaking down requires some practice, and is best accomplished by a series of jerks from the wrist. The bulb of the thermometer is now to be placed in the arm-pit against the skin, and the arm pressed to the side, or the bulb may be placed in the mouth beneath the tongue. In the case of a child or a restless patient the temperature may be taken in the lower bowel. The thermometer should be left for five minutes; the end of the index furthest from the bulb will then mark the temperature. If the thermometer is to be kept for the doctor to read it should be laid carefully on its side and not shaken. Before and after use the thermometer should be carefully washed.

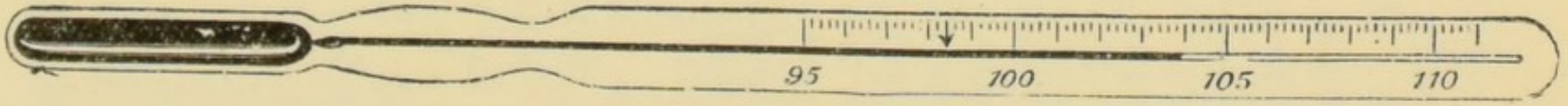
A wise nurse, having taken a patient's temperature, keeps the record *for the doctor only*. If she tells the



Thermometer registering normal.



Thermometer registering 100°.



Thermometer registering 104°.

FIG. 13.

Three clinical thermometers with the mercury at different heights.

patient or his friends what it is she may cause needless alarm. If the temperature is *normal,* well and good; but if it begins to go up people often become anxious.

To "read" a thermometer accurately requires practice; the usefulness of the knowledge repays the trouble of acquiring it.

The observations and the exact time of making them should be recorded on a chart (see Fig. 14). The nurse will do well to keep the chart concealed, only showing it to the doctor.

BATHS.

Baths are important in health and disease. They remove impurities from the surface, and prevent the pores being clogged by their own secretions or by the fine branny dust of the outer skin which is being continually shed. These objects are promoted by friction and by soap. The alkali of the soap dissolves the fatty matter of the perspiration, which would resist the action of water. Baths are also used for their tonic effects.

The human skin, although fitted to withstand changes of temperature in air, cannot do so in water. The capillaries contract and drive the blood from the skin when the air is cold, and dilate and give off heat when the air is warm, thus keeping the body always at the same temperature (p. 36). In water, however, it is different. Immersion for any length of time in a bath at 75 deg. F. is felt to be cold and depressing (air at that temperature would be unpleasantly warm); whilst water at 100 deg. F. has a far greater effect than air at the same temperature. This is because immersion

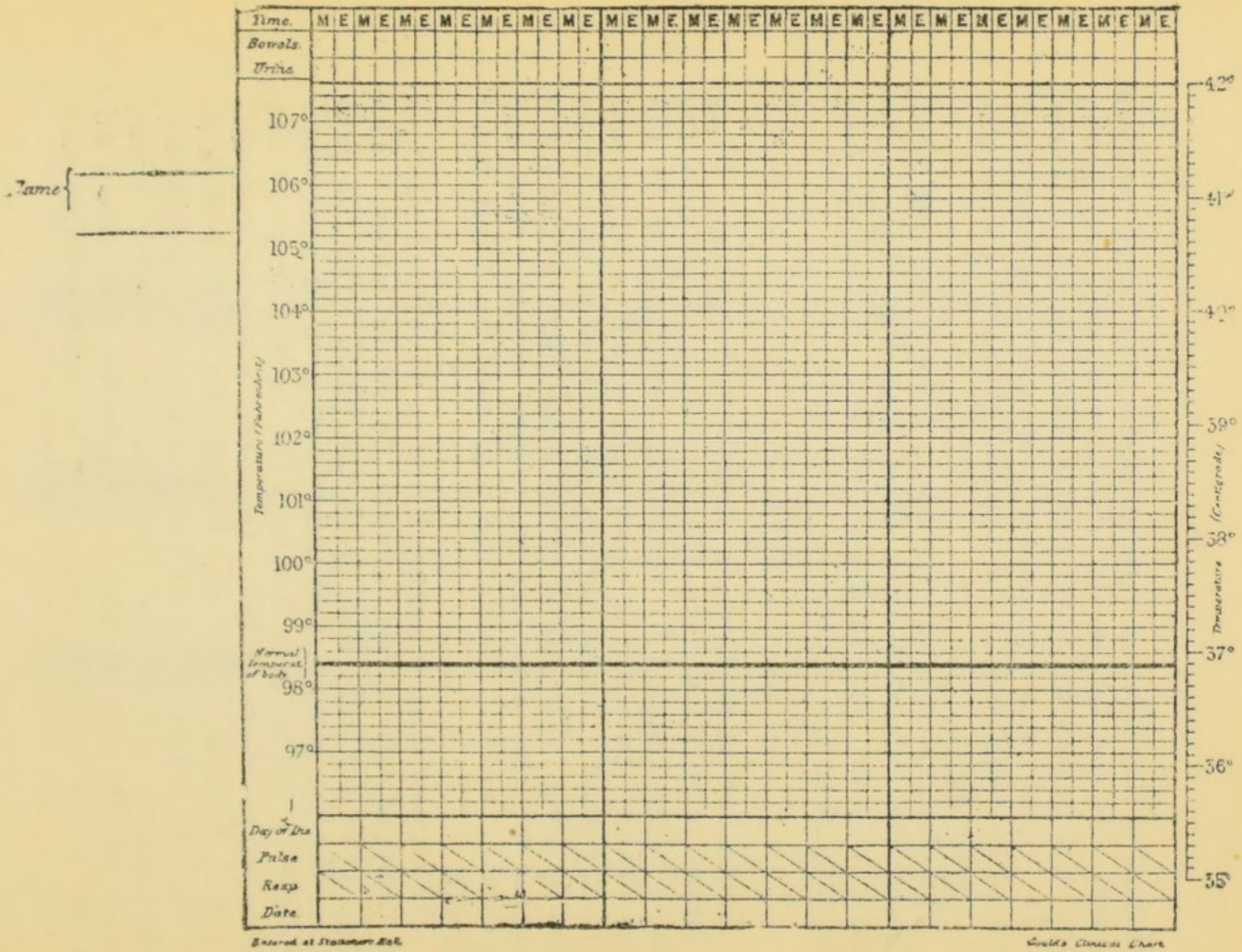


FIG. 14.

A temperature chart drawn on a reduced scale. The pulse and respiration can also be recorded on it.

in water checks the perspiration, which in air would counteract the effect of the heat, as explained on page 36.

A *hot bath* causes dilatation of the vessels of the skin and consequently a feeling of warmth. This is followed by *reaction*, the vessels of the skin contracting and driving the blood into the body, a sense of chilliness being perceived. A *cold bath*, on the other hand, causes a sensation of shock, the blood being driven into the centre of the body. It also is followed by *reaction*, but in this case the reaction is a healthy glow and feeling of warmth in the skin. Prolonged immersion in cold water may have such a depressing effect that reaction does not follow.

Tepid Baths are given at a temperature of 85 to 95 deg. F. They act only on the skin, and do not affect the nerve centres. They do not affect the body temperature, and are not followed by reaction.

Warm Baths, 96 to 104 deg. F., cause stimulation of the central nervous system, followed by a slight flow of blood to the skin and increased frequency of pulse.

Hot Baths, 102 to 110 deg. F.—Pulse and respiration increase in frequency, and profuse perspiration occurs.

When a patient is put in a bath his shoulders should be covered with a blanket. On coming out a warm sheet should be at once thrown over him. He should then be dried and got into bed as rapidly as possible.

Children are often frightened when they see a steaming hot bath. In such a case a blanket should be laid over the bath, and the child placed on it and gradually lowered into the water. A cork or a toy floating about will generally engage his attention.

When preparing a hot bath, some cold water should be put in first. It is easy to scald a child in a bath which some people would scarcely call "hot," so the temperature of a bath should always be taken carefully with a thermometer. The temperature of a hot bath for a child is about 100 deg. F. The hand is a very unsafe guide as to temperature, particularly in the case of those who are accustomed to manual labour. If there is no thermometer at hand, *the elbow* will give a fair idea as to whether or not the heat of the bath is bearable.

A *vapour bath* is very useful in getting the skin to act when the kidneys are not working well. The more the skin acts the less the kidneys are called upon to do. It may be given thus: Put a tub of boiling water under a chair, seat the patient on the chair, wrapping blankets round him. Have three hot bricks, and put them in the water, one by one, as required.

Wet sheet packing is done thus: a sheet is wrung out of cold water, a blanket is laid on the bed, and the sheet is spread over it; the patient laid on the sheet, which is then, together with the blanket, wrapped round him, and now more blankets are thrown over him. In a few minutes a warm glow is felt, the pores of the skin are opened, and the blood fills the vessels of the skin.

BED-SORES.

Bed-sores are the result of inflammation caused by continual pressure, the skin mortifying and leaving an unhealthy sore. They are generally on those parts which are most subjected to pressure—as the lower part of the back, the heels and the shoulders

Bed-sores may be *caused* by a crumpling of the sheet or by crumbs; so the lower sheet must be kept smooth and clean. Lying on a blanket also increases the risk of bed-sores, as it retains moisture and acts like a poultice.

Cleanliness is of the utmost importance in preventing bed-sores. The patient should be sponged daily with warm water, to which a little vinegar may be added. If necessary, local cleanliness must be maintained by more frequent washing. But the great thing is to keep the likely places for sores from pressing upon the bed. If a patient with threatening bed-sores can be turned on to his face, this should be done. Next best to this is the use of a circular or horse-shoe air pillow.

When washing a patient or changing sheets, the nurse should *watch carefully for approaching bed-sores*. If the skin is red and tender, it should be bathed with brandy, eau de Cologne, spirits of camphor, or spirits and water, so as to harden it. If a sore is formed, it should be shielded from all contact by means of a folded sheet placed above and below it, or, better still, by an air-pillow with a central opening. Horse-shoe pillows are often the best. If a water-bed can be obtained, it will afford the best preventive to bed-sores, by equalising the pressure all over the body.

Bed-sores are most likely to occur when the vital powers are low, as towards the end of a tedious fever; or when the nutrition of the part is defective, as through paralysis.

DELIRIUM.

Delirium is a state of deranged mind, in which the intellect and judgment are perverted or lost, whilst the

imagination is left without control. Just as in dreaming, the mind wanders on from point to point and there is no power of controlling it, so in delirium the shape of something in the bed-room calls to mind something else, and so the mind wanders on, "dreaming aloud." In delirium patients may even spring out of bed.

Leaving out of the question *delirium tremens*, which is brought on by the nervous system being poisoned by alcohol, *delirium* is generally divided into two classes, *maniacal* and *typhoid*, according as the symptoms are strong and furious, or low and nervous.

Delirium generally increases as night comes on, and lessens as morning dawns.

Patients in delirium must be humoured and not actively opposed. Their delusions should be listened to and not contradicted; thus, if a curtain appears to the fevered intellect to be some personal enemy, it is no good to say that it is only a curtain; but if the curtain be shaken and its folds rearranged, and the patient be told that there is no enemy there now, the idea will probably pass from his mind.

Delirium generally takes its shape from surrounding objects, and if its cause can be detected by following the direction of the patient's eye, it may sometimes be lessened by rearranging the furniture of the bed-room or hiding the offending article.

Cloths wrung out of cold water and applied to the forehead, and frequently changed, may relieve delirium and induce sleep.

A nurse should never repeat anything of a private or family nature that she has heard from a delirious patient.

SICK CHILDREN.

The nursing of sick children deserves special notice. Most of what has been said about general nursing also applies to children. But patience, care, and tenderness are more than ever essential.

If a nurse is given charge of a child to whom she is a stranger, she must be careful not to alarm him. On entering the room she should sit down at some distance from him and pretend not to notice him. After a few minutes her presence will have become familiar, and she may approach. If the child is asleep she should be especially careful to keep out of the way, so that he may not see a strange face on awakening. In noticing or speaking to the child her manner should be quiet, and her voice gentle and soothing. She must strive above all things to win her patient's confidence; when that is won her position is secure.

To find out what is the matter with a child may require much tact. A child cannot be questioned, and if he is fretful he can scarcely bear to be looked at.

Symptoms must never be neglected in children. The bodies of children are frail, and so disease has a dangerous power over them; there also seems to be a closer union between the parts, and so diseases spread rapidly from one organ to another. An apparently trivial symptom may be the precursor of a serious disease, just as an apparently trivial accident may, if neglected, lead to a life-long deformity.

A *flow of tears* need not be minded nearly as much as *tearless crying*, the latter arising more usually from bodily pain than from mental causes. The *cry of hunger* may be recognised by the hand being carried to the

mouth, and by the mouth being moved as though drawing in and swallowing food.

Rolling of the head on the pillow, especially if the eyes be fixed, and passing the hand over the top of the head, are symptoms that should not be neglected; if not arising from costiveness, advice should be at once obtained. The persistent drawing of the head backwards between the shoulders should at once attract attention.

The *movements of the mouth*, poetically considered the effect of an angel's whisper, are generally caused by flatulence; change of posture, rubbing the abdomen with a warmed hand, or laying a hot flannel on it, may relieve this.

Some diseases of infancy come on so suddenly, and so soon obtain the master-hand, that everyone having to do with children should have a knowledge of what to do *until the doctor comes*.

Diarrhœa. In very young children this generally occurs from errors in diet. In children at the breast the mother's diet may be at fault.

The diet of the child should be carefully regulated. If diarrhœa is excessive (especially in hot weather) continues too long, or is accompanied by vomiting or much feverishness, advice should be sought. In older children, if it arises from errors of diet, a small dose of castor oil or rhubarb may be given.

Strong purgatives should never be given if there are any feverish symptoms. If the case turned out to be an early stage of typhoid fever purgatives might be dangerous.

Diphtheria is an inflammatory affection of the windpipe. A false membrane often forms, narrowing the air-way, and so causes suffocation. It often comes on suddenly, and is ushered in by a peculiar, loud, brassy cough. After a time the breathing becomes difficult, and there is a roughness and shrillness of inspiration. The skin is hot, the face flushed, and there is great thirst. Sometimes, however, the face is pale, and there is no elevation of temperature. If the disease advances the lips become livid, and there is either an increased struggle for breath or a tendency towards unconsciousness. A doctor should be called in at once.

Treatment. One or two teaspoonfuls of ipecacuanha wine should be given in warm water sweetened, followed by hot drinks until vomiting occurs. If relief is not obtained, the dose is to be repeated in ten minutes. The child's feet should be put into hot water and mustard, or, better still, the child should be put sitting in hot water, the shoulders being covered with flannel; then a large, thick poultice of three parts of linseed meal and one of mustard should be put on the upper part of the chest and well round the throat.

The room should be kept warm and the air moist; so a fire should be lighted and a kettle placed on it, the steam being conducted into the room by a tube; a roll of paper will do for a tube for a short time. The air should not be made too moist.

Convulsions are often preceded by contractions occurring in a limb. Drawing in the thumb tightly across the palm of the hand is frequently a warning.

The best *treatment* is to put the child at once into a hot bath, or, if this causes fright and struggling, cloths

dipped in mustard and hot water may be applied to the feet, legs, and lower part of the body. This induces the blood to leave the brain and enter the dilated capillaries of the skin. If the fit is caused by an error of diet, some castor oil may be given as soon as the child can swallow it.

When children are "*out of sorts*" it is a mistake to dose them with medicine. The widely-advertised drugs, powders, soothing or aperient, are decidedly injurious. Careful dieting is generally the chief medicine needful in the trivial ailments of children. Broth may be substituted for meat, bread and milk for cakes and jam, and light puddings for indigestible pastry. Careful bathing, fresh air, and exercise will probably complete the cure. The less patent foods and patent medicines that are given the better.

Feeling a child's pulse often causes a struggle. If, however, one finger be given to the child to hold on by, and another laid on the wrist, the pulse can generally be counted. The pulse may also be felt behind the inner ankle bone or in front of the ear.

To count the respirations the hand should be laid on the abdomen, as already remarked.

A child should never be allowed to sleep with an adult. There is a risk of "accidental over-laying," or more properly "careless suffocation." Pure air is even a greater necessity for children than for the grown-up, and air contaminated by the emanations from another's lungs and skin is injurious. For the same reason children should never be allowed to sleep with their heads under the clothes. A child in its own

cradle or cot can be kept sufficiently warm by an extra blanket or an eider-down quilt.

PREPARATION FOR MEDICAL MAN'S VISIT.

Due preparation must be made for a medical man's visit, in order to save time and to avoid fuss. Hot and cold water, carbolic or other antiseptic soap, and a clean towel should be provided for his hands.

If necessary, the patient's temperature should have been taken, and all information since the last visit should be ready.

In *surgical cases* if dressings or fomentations have to be removed, the new dressing, or the materials for making a fresh application should be ready. Lint, oil-silk, cotton wadding, or anything else required for the case must be at hand. Scissors, needle and thread, and pins should always be within reach of the nurse.

CHAPTER VI.

APPLICATION OF LOCAL REMEDIES.

POULTICES.

In treating of *Local Remedies* we must first inquire why they are used, and what results are expected from them. To understand their action is of the utmost importance.

Heat is applied locally, either in a *moist* or *dry* form—most frequently in the former. Poultices and fomentations are the usual forms in which moist heat is applied.

Poultices afford warmth and moisture, and ease pain by lessening the tension and hardness of the tissues, which are the chief causes of pain in inflammation. They establish an even circulation through tissues which previously were congested in places.

In *inflammation* very large poultices should be used, and they should be as hot as possible. If applied at the very beginning to inflamed tissues, they check the inflammation and may prevent the formation of matter.

When matter is formed they assist its discharge. For this purpose they actually need be *very little larger than the opening in the skin.*

Fomentations or poultices should be changed about every two or three hours. Heat, softness, and moisture are required: so as soon as poultices become cold, hard,

or dry, they must be taken off. From two to three hours will generally be found to be the extreme time for which poultices will retain the desired qualities.

To retain its heat a poultice must be thick: from a quarter to half an inch will generally be found sufficient. It is best spread on cotton-wool, which is light and keeps the heat in; old flannel also does. Whatever material is used, it must be larger than the poultice is to be, and as soon as the poultice is spread the free edges of the material should be doubled down on it. This limits the poultice to a given size, keeps it hotter, and makes it easier to put on and take off.

If a poultice is covered with several thicknesses of flannel, and with waterproof, such as jaconette, it will retain heat and moisture much longer than it otherwise would.

In some cases very large poultices are required. In children it may even be necessary to cover the entire chest, front and back. This is called a "*jacket poultice.*" It may be spread on a piece of linen sufficiently large to go round the entire chest, tapes being sewn on to fasten in front and over the shoulders. A jacket poultice can also be fastened on with two triangular bandages, the base running over one shoulder and under the other armpit, the point going under the second armpit. The back bandage should be put on first.

Before making a poultice the patient should be got ready. If another poultice has to be removed it should be taken off, the part sponged and covered up warmly. If there is a wound it should be washed and lightly covered. The poultice should then be made rapidly,

brought to the bed-side, and put on as hot as the patient can bear. It should be carried on the palm of the left hand, and the lower end placed against the patient; it should then be turned up into its proper position. Care must be taken in doing this not to scald the skin.

Especial care must be taken in putting poultices on children. The skin is more tender, and it has been known to mortify after being scalded by a cup of hot tea. It is sometimes well to lay a handkerchief, or even a piece of flannel, between the poultice and the skin. This can be slipped away when the child is accustomed to the heat.

In taking off a poultice it is well to begin at the top and then turn it in as it is removed, gently pressing against the skin. It should be removed in one piece, without any being left sticking to the skin, or without it being allowed to fall about the bed. Sometimes, however, this cannot be done: a good deal depends upon the kind of poultice, how it is made, and how long it has been left on. A bread poultice is more likely to fall in pieces than a linseed one.

Linseed poultice.—A basin is to be scalded out, and sufficient boiling water poured into it. The linseed meal is then to be added with the left hand, being sifted between the fingers. It is to be well worked, and when it is light and free from stickiness, and cuts clean, a little linseed or olive oil is to be stirred into it. It is then to be spread on cotton-wool, well pulled-out tow, flannel, or a piece of old blanket.

Bread poultice.—A basin is to be scalded out and some boiling water poured into it. Then coarsely-crumbled

bread is to be added, the mixture being well stirred. The basin is then to be covered with a plate and left before the fire for about five minutes. The superfluous moisture is to be drained off, and the poultice is ready for spreading. If not hot enough, more boiling water may be added, and almost immediately drained off.

A *charcoal poultice* may be made by sprinkling powdered wood charcoal on either a bread or linseed poultice. From $\frac{1}{4}$ to $\frac{1}{2}$ ounce of charcoal is generally sufficient. Charcoal poultices are generally used for unhealthy or foul sores. Charcoal has the power of absorbing evil-smelling gases; this power is lost, however, if the charcoal is wetted by being stirred up in the basin.

Mustard poultices are generally made by working equal parts of mustard and linseed meal into a paste, with hot, *but not boiling,* water. If they are wanted very strong, the quantity of linseed meal may be lessened or omitted, mustard and cold water being used alone. If a milder effect is desired, as in the case of children, or when the poultice is to be left on for a considerable time, two, three, or even more parts of linseed meal, may be used to one of mustard.

Mustard poultices should be covered with muslin. All other poultices should be applied directly to the skin.

Mustard leaves make good stimulating poultices. They fit into a small space, and are easily and rapidly prepared.

FOMENTATIONS.

Fomentations have the same action as poultices, and are lighter and cleaner, and better borne on tender

surfaces. They are made by pouring boiling water over flannel, and then wringing the flannel out, shaking it up, and quickly applying it. They are to be covered with waterproof and fastened on with bandages. If wrung as dry as possible there is very little fear of scalding or blistering, no matter how hot the flannel is. The waterproof covering should be larger than the poultice itself, so that evaporation is completely checked, and the heat is thus better retained.

The wringing can be best done in a roller towel. The flannel is placed in the middle of the towel in a basin, and boiling water is poured over it. Sticks are passed through each end of the towel, the centre is raised, the sticks twisted in opposite directions, and so the flannel is wrung out.

An ordinary towel will also do. It is spread over a basin, the flannel is placed upon it, and the boiling water is poured in. The towel is then folded over the flannel, it is lifted out of the basin, and the two ends are twisted in opposite directions until the flannel is squeezed dry.

The flannel is "shaken up" in order to let the air into its substance and folds. Air being a bad conductor of heat, this causes the fomentation to retain its heat much longer than it would otherwise have done.

If poppy heads have been boiled in the water the fomentation will be more *anodyne*.

Spongio-piline, being porous at one side and waterproof at the other, does for fomentations, but it should not be used over a wound.

Twenty or thirty drops of *Turpentine* sprinkled on either the flannel or spongio-piline is a good stimulant,

and is often used when the bowels are distended with gas.

As fomentations rapidly become cool, they must be frequently changed. When they are finally removed the skin must be dried and covered with warm, dry flannel.

DRY HEAT.

Dry heat is applied when heat is necessary and it is desired to avoid the relaxation of the tissues caused by moisture. Flannel heated before the fire or in an oven, sand or bran sewn in flannel bags, and heated in an oven, or a flat tile heated and wrapped in flannel may be used.

One of the commonest ways of using dry heat is to apply tins, jars, or bottles of hot water to the feet. They ought to be wrapped in flannel to prevent the skin from being injured. Heat ought not to be applied to the unconscious or paralysed; it is surprising how easily mortification may follow the application of heat to ill-nourished tissues.

BLISTERS.

Cantharides, or Spanish fly, is the general basis of *blistering preparations*. When applied to the skin they cause tingling, smarting, and a sensation of heat; soon the "true skin" becomes congested, and an oozing takes place. The minute drops of serum enlarge and coalesce, forming different-sized blebs. The outer skin, or epidermis, is, of course, raised up by the fluid.

As a rule, blisters are applied as *counter-irritants*, and for this purpose redness and a minimum amount of bleb-forming are desirable.

The effect of counter-irritation may be shortly explained. It affects the nerve endings, and through them causes an impression to be brought by the nerve fibres to some portion of the brain. This causes another impression to be carried by other nerve fibres, either to the spot where the counter-irritant was applied, or to some other portion of the body which receives nerves from that part of the brain.

Thus we find that irritating the skin may have an effect on the brain. This is seen in some cases of coma, where consciousness is aroused by blisters applied to different parts of the body in rapid succession, and for a short time each—"flying blisters."

Thus a blister in one situation may ease pain in another. The nerve that supplies a joint or muscle also supplies the skin over it, so a superficial application generally affects the tissues beneath.

The common preparation of cantharides is a thick plaster. Some of it may be spread on sticking-plaster, a margin of the latter being left to fasten the blister to the skin.

Blistering Fluid is painted on with a camel's hair pencil. The amount put on and the delicacy of the skin will regulate the effect.

A small blister can readily be made by putting some cotton-wool into a silver thimble and pouring on it a few drops of strong solution of ammonia. The thimble is then to be inverted on the skin, and kept there for ten minutes. By this time a blister will have arisen.

Counter-irritation by mustard, or by tincture or liniment of iodine, may take the place of blistering.

The dressing of a blister deserves care, as ignorant handling may cause severe suffering. Unless specially directed to the contrary, a blister should *not* be opened, but be covered with a layer of soft cotton-wool till the effused serum is absorbed. Even if the blebs are too large to admit of absorption, it is important to preserve the covering until the true skin has had time to form a new epidermis. The highly sensitive nerve-endings are thus protected, and the risk of ulceration is lessened. Allowing the air to reach the raw surface may, in persons of weak constitution, cause inflammation, ulceration, or mortification.

When desired to open the blister, it is best to prick it with a fine needle, and allow the serum to ooze slowly out. The vesicle should not be squeezed. Large blisters may be snipped with a pair of scissors. The fluid should be caught in a vessel or on soft rags, to prevent it irritating the neighbouring skin. And when the fluid has nearly ceased running, some simple dressing is to be laid gently on the blister and secured with strips of sticking-plaster.

OINTMENT.

Ointments are composed of some fatty matter, and are sometimes used plain, for softening and lubricating the skin. Generally, however, some powder, solution, or extract is rubbed up with some greasy basis, and it is the action of this additional principle that is desired.

Vaseline and *Lanoline* are much used, both for their own action and as a basis for other remedies, and are superior to lard, as they do not become rancid.

Ointments are *spread* on lint or soft linen, and are secured either by bandages or strips of sticking-plaster.

LEECHES.

Leeches are used for the removal of blood. Their effect is local and not constitutional. They can be used in cases of acute inflammation, when cupping would be too painful.

The medicinal leech is three or four inches long, and has a soft, elongated, oval body, terminating in a sucker, which is furnished with three small, hard teeth. An average-sized leech abstracts about a teaspoonful and a half of blood.

In putting on leeches, a bony surface, or some part where pressure will stop the bleeding, should be selected when possible.

Before putting on leeches the part is to be washed with warm milk and water and well dried. It is better not to use soap, as it may prevent the leeches biting.

In applying leeches they may be put into a tumbler, which is held against the skin.

When a leech has to be placed on some particular spot, it is put into a *leech-glass,* or tube tapering to one extremity and ending in a small hole, through which the leech can bite. The leech must not be placed in the glass *tail foremost.* To find out which end is the tail watch the leech move.

When a leech has taken its fill of blood it falls off; if it is desired *to remove it* sooner it must not be pulled off, as this might leave the teeth in the skin, and so give rise to a troublesome sore. A pinch of salt placed on its body will make it drop off.

The *bleeding* has generally to be encouraged by a fomentation. If it continues too long it may be stopped

by pressing a finger for a few minutes to the bleeding spot. A compress, small piece of cotton-wool, or the fluff off a blanket, will also generally stop it, by entangling the fibrin of the blood, and so leading to the formation of a clot. If these means fail, a little cone of lint may be inserted into the bite and secured firmly with a pad and bandage. If the bite continues to bleed and causes anxiety, a fine needle may be made to transfix it, and a thread twisted round the ends of the needle in a figure of 8.

INHALATIONS.

The word *inhalation* is applied in medicine to the breathing of steam or vapour. The steam may be plain or medicated. Many ingenious inhalers are sold, but, although often more convenient, they are hardly more efficacious than the following improvised one:

Boiling water is to be poured into a jug, round the edge of which a towel folded into a circular shape is placed. The patient is to lay his face on the towel and inhale the steam.

A teaspoonful of vinegar, turpentine, tincture of benzoin, or carbolic lotion, added to the water makes a useful *medicated* inhalation.

PADDING SPLINTS.

Pads are made out of one or two thicknesses of cotton-wool. Pocket-handkerchiefs, or tow—well pulled out—will do. Newspapers and straw are suitable as temporary expedients. Pads must always be made *larger than the splints*, and must project at all sides, so that the edge of the splint may not touch the skin.

The pads must be arranged with regard to the contour of the limb, so as to exert proper pressure along its length. No pressure is permissible on bony prominences; at superficial joints, such as the knee, the pads must be thicker above and below, so as to prevent pressure on the bone where it is only protected by the skin.

The best way to form a pad for a splint is as follows:—

Lay the splint on two thicknesses of cotton-wool and cut round it, leaving an inch free all round. Take three strips of plaster, warm them, and lay their middle part on the cotton-wool—one at the top, another at the bottom, and the third in the middle—bringing the ends round the splint and fastening on its back.

MANAGEMENT OF CONVALESCENTS.

During *convalescence* a nurse's capabilities have full scope. The body and mind are weak and worn, and have to be restored to strength and vigour. The following points must be attended to.

Food.—More food is required during convalescence from acute diseases than in a state of health, as the body has not to be kept *at a particular weight*, but has actually to be built up and to *increase in weight*. At the same time the digestive system is weak, so the food must be such as can be easily digested; and it must be carefully and tastefully administered. Soups, milk puddings, bread and butter, and similar light foods should be given every three or four hours. It is important not to leave too long an interval between meals as

exhaustion so soon comes on; but continual "nibbling" at food must not be allowed. Beef-tea and arrowroot are not of much use in convalescence.

The *clothing* must be warm and comfortable, for "catching cold" is one of the most frequent causes of delayed convalescence, or even of relapse. The extremities must be well protected, especially the feet, as they are most distant from the heart, and warm blood does not always reach them. If possible, the bed of a convalescent should be in the sunny part of a sunny room.

Sufficient *rest* must be taken. At least nine to ten hours' rest will be necessary at night, and lying down for a short time after each meal is of service.

Variety lessens the tedium of convalescence and hastens recovery. Sometimes during convalescence progress seems to cease. It is then that variety is most important: and, if an entire change of scene cannot be managed, changing into another room—even for meal-times—will act as a stimulus to making a fresh start towards health.

A convalescent must be *amused*. This is easy, as even childish occupations are generally acceptable. Thus scrap-books, picture-books, and puzzles, watching another at work, or hearing a simple story read, may make the time pass pleasantly.

Some diseases have *special dangers* in the convalescence stage. Thus, after typhoid, even slight errors of diet may cause relapse. *Meat must not be given until ordered by the doctor.* After scarlet-fever there is a peculiar danger from cold, and so the patient should be well protected by flannel; the slightest enlargement

about the ankles must be immediately reported. Paralysis is apt to occur after diphtheria.

The *part affected* must to a great extent guide the treatment during convalescence. For example, if the lungs or throat have been affected, special precautions should be taken against anything likely to give cold; or, if the stomach be affected, the dieting will require special attention and care.

PERSONAL AND FAMILY HYGIENE.

Under the heading of *Personal and Family Hygiene*, it will be only possible to deal shortly with a few of those points, the care or neglect of which so often turns the balance in favour of health or disease.

Dwelling.—A house should be perfectly *dry*. Damp should neither rise in the walls nor come through them. Thin porous walls that admit damp should be cemented. The roof should be sound, and the gutters and rain-pipes clean. Dampness of the basement may be caused by a leaking drain or rain-pipe, by slop-water being thrown out too near the house, or by dampness of soil. In the latter cases the floor should be excavated, and relaid with spaces beneath to admit of a current of air.

A *sunny aspect* is a great preventive of illness. The Italian proverb says that where the sun does not go the doctor does.

The *drainage* should be in perfect order, and no one should go into a house without having all the traps and drains inspected by a *competent man*. Inspection should be repeated at regular intervals—say, of six months. In dry weather water should be frequently poured down all traps, and carbolic powder or chloride of lime should

be thrown occasionally on them. Disinfectants should be employed when the closet is used. The exit drain *from the house* should always be trapped and ventilated by a large pipe reaching above the roof. The overflow pipe of a cistern should discharge over a trap, and should *never open directly to a drain*, lest sewer gas should pass up it and be absorbed by the water.

The *entire house* must be *kept clean*, not only those parts of it which meet the eye of a visitor, but the insides of cupboards, servants' rooms, &c.

The old wall-papers should be stripped off before new ones are put on. Distempered or painted walls are better than those which are papered, however.

Fresh air is absolutely necessary to health. In *bedrooms* at least 600 cubic feet of air should be allowed for each adult, and children require space in proportion. Even when the room is of proper size, the air will need renewing, so the top of the window should be open day and night, and the chimney should be free.

In *sitting-rooms* purity of air is also important. Electric light is far more wholesome than gas.

Air should be admitted by the top of the windows, or by ventilating tubes or valves, and *not by the door*. Much of the lassitude and of the liability to illness that are such features of modern life are due to the unpardonably neglected state of the air of the house.

Cleanliness.—The entire body should be washed daily. A hot bath should be taken weekly. The teeth should be well brushed after each meal, and at night. When the hands have been washed in warm water they should be dipped into

cold water; this closes the pores, takes away the liability to chill, and prevents the hands becoming soiled as soon as they otherwise would.

Clothing should be warm and light. Muffling-up is injurious, but so is the other extreme of defying the weather. Those whose chests are weak must be careful not to run the slightest risk of cold. As a rule, however, cold baths, followed by vigorous friction with a rough towel, and brisk exercise keep off the cold more effectually than mufflers. If, however, a person does not get warm after a cold bath—if his skin does not "react"—he should take a tepid bath. Flannel is good next the skin, and especially so if there is any predisposition to rheumatism or catching cold.

The evil effects of injudicious clothing are most seriously felt by females. Pressure on the shoulders and lower ribs lessens the freedom of the respiratory movements, and predisposes to consumption. The abdominal organs are often seriously displaced, and curvature of the spine results from the muscles of the back wasting in consequence of being prevented from performing their natural function. High heels strain the ankles, lessen the power of the muscles of the calf, and disturb the balance of the body. They also cause fatigue, similar to that which is felt going down a steep hill. Boots made on the theory that there are equal arches inside and outside the foot, and that the great toe is central, are the direct cause of bunions and lameness. Parents have a heavy responsibility in selecting proper clothing for their children.

Food should be taken *regularly* and at proper intervals. Meal-times should be fixed and adhered to.

Growing people should have meals about every four hours during the daytime. Those who are further advanced in life find three meals a day sufficient. The morning meal should be taken before work is commenced.

Food should be eaten *slowly*, and never "bolted," and violent exercise should not be taken immediately afterwards.

The *quality* of food is important. It is necessary to take nitrogenous food, some sort of fat, sugar, or starch, water, and various salts. The nitrogenous foods are generally called "tissue-formers," and fat, sugar, and starch "heat-givers" (p. 28). Milk contains the proper proportion of each class of food, and as those who work hard require solids, oatmeal may be looked upon as nearly a perfect food, containing as it does heat-givers and tissue-formers in proper proportions. One should not depend too much upon meat for the needful supply of nitrogen. Oatmeal, lentils, pease, and haricot beans are all rich in nitrogen, and many other vegetables contain a considerable proportion. So that, although meat is of great use as a food, it should not be too much depended upon. Dr. Parkes kept a soldier doing hard work on 1¾lbs. oatmeal and two pints of milk a day, at a cost of ninepence, in perfect health, and at a constant weight. Bacon will supply some of the necessary fat for those who cannot afford to buy so much milk. Meat soup, with oatmeal in it, and bread also form a capital diet.

"Wholemeal" bread is much more nourishing and wholesome than either white or the common brown

bread. The least nutritious bread is that made of the finest white flour.

The *quantity* of food taken should depend upon the amount of work to be done and of heat required, so that in cold weather, and after active exercise, food should be increased in quantity, and *vice versâ*.

If no stimulants or condiments have been used, it is generally right to eat until the appetite has been satisfied.

Drinks.—Two to three pints of water are necessary daily for adults. Some of this is taken as a drink and some in food. Tea and coffee are useful adjuncts, and unless taken in excess are harmless. Nurses are apt to drink too much tea, with the result that many of them are dyspeptic and pale. Tepid drinks generally slake the thirst most effectually, as they soften the mucous membrane.

During hard work oatmeal and water (boiled together), buttermilk, and cold tea or coffee with plenty of milk, form the best drinks.

Alcohol taken in excess, whether in the form of wine, beer, or spirits, over-exerts the heart, alters the blood-corpuscles, paralyses the nerves, and consequently checks the circulation through the capillaries, hardens the tissues, and cools the body; particular organs are also injured—as the brain, liver, and kidneys. Still, it is absurd to talk of beer and wine as if they were pure alcohol, or to affirm that drinking them in moderate quantity at meals is harmful. Taken on an empty stomach all spirituous drinks—wine and beer included—are injurious. The proper time to drink wine and beer

is at meals—not before them and not after. Spirits deserve a place among the poisons.

Sleep.—From seven to nine hours of sleep are generally required. For the sleep to be *sound*, neither the mind nor any particular organ of the body should be specially engrossed; thus a student should spend half-an-hour before going to bed in conversation or at light literature. So also the final meal should be taken two or even three hours before bed-time, and should be composed of light and easily-digested food. Fresh air, a fairly hard mattress, and not too heavy bed-clothes are all important factors in securing a good night's rest.

Exercise.—Any part not used gradually wastes, so all the muscles of the body should be regularly exercised. Walking chiefly exercises the muscles of the lower part of the body, but swimming uses them all. Many games afford capital exercise, and should be played by *girls* and boys alike.

Gymnasia are very useful, but they should be used for general and regulated exercise, rather than for attaining proficiency in some particular feat. It is important to *work up gradually*, and not to begin with anything requiring much muscular exertion. Periods of rest should alternate with periods of exertion.

The narrow chest and ill-developed muscles that result from neglect of proper exercise in youth are the strongest argument in favour of universal military service. Every boy and man would be the better for systematic drilling or training.

In conclusion.—Morality, cleanliness, temperance, regularity, exercise, sleep, wholesome and sufficient food, pure water, fresh air, and proper clothing, are all

in favour of health, whilst the opposites, such as intemperance, irregularity, want, and luxury are against it. All classes are afflicted with diseases, arising from the facts and prejudices of their surroundings, many of them being altogether avoidable. The *poor* would do well if they would give up spending money on drinks which only give temporary and deceitful stimulation, and spend it instead on improved home, food, and clothes. The *rich* would do well if they would remember and act on Dr. Abernethy's advice—"If you wish to be healthy, live on sixpence a day, and *earn* it."

CHAPTER VII.

THE ROLLER BANDAGE AND ITS APPLICATION.

(By ROBERT J. COLLIE, M.D.)

THE ROLLER BANDAGE.

Roller bandages may be bought ready made of different materials: linen, calico, web, gauze, &c. They can, however, be easily made by tearing strips of suitable widths from a piece of calico 6 yards long, taking

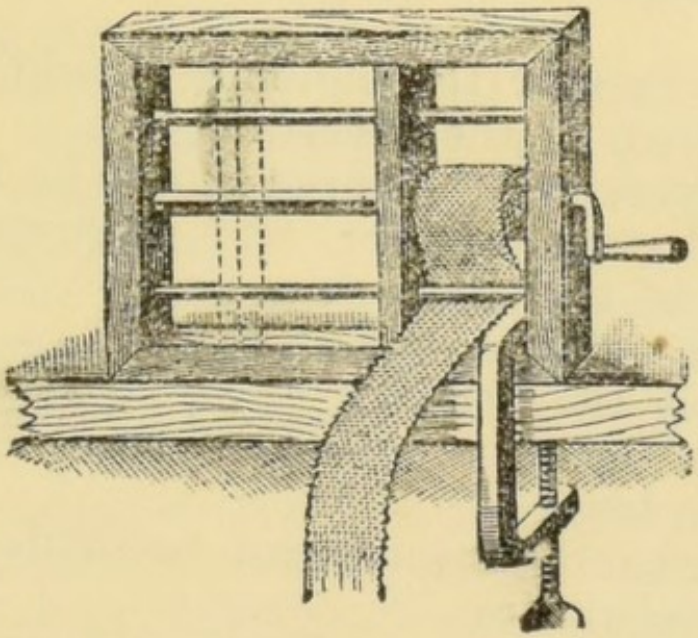


Fig. 15.

Designed by A. C. Tunstall, M.D., Lecturer and Examiner to the Association.

To be had from the St. John Ambulance Association.

care to remove the selvedge. These strips are then firmly and uniformly wound up into rolls, either by the fingers or by means of the winding machine shown in Fig. 15.

GENERAL RULES.

1. The bandage must be tightly rolled.

2. Begin by placing the outer surface of the roll next to the skin, in order that it may readily unwind.

3. Never unroll more than two or three inches of the bandage at a time, and if by accident more is unrolled, roll it up before proceeding.

4. Begin by making a couple of turns round the limb to fix the bandage firmly.

5. Bandage from below upwards—that is, in the direc- to fix the bandage firmly.

6. Bandage from within outwards over the front of the limb.

7. Each turn of the bandage should, as a rule, overlap two-thirds of the preceding one.

8. In reversing, the turns should be kept parallel and at equal distances apart, and downwards towards the extremity of the limb.

9. Form a figure of 8 at a joint.

10. Apply the bandage firmly or it is useless. If the edges turn up on running the hand down it, the bandage is too loose.

11. The bandage must not be made tight enough to stop the circulation.

12. The pressure must be equally applied throughout. If on removing the bandage red lines are found on the skin, it is an indication of unequal pressure produced by the edges.

13. Fix the bandage securely at the end by pinning or stitching.

14. Do not re-apply a bandage without first completely winding it up. This should be done firmly and evenly, otherwise it is impossible to apply it properly.

15. In taking off a bandage, gather the slack into a loose bundle and pass it round and round.

METHOD OF APPLYING THE ROLLER BANDAGE.

There are three methods of applying the roller bandage:—

1st. The Spiral.

2nd. The Reverse.

3rd. The Figure of 8.

The Spiral is made by simply encircling the limb with the bandage, each circle being made to cover two-thirds of the preceding one.

This method can only be applied where the part to be bandaged is of a uniform thickness, as for instance the finger and a short portion of the forearm immediately above the wrist.

The Reverse.—In applying the spiral bandage a point is always reached where the increasing thickness of the limb makes it impossible to tighten the lower edge; this difficulty is got over by applying the thumb or forefinger of the disengaged hand to the lower edge of the spiral about the centre of the outside of the limb and turning the bandage downwards upon itself with the other hand, and then drawing the bandage tight; it will now be seen that *both* edges firmly embrace the part. The bandage is again made to encircle the limb, and a second reverse is made in line with the first, but

on a slightly higher level. These reverses are continued as often as necessary.

The Figure of Eight.—Where the surface is so irregular that neither the spiral nor the reverse is admissible, as for instance at a joint, the bandage is applied in a series of loops, forming, as its name implies, a figure of eight.

THE FOREFINGER.

Take a hank of broad tape (or a narrow roller bandage) three-quarters of an inch wide, and wind it tightly into a roll.

Place the hand palm downwards. Commence at the root of the thumb, and, leaving a free end of three or four inches, carry the roller across the back of the

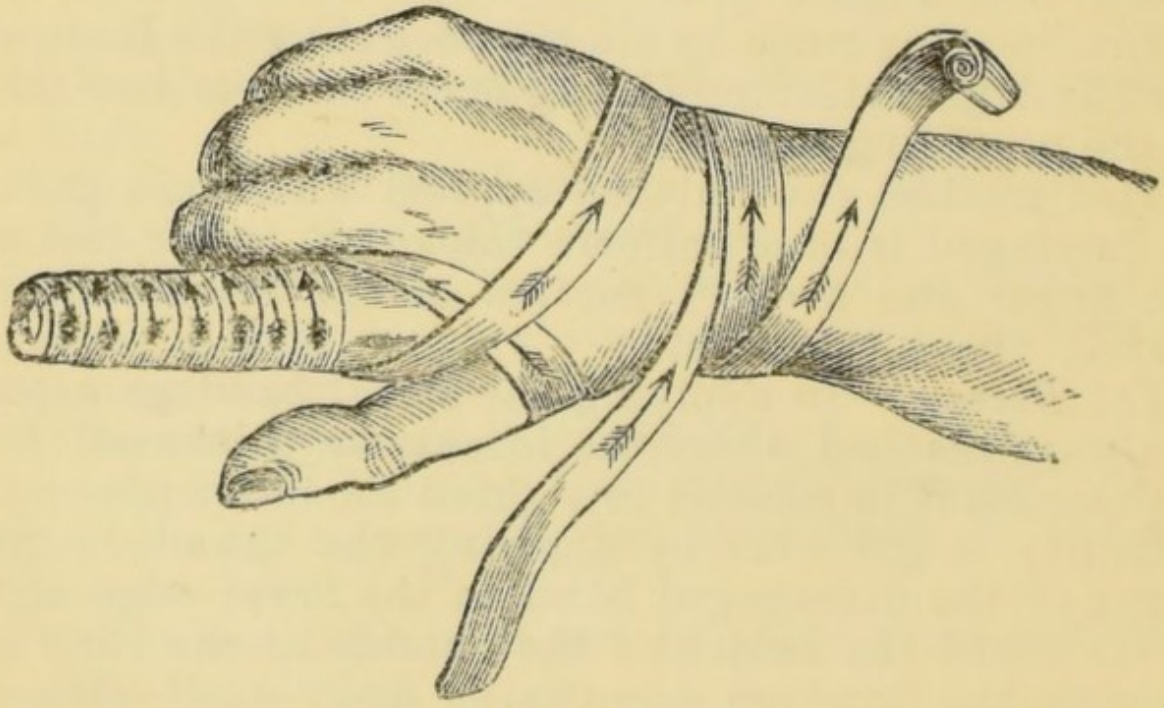


FIG. 16.

wrist, encircling it twice in order to fix the bandage. Now take the roller up the back of the hand from

the root of the thumb to between the first and second finger, and by one large spiral to the tip of the forefinger, which is then covered by a series of spirals from tip to root, each turn overlapping two-thirds of the preceding one. When the root of the finger is reached, the bandage is carried across the back of the hand to the inner side of the wrist, and fixed by tying it in a reef knot to the loose end previously left for the purpose.

The other fingers are bandaged in the same manner. If more than one is to be bandaged, a turn round the wrist should be taken before commencing the second.

SPICA* FOR THE THUMB.

Take a hank of broad tape, three-quarters of an inch wide, and wind it tightly into a roll, or a narrow roller bandage may be used.

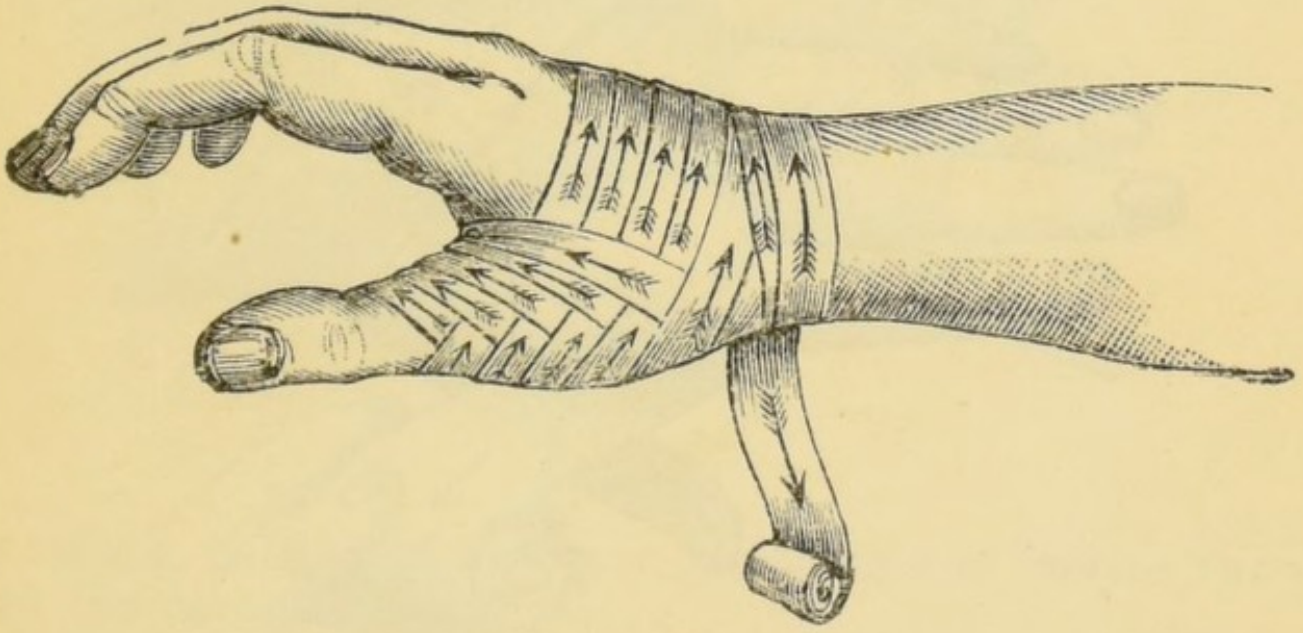


FIG. 17.

Place the palm of the hand downwards. Take two turns round the wrist, commencing at the root of the

* So called from its resemblance to *spica*, an ear of wheat.

thumb and going across the back of the wrist to fix the bandage. Now carry the roller upwards from the root of the thumb to between the thumb and the forefinger, encircling the thumb at the first joint. Take the bandage across the back of the hand and round the wrist, bringing it back to the root of the thumb. Carry it up and again encircle the thumb, covering two-thirds of the former loop; then take it across the back of the hand and repeat these turns round the wrist, and the loops round the thumb, each at a lower level than the preceding one, until the thumb is covered.

HAND AND FOREARM.

To bandage the right hand, take a 2½ inch roller bandage and make a couple of turns round the wrist,

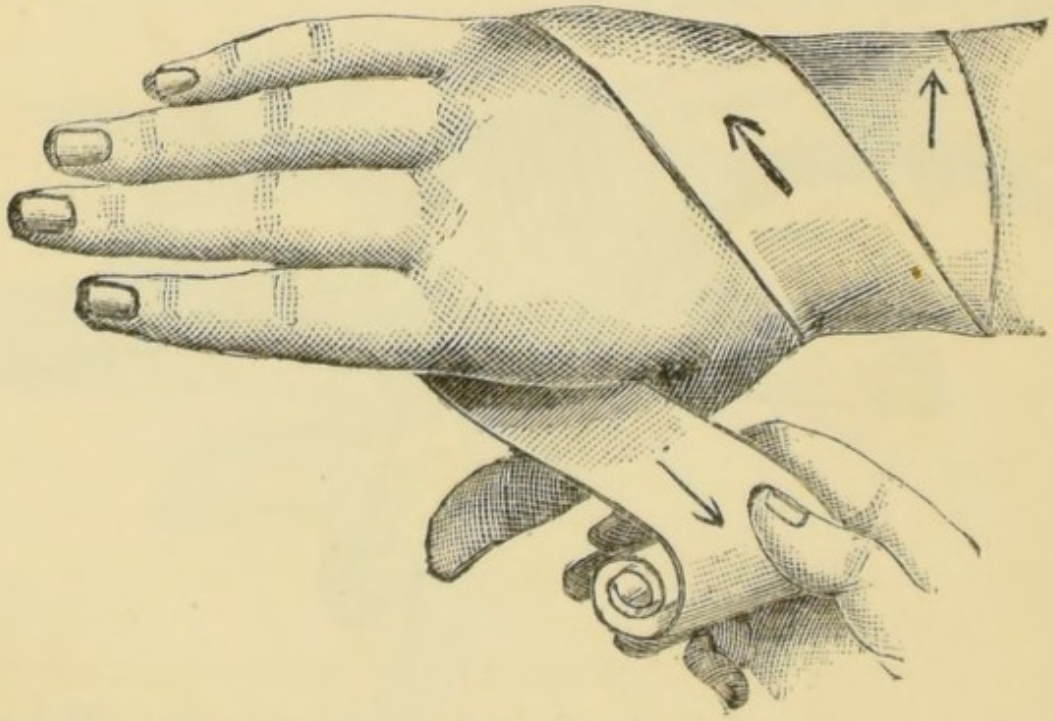


FIG. 18.

commencing at the root of the thumb and passing outwards over the back of the wrist. Carry the bandage

outwards over the back of the hand to the root of the little finger, take it across the palm, in which has been placed some cotton-wool, and bring it between the thumb and the root of the forefinger. (This is the position shown in Fig. 18.)

Carry the bandage over the back of the hand to the inner side of the wrist, and encircle the wrist and hand

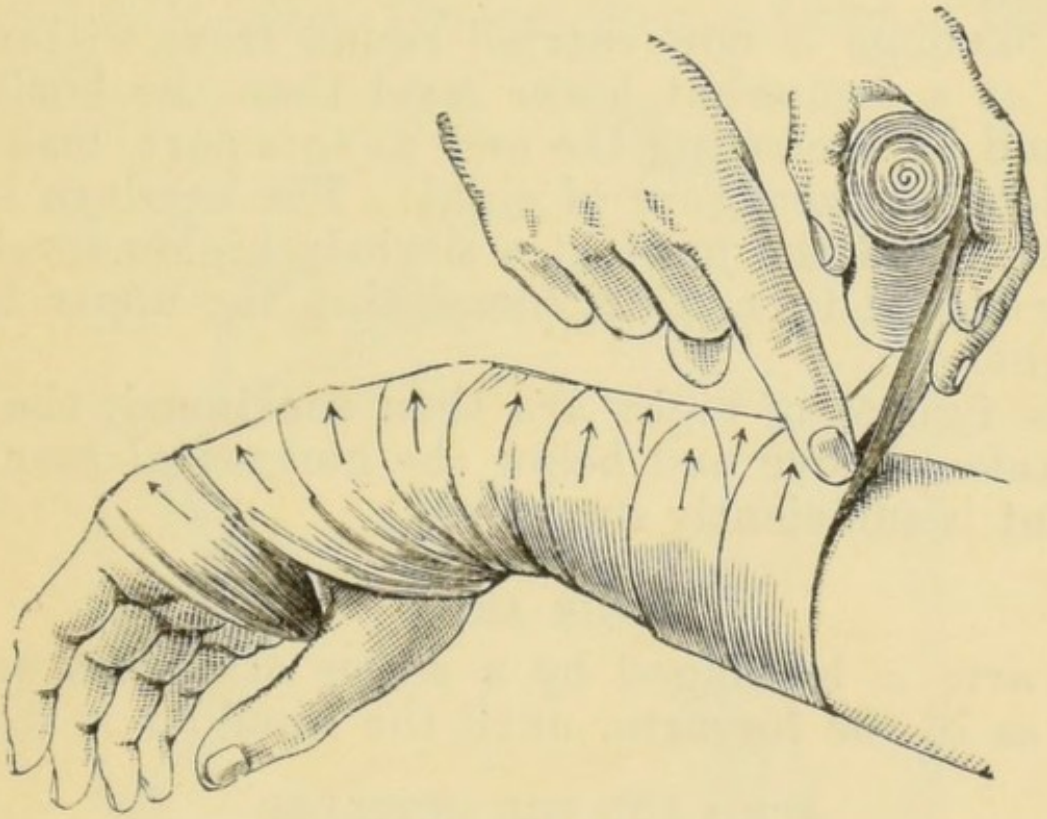


Fig. 19.

as before, this time, however, covering the former turn and the roots of the fingers.

When the hand is sufficiently covered by these turns, the forearm is bandaged by a few spirals until the increasing thickness of the arm necessitates a series of reverses which should be kept in line on the back of the forearm.

THE ELBOW.

When the bandage reaches the elbow, which should be bent, it is made to encircle the joint by carrying the roller once horizontally round the centre of the joint without reversing, taking care to apply the centre of the bandage over the bony prominence on the back of the elbow.

The bandage is now carried round from within outwards, at a somewhat lower level than the horizontal turn, and by encircling the arm at this part makes the lower loop of the figure of eight. The bandage is now brought round the joint at a slightly higher level than the horizontal turn, thus completing the upper half of the eight.

These figures of eight are then continued, the loops being taken above and below the horizontal turn until the joint is sufficiently supported.

THE ARM.

The arm is bandaged by a series of spirals and reverses as in the forearm, until the shoulder is reached.

SPICA FOR THE SHOULDER.

To apply a spica bandage to the left shoulder, take a roller bandage thirty feet long, and make two turns from within outward round the left arm about four inches below the shoulder in order to fix the free end.

Carry the bandage up the arm to the back of the left shoulder, across the back, under the right armpit (in which a pad of cotton-wool has been placed), and thence obliquely across the chest to the starting point on the left arm.

Encircle the arm half an inch above the lower edge of the first turn, and repeat the turn across the back and chest.

Continue to encircle the arm and the body in this manner, taking care to make each turn half an inch higher than its predecessor, until the shoulder is covered as shown in Fig. 20. The bandage is finished by pinning its end to the last turn in front of the chest.

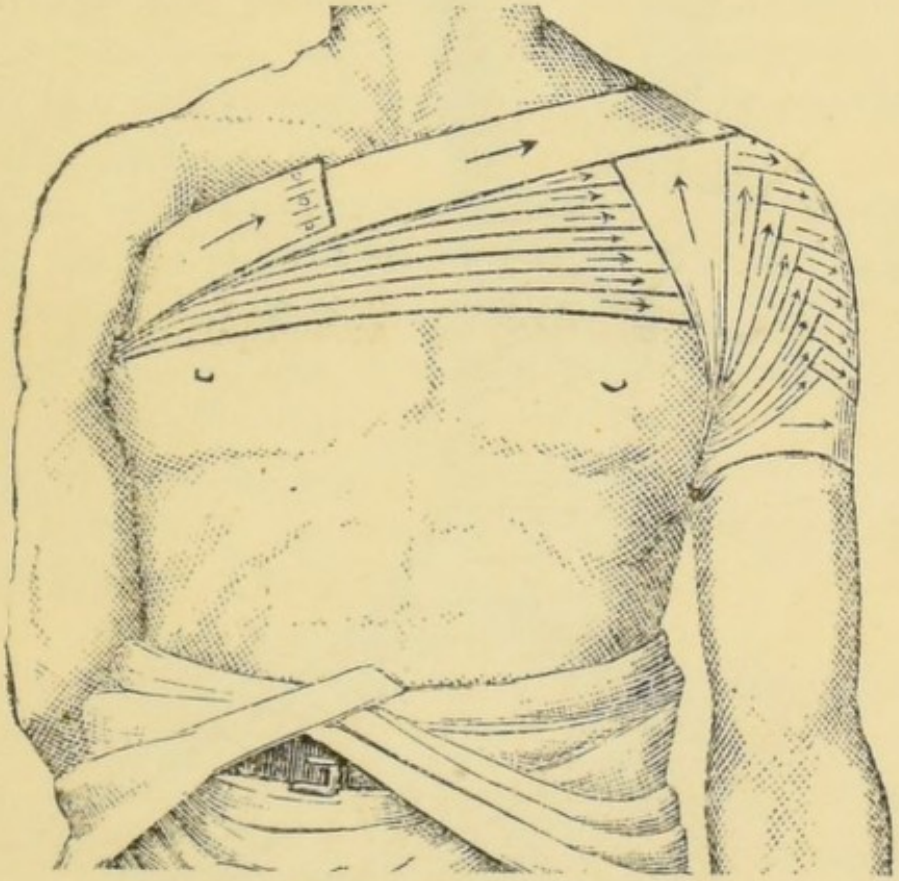


FIG. 20.—SHOULDER SPICA.

The lower edges of the bandage will make a series of inverted "V's" where they cross each other on the outside of the left arm. To apply this bandage to the right shoulder follow the foregoing instructions, reading "right" for "left," and *vice versâ*.

To bandage the right foot, ankle, leg, and thigh, take a $2\frac{1}{2}$ or 3 inch roller bandage in the left hand and apply the free end over the inner ankle bone, carry it across the instep to the root of the little toe, and take

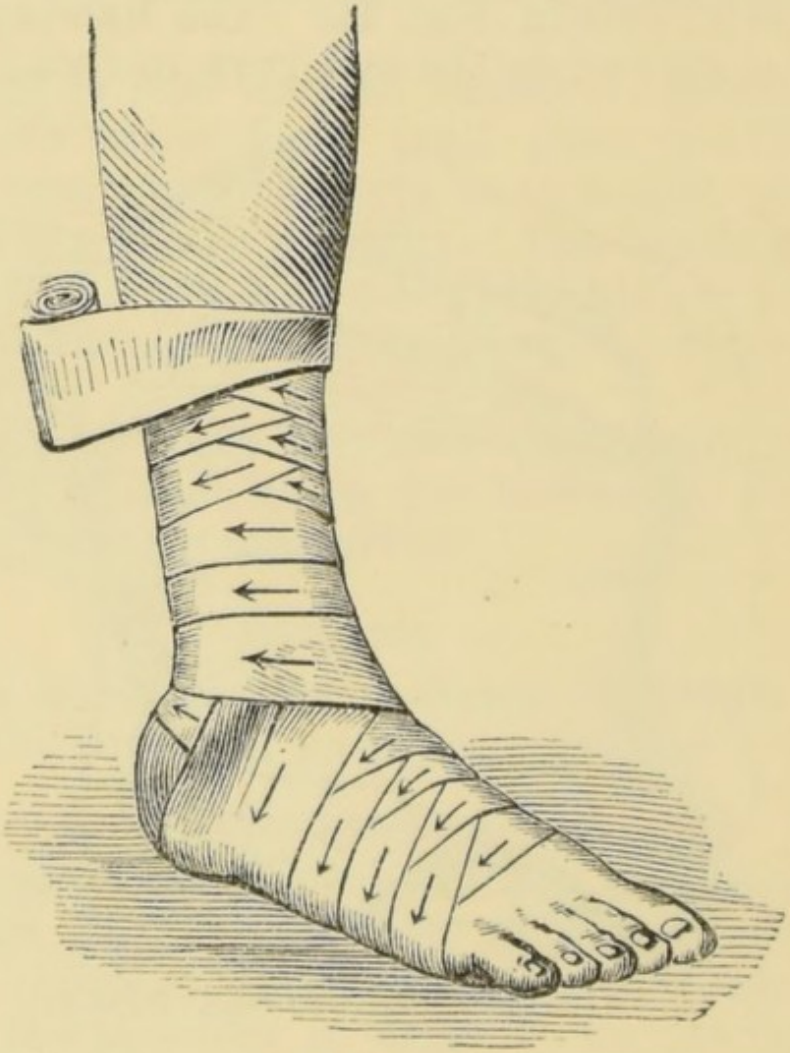


FIG. 21.

it beneath the foot to the ball of the great toe. Bring it up over the instep and the outer ankle bone, round the back of the leg a few inches above the heel overlapping and fixing the commencement of the bandage.

Thus a figure of eight turn round the foot and ankle has been made, and this turn should be repeated in order to fix more firmly the commencement of the bandage.

When the bandage again reaches the root of the little toe a spiral is made round the foot at that level, and as the surface is irregular, a reverse must be made in front, at the centre of the roots of the toes.

These spirals and reverses are then continued until the ankle is reached, when another figure of eight is made round the ankle and foot, thus bringing the bandage above the ankle.

The small of the leg is now covered by three simple spirals, and, as the leg increases in thickness, a series of *spirals and reverses* must be made until the knee is reached, when the figure of eight is again resorted to in order to surmount the joint.

The bandage is continued up the thigh by a series of spirals and reverses, as in the leg bandage, and fastened at the hip by a spica.

SPICA FOR THE GROIN.

To apply a spica bandage to the right groin lay the free end of the roll along the right groin, *i.e.*, at the junction of the thigh with the abdomen. Carry the bandage outwards and upwards to a little above the right hip joint, then across the small of the back, bringing it round in front to the right groin again, where it should cross the former fold. (Fig. 22.)

The bandage is now made to encircle the upper part of the thigh, and is brought out in front between the thighs and carried upwards half an inch above the lower edge of the first turn round the body.

Repeat these turns, making each half an inch higher than the preceding one, until the wound is covered. The bandage is finished by fixing it with a pin.

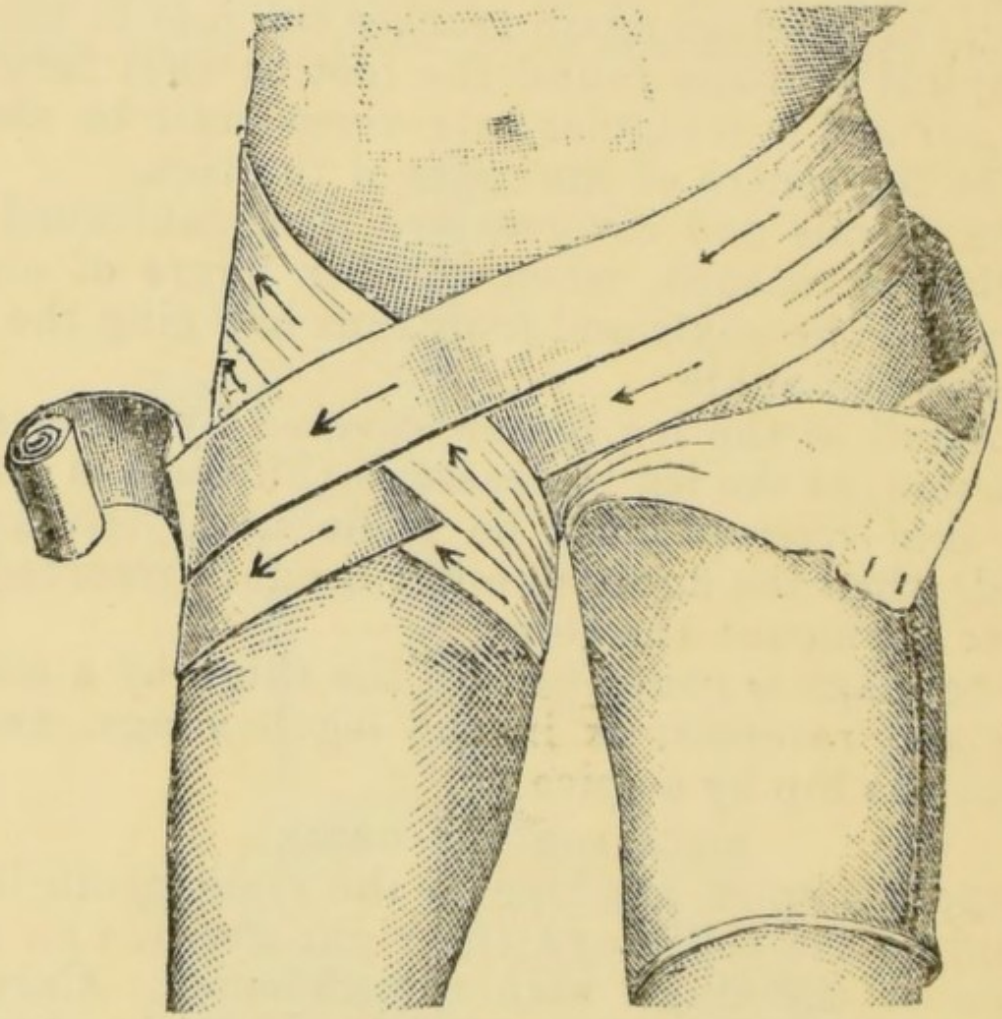


FIG. 22.—SPICA FOR GROIN.

Thus the bandage describes a figure of eight, the larger loop of which is round the body, and the smaller and lower loop round the thigh. To apply this bandage to the left groin follow the foregoing instructions, reading "left" for "right."

THE RIGHT BREAST.

Apply the end of a four inch roller bandage (flannel or domette is preferable) about three inches below the right breast, and make two horizontal turns from right to left round the body to fix it.

Carry the bandage upwards from beneath the right breast in front of the chest, over the left shoulder, and across the back, bringing it to the front at a slightly

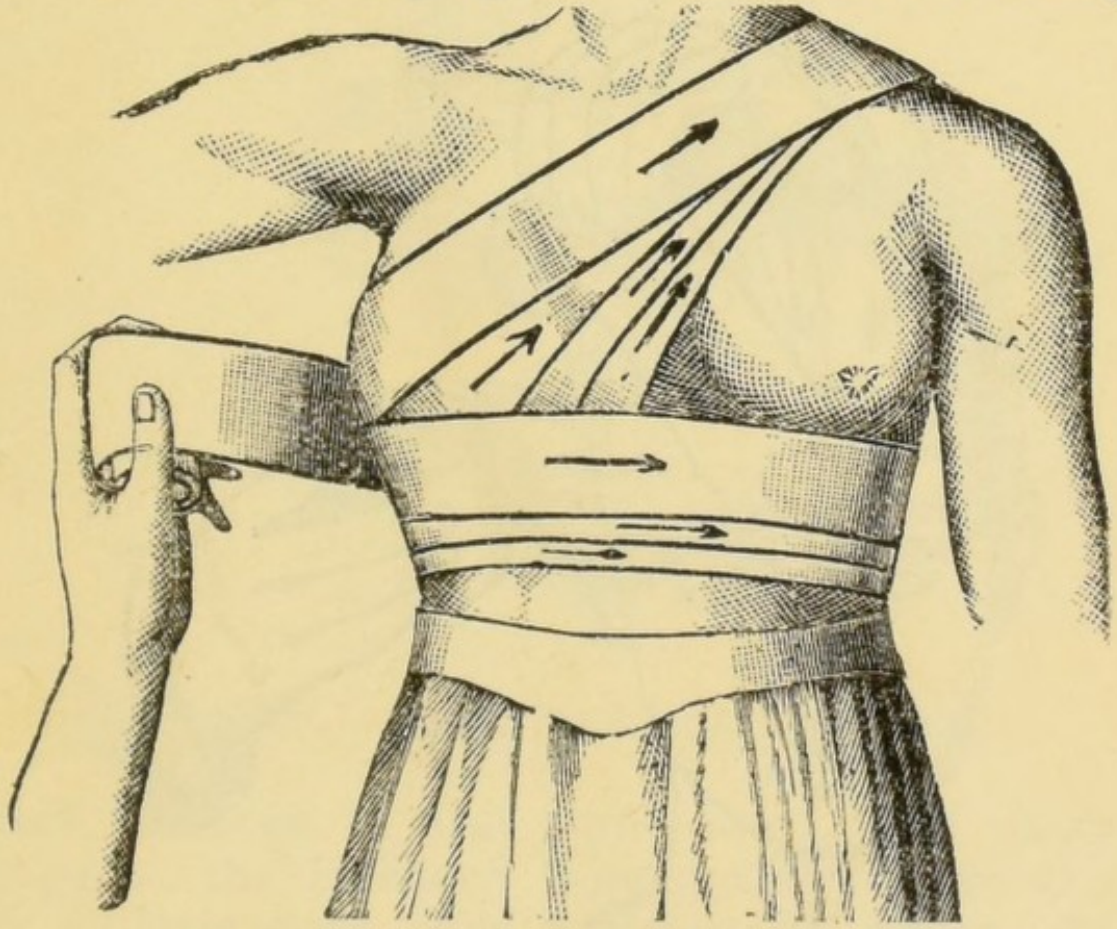


FIG. 23.—BANDAGE FOR BREAST.

higher level than the horizontal turn. Continue this turn, also horizontally, round the body, keeping it throughout at a higher level than the first one. On coming round to the right breast the roll is again carried up to the left shoulder—this time covering half

an inch more of the breast—and thence obliquely across the back until it once more joins the horizontal turn in front below the right breast.

These turns—horizontal and the oblique—are alternately repeated, each at a higher level than the preceding one, until the breast is covered.

It will be seen that each horizontal turn fixes the preceding oblique one.

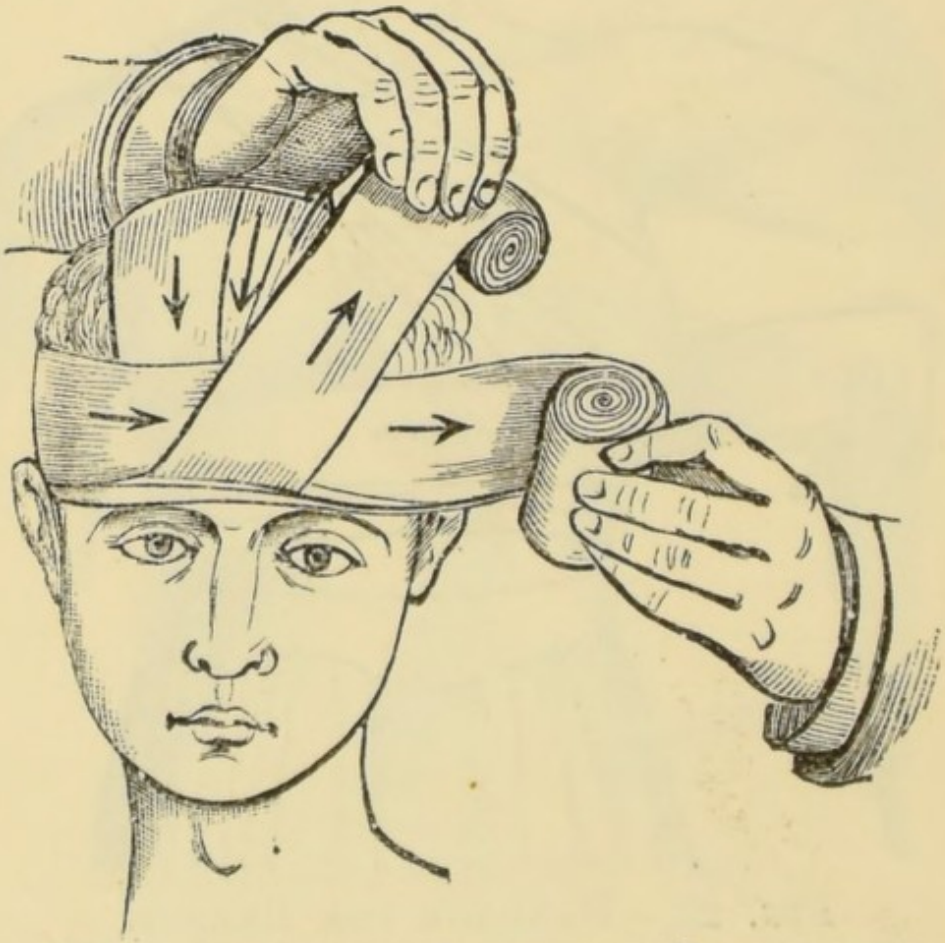


FIG. 24.—HEAD BANDAGE (CAPELLINE).

THE CAPELLINE BANDAGE.

Fasten two 2½in. roller bandages together, thus making a double-headed bandage. One roll is called the

vertical bandage, and the other is called the horizontal bandage.

Stand behind the patient, who should be seated, and take the horizontal bandage in the left hand and the

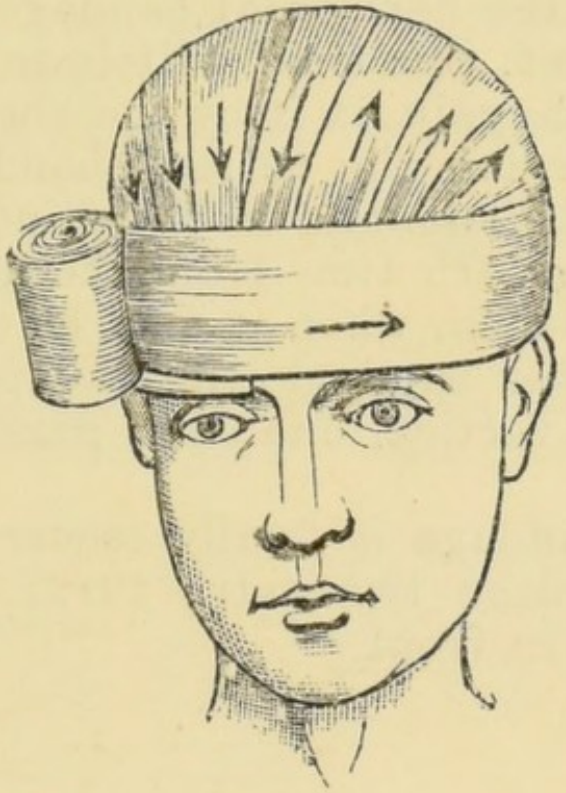


FIG. 25.—HEAD BANDAGE FINISHED.

vertical bandage in the right hand, and apply the bandage to the forehead immediately above the eyebrows. Pass both rolls horizontally above the ears until the hands meet in the middle line of the back of the head as low as practicable. Pass the horizontal bandage over the other, and transfer both to the opposite hands, and pull them tight.

Now carry the vertical bandage along the middle line over the head and down to the root of the nose.

Bring the horizontal bandage (now in the right hand) forward above the right ear, making it cross, and thus fix the vertical bandage at the root of the nose. Now take the vertical bandage back over the top of the head a little to the left of the middle line, fixing it behind, as in front, by the horizontal bandage. Bring it once more to the front, this time a little to the right of the middle line, and again fix it by the horizontal bandage.

Continue carrying the vertical bandage from before backwards on the left, and from behind forward on the right, diverging each time from the middle line, until the ears are reached, when it may be cut off in front.

The Horizontal bandage thus simply encircles the head to fix the vertical one as it passes backward and forward.

The whole bandage is finally secured by giving the Horizontal bandage two extra turns round the head and pinning it in front.

APPENDIX.

DIETS.

THE following are the diets generally ordered:—

Ordinary or *full diet* consists of meat, bread, vegetables, &c., in variety.

Low diet.—"Slops," such as tea, weak broth, barley water, thin gruel, arrowroot, &c.

Milk diet.—Milk, arrowroot, sago, tapioca, rice, bread, &c.

Vegetable diet.—Meat is dispensed with, fish and fowl being, however, generally allowed occasionally.

Meat diet.—Meat, cheese, eggs, milk, beef-tea, broth, &c.

Diabetic diet.—This consists of articles that do not contain either sugar or starch. Meat, bran, and gluten bread, almond rusks, thin, well-browned toast, Van Houten's cocoa. Milk is generally allowed, though it contains a percentage of sugar.

SICK DIETARY.

Hot milk and soda-water.—Heat milk until it is just about to boil; pour out half a tumbler, and fill up the tumbler with soda-water. To be taken whilst effervescing. (Good for sickness of stomach as a stimulant, and for chills and rigors.)

Beef-tea.—Take a juicy slice off the top side of the round, cut it up finely on a board, removing skin and fat, put into a stone jar with its own weight of water, put the lid on the jar and tie paper over it. If possible, let it soak for an hour. Place it on the

hob for three hours, and then for half-an-hour in the oven or standing in a saucepan of boiling water. When cold, skim and heat up as required. (Good beef-tea should never be boiled. It ought *not* to form a jelly.)

To make beef-tea rapidly.—Chop half a pound of beef fine, removing all fat, &c., put it in a saucepan with half a pint of cold water. Bring it quickly to the boil, and allow it to boil for five minutes.

Beef-tea and veal broth.—One part of veal broth may be added to two parts of beef-tea.

Beef-tea and oatmeal.—Mix two tablespoonfuls of oatmeal with the same quantity of cold water. Add a pint of strong beef-tea, boil for five minutes, stirring all the time.

Raw beef essence.—Take half-a-pound of raw beef, free from fat, chop it up fine, pour over it a teacupful of water, add a pinch of salt, stir, and let it stand for three hours, strain, washing the meat with a little additional water. The addition of four or five drops of hydrochloric acid makes the process more rapid. It should be taken cold. The red colour can be disguised by giving it in a coloured wineglass. This is a most useful preparation, and can sometimes be taken—even by very young children—when the stomach will retain nothing else.

Meat-juices, essences, jellies, broths, and all such things, are far better when freshly made at home than when bought.

Mutton broth.—Use a piece of the scrag of mutton, taken as near the head as possible. A pint of water should go to a pound of meat.

Bread and milk.—Cut some thin slices of stale bread, place them in a basin, make the milk boil, and the moment it rises pour it over the bread. Cover the basin with a plate, and let it stand before the fire for ten minutes. Patients generally like it made thus better than when the bread is broken up.

Gruel may be made with water or milk, or a mixture of both. Place two tablespoonfuls of oatmeal in a saucepan, add a little water, and mix well, add a pint of milk or water, and let it boil gently for half an hour, stirring frequently. Flavour with sugar or salt. Milk gruel is a most nutritious food.

Rice.—Put one part of well-washed rice with five parts of milk in a pie-dish, a little cinnamon, a laurel-leaf, or any other flavouring may be added. Place in the oven for an hour or more. The milk must not boil, and the rice must be thoroughly cooked.

Potatoes.—Wash and brush them well, but do not break the skins. Throw them into boiling water. In two minutes draw the saucepan to the side of the fire, and do not let the water quite boil again. The first plunge into boiling water hardens the outside of the potato, and the subsequent application of heat causes the starch grains to swell, until they at length burst the outer skin, and a *mealy* potato results. Potatoes put into cold water become sodden, and so cannot become mealy.

Eggs.—Put into boiling water, draw the saucepan to the side of the fire, and do not let the water come to the boil again. In five or six minutes the eggs will be done. The whites should be *thickened* but *not hard*.

Nutritious blanc-mange.—Things required:—Three-quarters of a pint of milk, three-quarters of an ounce of gelatine, two ounces of veal suet, a dessertspoonful of pounded white sugar, and a piece of lemon rind. Soak the gelatine in a little milk, put the rest of the milk in a saucepan with the suet, and let it simmer twenty minutes. Strain, and add the other ingredients. Stir often until cold.

Solid tea.—Pour boiling milk on some *good* tea, strain, add some isinglass (previously soaked in milk). Pour it into a shape.

Solid coffee can be made in the same way. Patients sometimes absolutely refuse food, but are willing to take tea or coffee; in such cases they can generally be got to take the "solid" tea or coffee, and of course get all the benefit of the milk.

Milk coffee (also of use in the same class of cases).

Arrowroot and black currant drink.—Boil some black currant preserve in a quart of water, and strain. Mix a teaspoonful of arrowroot in cold water, and pour the boiling liquor on it, stirring meanwhile. To be taken cold. (Particularly good in affections of the throat.)

Lemonade.—Rub two or three lumps of sugar on the rind of a lemon, squeeze out the juice, and add half a pint of cold water, or, better still, a bottle of soda-water.

Orangeade.—The juice of three or four oranges and one lemon, with a little sugar, are to be added to a quart of cold water.

Apple water.—Roast three apples. Remove any burned parts, put them into a jug with lemon peel and sugar, pour in a pint of boiling water. To be used cold.

Toast water.—Take a piece of crust of bread and toast it brown all over (it must not be burned). Put it into a jug and pour some cold water over it. Let it stand for half an hour before it is used.

(Apple water and toast water are good mixed.)

Barley water (Thin).—Put two ounces of well-washed barley into a jug, with the outer peel of a quarter of a lemon and a little sugar, pour in a pint of boiling water. Let it cool and strain for use.

Barley water (Thick).—Put two ounces of well-washed barley into a saucepan with a quart of cold water, boil it for two hours, strain into a jug in which the outer peel of half a lemon and sugar have been placed.

(The addition of a little lemon juice is a great improvement to barley water.)

Rice water.—Wash three ounces of rice well, and put it into a quart of boiling water, boil for an hour, strain and sweeten. Cinnamon may be added.

Linseed tea.—Put three tablespoonfuls of linseed into a teapot or jug, pour in a quart of boiling water, cover, and let it stand a quarter of an hour to draw, strain, sweeten with honey or sugar, and use.

Bran tea is made in the same way.

Ice.—Put a piece of wood into a basin, place the block of ice on it, and cover with flannel. Break off pieces when required with a fine needle stuck in a cork. Tie a piece of muslin very loosely over a tumbler, so as to form a sort of purse, put the small pieces of ice on the muslin, and leave the tumbler within the patient's reach.

To quench thirst the following may also be used:—

Weak coffee (an ounce to two quarts of boiling water) sweetened and let cool.

Cold weak tea.

A quarter of a pound of oatmeal, boiled in three quarts of water, and sweetened with brown sugar.

Rice water, with a little tartaric or citric acid.

The juice of currants or raspberries, boiled in water with a little tartaric acid and sugar.

WEIGHTS AND MEASURES.

SOLID (APOTHECARIES' WEIGHT).

20 grains (gr.) make a scruple (℈).

3 scruples (60 grains) make a drachm (ʒ).

The ounce of 8 drachms (480 grains) is practically obsolete.

SOLID (AVOIRDUPOIS WEIGHT).

437½ grains make an ounce (oz.).

16 ounces make a pound (lb).

FLUID.

1 minim (♏) is a drop.

60 minims make a fluid drachm (ʒ) (a teaspoonful).

2 fluid drachms (ʒij) make a dessertspoonful.

4 fluid drachms (ʒiv or ℥fs) make a tablespoonful.

8 fluid drachms make a fluid ounce (℥) (two tablespoonfuls).

2½ fluid ounces (℥ij fs) (about) make a wineglassful.
20 fluid ounces make a pint (O).
Quantities are written in Roman figures thus :—viij. =8. ½ is written like the old-fashioned double s (ſs).
A graduated measure glass should always be used as spoons and wine glasses vary greatly in size.

Thermometers.

In the British Isles the Fahrenheit scale is generally used, but the Centigrade scale is also met with.
To convert degrees Centigrade into degrees Fahrenheit multiply by 9, divide by 5, and add 32. Thus: A Centigrade thermometer reads 40 degrees. Multiply by 9, equals 360; divide by 5, equals 72; add 32, equals 104. So that 40 degrees Centigrade corresponds to 104 degrees Fahrenheit.
To convert degrees Fahrenheit into degrees Centigrade, deduct 32, multiply by 5, and divide by 9. Thus: The thermometer reads 77 degrees Fahrenheit, deduct 32, equals 45; multiply by 5, equals 225; divide by 9, equals 25. So 77 degrees Fahrenheit corresponds to 25 degrees Centigrade.

Useful Examples.

	Fahrenheit Degrees.	Centigrade Degrees.
Freezing point	32	0
Human temperature in health	98.4	37
Tepid bath	85 to 95	30 to 35
Warm bath	96 to 104	36 to 40
Hot bath	102 to 110	39 to 43
Very hot bath	110 to 120	43 to 48
Sickroom temperature	55 to 65	13 to 18

INDEX.

St. John Ambulance Association.

ABRIDGED PRICE LIST.

Stores of the value of 10s. or upwards will be sent carriage paid to any part of the United Kingdom.

Owing to the great and continuing advance in prices it is impossible to guarantee that the quotations herein can be adhered to.

Quotations will be furnished for Articles relating to Ambulance Nursing and Hygiene not mentioned in this list.

Orders and correspondence should be addressed to the St. John Ambulance Association, St. John's Gate, Clerkenwell, London, E.C.

Remittances should be made payable to the St. John Ambulance Association, and crossed "London County and Westminster Bank, Lothbury."

PRICES OF THE "FURLEY" STRETCHERS, WITH THE LATEST IMPROVEMENTS (1899 MODELS).

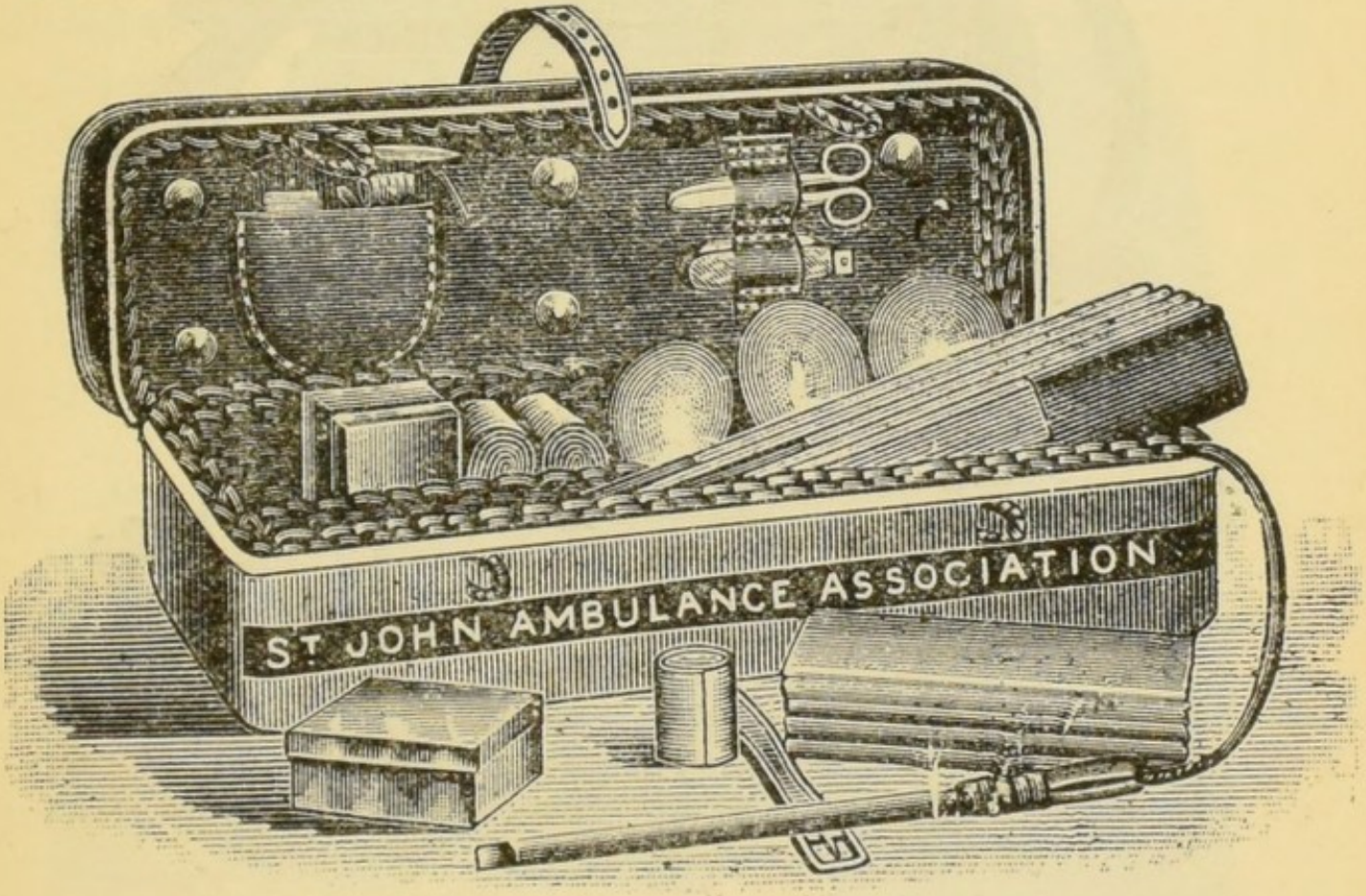
N.B.—The prices of the Standard Models are shown in heavy type.

	Without Slings or Chest Strap.	With Wide Webbing Slings (no Chest Strap).	With Wide Webbing Slings and Chest Strap.	With Leather Slings (no Chest Strap).	With Leather Slings and Webbing Chest Strap.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Ordinary Stretcher, for General and Brigade use, taking the place of both the old ordinary and military patterns	1 13 6	**1 17 6**	1 19 0	2 3 0	2 4 6
Telescopic-handled Stretcher, for working in confined spaces ...	1 19 6	2 3 6	**2 5 0**	2 9 0	2 10 6

	£ s. d.
Police Stretcher, very strong, with Ash Poles, and provided with Leather Straps to secure a refractory patient—	
Complete, with Wide Webbing Slings	**2 17 6**
,, ,, Leather Slings	3 3 0
Slings, Wide Webbing ... ... per pair	0 4 0
Do. Leather ... ... per pair	0 9 6
(Or if purchased with the Stretcher instead of Webbing Slings, 5/6 extra.)	
Cover (awning) for Stretcher (when ordering please state pattern of Stretcher)	0 15 0
Superior Hood and Apron (*see illustration, page* 3)	2 10 0
Spare Bed for Stretcher	0 8 6
Army Rug, to cover patient on Stretcher	0 6 6
Pillow for Stretcher, stuffed hair	0 7 6
Chest Strap	0 1 6

SMALL AMBULANCE HAMPER.

With Waterproof Cover and Strap, for use in factories, collieries, stations, and large works, as well as for parochial and domestic use.



CONTAINING

Set Splints. 1 Elastic Tourniquet. 3 Tampons, for washing wounds. 2 Packets Lint. 4 Roller Bandages (wide and narrow). 4 Triangular Bandages.

Cotton Wool. ... ... } In Tin Cases.
Boric Wool ... ... }

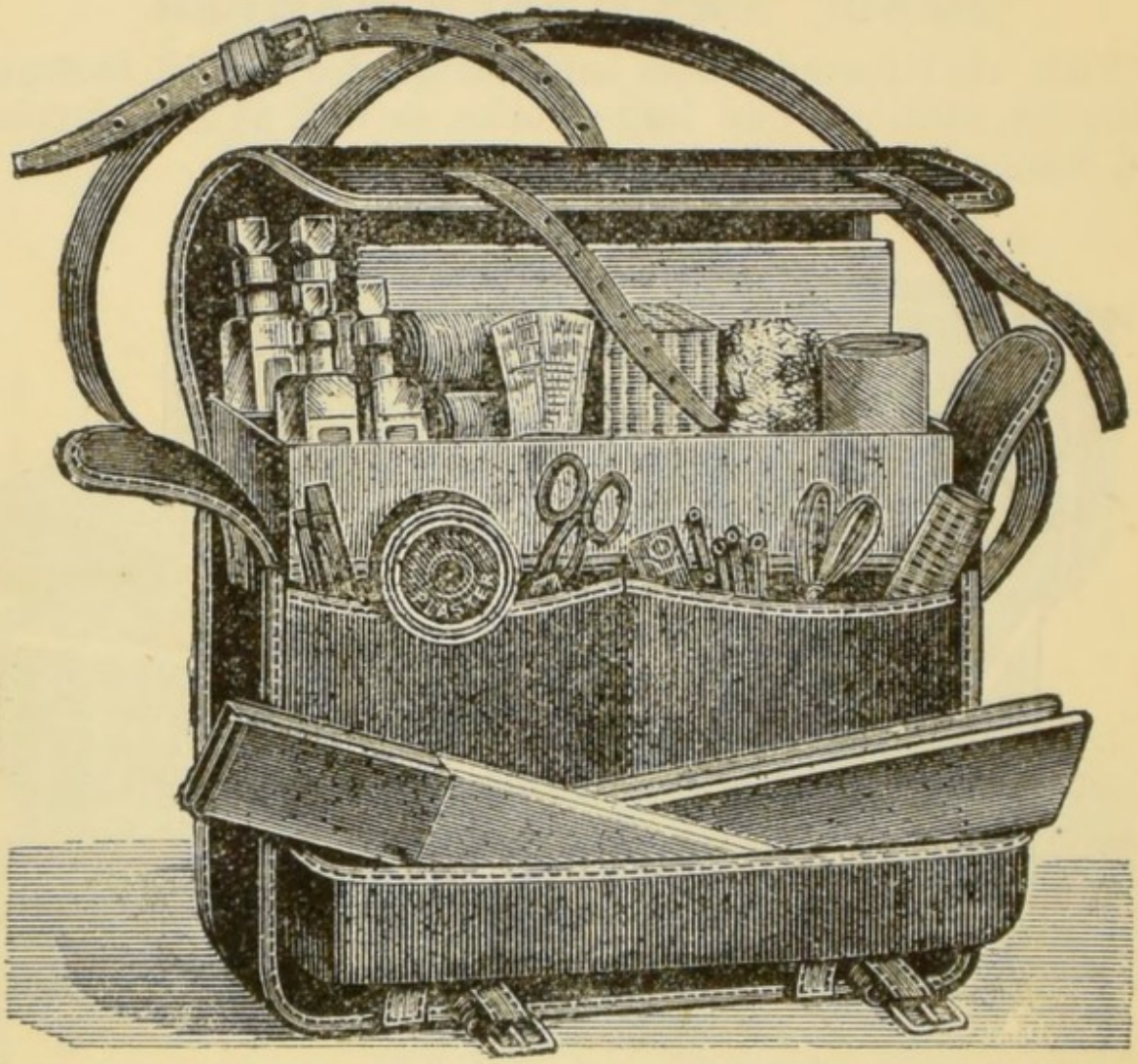
Spool of Adhesive Plaster.

Knife, Scissors, Thread, Tape, Needles, and Pins.

Weight, complete, 6½ lbs.

Length, 1 ft. 6 in. Depth, 5 in. Width, 7 in. Price, £1 11s. 6d.

SURGICAL HAVERSAC.



IMPROVED PATTERN, fitted with a tin, so arranged that any article can be taken out without disturbing the rest of the contents.

Contents: 1 Set of Splints, 6 Triangular Bandages, 6 Roller Bandages (wide and narrow), Cotton Wool, Boric Lint, in tin cases; 1 Roll Adhesive Plaster, 1 pair Scissors, 1 Knife, 2 oz. Olive Oil, 2 oz. Tinct. Eucalyptus B.P.C., 2 oz. Sal Volatile, 2 oz. Spirits Ether Comp., 1 Graduated Glass Measure, 1 Elastic Band Tourniquet, Pins, Needles, and Thread.

Price £1 11s. 6d.

White Linen Ration Haversacs, 1s. 9d. each.

NURSES' WALLETS.

ORDINARY PADLOCK SHAPE.

Without Instruments, 4s. 3d.

Fitted complete, containing Spring Dressing Forceps, Spatula, Probe, 2 pairs Scissors (round and sharp pointed), Clinical Thermometer, and Knife.

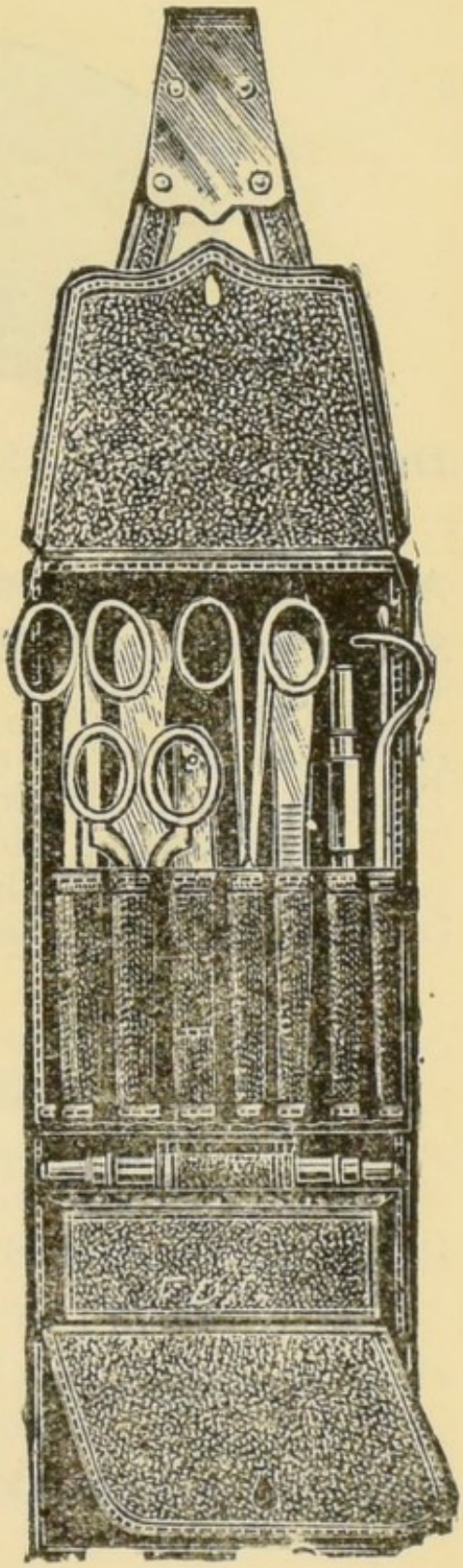
Advanced price 10s.

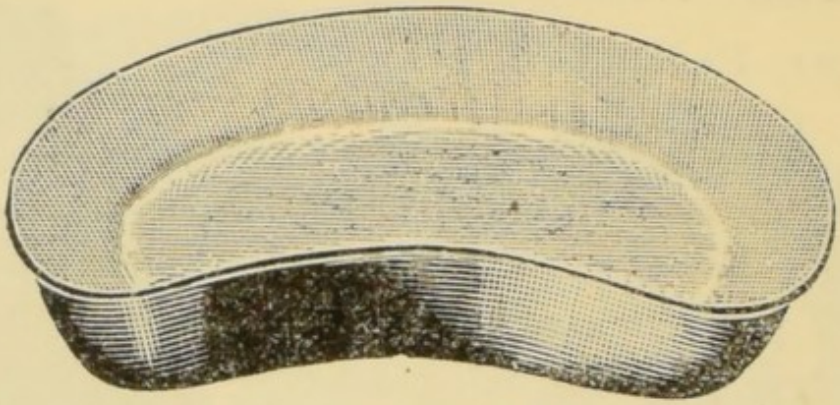
ST. JOHN'S PATTERN, as illustrated, but improved by the addition of flaps to protect the instruments.

Without Instruments, 7s. 9d.

Fitted complete, containing Spring Dressing Forceps, Artery Forceps (also useful for dressing), Spatula, Probe, Director with Ear Scoop, 2 pairs Scissors (round and sharp pointed), Clinical Thermometer (minute, round), Knife, Pencil, and Safety Pins.

Price £1 1s.





Dressing Basin, kidney shaped, made of Enamelled Iron. Price 1s. 3d.

Ambulance Station Plate, Enamelled Iron, 3s. 6d. each.

Stretcher Depot Plate, Enamelled Iron, 3s. 6d. each.

Carrying Sheet, for carrying patients up and down stairs or otherwise about the house. Designed by J. C. Derham, Esq., Blackpool, and Mrs. Alfred Paine, Bedford. The sheet is fitted with rope handles and detachable bamboo poles, and may be placed on a stretcher without disturbing the patient. Price complete, 15s.

SAFETY PINS.

All fasten or unfasten on either side.

		s.	d.
Facile No. S 600 or S 602...	per 3 doz.	0	6
,, ,, S 603	,,	0	8
Duchess Duplex, No. 2	per doz.	0	2
,, Assorted	,,	0	3
Special Blanket Safety Pins, 3 in. ...	,,	1	0
,, ,, ,, ,, 3½ in. ..	,,	1	6

	s.	d.
Tourniquet, Elastic	1	6
Tourniquet, Field	2	6
Splints, Wooden, per set, 2s. 6d. ; Cane per set	7	6
Greatly Improved Wooden Splints, with grooved joints and angle piece. Strongly recommended ...	4	6
Tow, for splint padding ... ... per lb.	0	6
First Field Dressing (Army Regulation Pattern). Price ... ... each	0	9
Jaconette, 44 inches wide ... ... per yard	2	3
Tow, Carbolised or Styptic ... .. per lb.	0	9

Wound Pad.—A pad of Cotton Wool and Gauze, to which a bandage is attached. The surface of the pad coming in contact with the wound is not touched by the hand of the person applying the pad. Price 4d. each.

First Aid Dressing, consisting of a small compressed packet of boric lint, a compressed roller bandage, and a safety pin. Price 2d. each.

Dredger, containing boric acid powder, 1s. 4d.

Measure Glass, 2d.

Knife, with Strong Blade ... each 9d. ; per doz. 8s.

Pair of Scissors ... ... each 1s. ; per doz. 10s.

Splint Straps, Webbing, and suitable Buckles. Per set of 12 yards of strong 2-inch Webbing and 15 Buckles, 2s. 6d.

These make very compact Straps for carrying in the Pouch. The Webbing should be cut to meet local requirements.

Buckles only, 1s. 3d. per dozen.

Webbing only, 1s. 3d. per dozen yards.

It is unnecessary to sew the Buckles. The spikes should be passed through the webbing, and the short end of the webbing should lie outwards.

TEXT BOOKS, &c.

"First Aid to the Injured." By James Cantlie, M.B., F.R.C.S. The authorised Text-book of the First Aid Course. 1s. ; by post, 1s. 2d.

"Catechism of First Aid." Compiled from Dr. Cantlie's Manual. By J. Brown, L.R.C.P., L.R.C.S., and J. M. Carvell, M.R.C.S., L.S.A. Price 6d. ; by post, 7d.

"Hints and Helps for Home Nursing and Hygiene." By E. MacDowel Cosgrave, M.D., illustrated, with chapter on the application of the roller bandage, by R. J. Collie, M.D. The authorised Text-book for the Nursing Course. 1s. ; by post, 1s. 2d.

"Catechism on Home Nursing" (based on Dr. Cosgrave's Text-book). By J. Brown, L.R.C.P., L.R.C.S., and J. M. Carvell, M.R.C.S., L.S.A. Price 6d. ; by post, 7d.

"Home Hygiene." By John F. J. Sykes, D.Sc. (Public Health), M.D., &c. Illustrated. The authorised Text-book for the Home Hygiene Course. 1s. ; by post, 1s. 2d.

"Questions and Answers upon Ambulance Work." By John W. Martin, M.D., and John Martin, F.R.C.S.Ed., 1s. ; by post, 1s. 1d.

"Questions and Answers upon Nursing." By John W. Martin, M.D. 1s. 6d. ; by post, 1s. 8d.

"First Aid to the Injured (six Ambulance Lectures)." By Professor Frederich Esmarch. Translated from the German by H.R.H. Princess Christian. 2s. ; by post, 2s. 2d.

"Elementary Bandaging and Surgical Dressing." By Walter Pye, F.R.C.S. 2s. ; by post, 2s. 2d.

Dr. G. H. Darwin's "First Aids," being a card to hang up, giving treatment of various accidents. 2d ; by post, 5d.

TEXT BOOKS, &c.—*continued.*

To Restore the Apparently Drowned, printed in large type with Two Diagrams. Unmounted, 2d. each. Mounted, with red border, and varnished to hang up, 6d. ; post free, packed, 1s.

"How to Act when Clothing takes Fire." By J. E. H. Mackinlay, M.R.C.S. Unmounted, 2d. ; by post, 3d. Mounted on card and varnished, 4d. ; by post, packed, 7d.

"First Aid Principles." Cards of concise directions for waistcoat pocket, ½d. each ; 4d. per doz. Special quotations for large quantities.

"Specimen Examination Papers," First Aid, Nursing and Hygiene Courses. 3d. ; by post, 4d.

Small Anatomical Diagram. Showing the human skeleton, main arteries, and points where pressure should be applied to arrest bleeding. 2d. ; by post, 3d.

Directions as to the Restoration of Persons suffering from Electric Shock. Large print, poster size, 3d. each ; by post, 4d. ; or 2s. 6d. per dozen.

General Note on First Aid to be Rendered in Cases of Poisoning. By Milnes Hey, M.A., M.R.C.S., L.R.C.P. Price 2d. ; by post, 3d.

"Ambulance Tablets." By Sydney Partridge, M.D. Price 1s. ; by post, 1s. 1d.

"Notes on Military Sanitation." By Lt.-Col. H. P. G. Elkington, R.A.M.C. Price 6d. ; by post, 7d.

"Emergency Book," for instantaneous reference, giving concise instructions : to hang on wall. Size about one foot square. Price 2s. 6d. ; by post, 3s.

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Registers. Class Attendance, 2s. 6d. Certificates, 4s. 6d. Case Report, 1s.

St. John Ambulance Brigade Cash Book, Minute Book and Occurrence Book. Set of three, 7s. 6d. **Receipt Book,** 6d.

Large Physiological Diagrams. For Lecturers' use. Comprising: The Human Skeleton, the Muscular, Arterial and Venous Systems, the Heart and Circulation of the Blood, Simple Fracture, Compound Fracture, Dislocations. Price per set of six, 15s. These may be hired for a course of "First Aid" lectures, given under the auspices of the Association, for a fee of 5s., or with the addition of Splints, Tourniquet, and Plain Triangular Bandages, for a fee of 10s.

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Medallions, issued only in accordance with paper No. 62, to be had on application. Coinage Bronze, 2s. ; Silver, 7s. 6d. ; Gold, £2 10s. ; including engraving name and number on back. Morocco velvet-lined case, 2s.

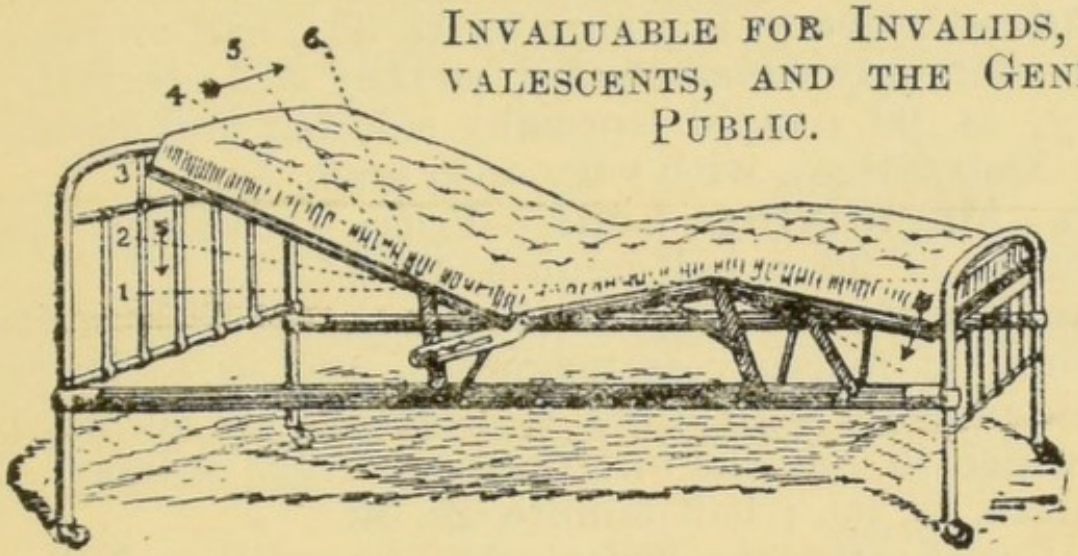
Labels, to be placed above Medallions for each subsequent year's examination, issued only in accordance with paper 62. Coinage Bronze, 6d. ; Silver, 1s. 6d. ; Gold, 12s. 6d.

Nursing Chart. Designed by Miss Inderwick. ½d. each.

Temperature Chart. ½d. each.

THE EQUIPOISE BED.

INVALUABLE FOR INVALIDS, CONVALESCENTS, AND THE GENERAL PUBLIC.



The movement of the bed is so easily effected that the person lying on it can regulate its position to any angle without assistance. It can be locked in seven different positions. Price from £5 15s. 6d.

BATH THERMOMETERS.

To Dr. Forbes' specification. Japanned, with zinc scale, 2s. 3d.; Clinical Thermometer size, in case, 1s. 6d.

No liability is taken for breakage of Thermometers in transit.

NURSING INSTRUMENTS.

Bow Dressing Forceps, full size, 1s. 3d.; small, extra well finished, 1s. 6d.

Scissors, round pointed, 1s. 3d.; sharp pointed, for delicate work, 1s. 3d.; stronger, 1s. 6d.; small round pointed, blades take apart for cleaning, 1s. 9d.

Spatula, 9d. **Probe,** 9d. **Director, with Ear Scoop,** 1s. 9d. **Artery Forceps,** 2s. 4d. **Knife,** very thin, ivory handle, two blades, 1s. 9d.

CLINICAL THERMOMETERS.

REDUCED PRICES.

Round.—Ordinary, 1s.; minute, 1s. 3d.; half-minute, 1s. 6d.

Flat.—Strongly recommended, as they will not roll. Ordinary, 1s. 6d.; rapid (specially selected and reserved for the Association), with very open scale, 3s.

With Magnifying Lens.—Price, ordinary, 1s. 6d.; minute, 1s. 9d.; half-minute, 2s. 3d.

Lense Fronted.—When held in the proper position the column of mercury is magnified, and so easily read. A little practice is required to ascertain the correct position in which to hold the instrument. Price, ordinary, 1s. 6d.; minute, 1s. 9d.; half-minute, 2s. 3d.

Kew Certificates (to order), 1s. 3d. each. N.B.—These certificates either state the instrument is correct or point out any slight error there may be; they are not usually considered necessary.

N.B.—Minute and half-minute instruments will only register in the time stated under favourable circumstances.

No liability is taken for breakage of Thermometers in transit.

ROLLER BANDAGES.

(6 yards long.)

	Open Wove Grey.	Fine Grey Calico, or Superior White Open Wove.	Best Quality White, with Woven Edges.	Superior White Open Wove Compressed.
	s. d.	s. d.	s. d.	s. d.
¾ in., per doz.	—	—	1 9	—
1 in., ,,	0 9	1 0	2 0	1 3
1½ in., ,,	—	1 3	2 6	1 6
2 in., ,,	1 3	1 6	3 0	1 9
2½ in., ,,	1 8	2 0	3 6	2 3
3 in., ,,	2 0	2 6	4 0	2 9
4 in., ,,	—	3 6	4 6	3 9
6 in., ,,	—	4 6	—	—

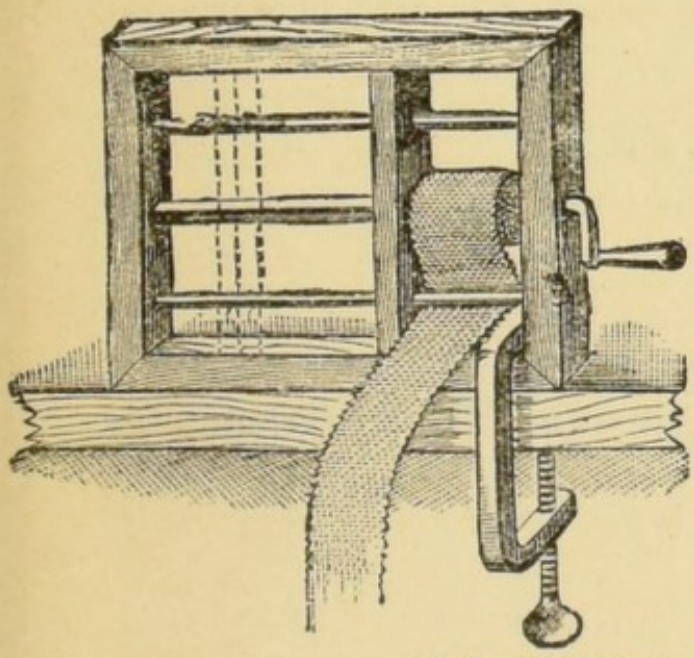
ROLLER BANDAGES (in Assortment).

Each packet contains 6 bandages as follows :—

6 yards long—one 6 inch, two 3 inch, one 1 inch ; 4 yards long—two 2½ inch.

		s.	d.
Fine Grey Calico...	per packet	1	0
Plain Triangular Bandages, each 3½d. (Special quotations for large quantities.)			
Ditto Compressed (thinner quality), each 4d. ; per doz. 3s 9d.			
Illustrated Triangular Bandages (after Esmarch) showing 25 applications of the Triangular Bandage, with printed instructions... ...	each	0	6
,, ,, ,, ,, ...	... per doz.	4	6

ROLLER BANDAGE MACHINE.



Designed by

Dr. A. C. Tunstall.

Price 2s. 6d.

COTTON WOOL.

Plain, 1 oz., 2d. ; 2 oz., 3d. ; 4 oz., 4d. ; ½ lb., 7d. ; 1 lb., 1s. ; small packet (Compressed), 1d.

Medicated, Boracic, ¼ lb., 6d. ; 1 lb., 1s. 6d. ; Carbolic, per lb., 1s. 8d. ; Alembroth, per lb., 1s. 6d. ; Double Cyanide, per lb., 2s. 6d.

LINT.

Plain, 1 oz., 2d. ; 2 oz., 3d. ; 4 oz., 6d. ; ½ lb., 10d. ; 1 lb., 1s. 6d.

Boracic 4 oz., 6d, ; 1 lb., 1s. 6d. ; square foot packet, 2d. ; small packet (Compressed), 1d.

GAUZES.

These are supplied in 6-yard lengths, width about 36 inches.

		s.	d.
Unmedicated White	per length	0	10
Alembroth	,, ,,	1	0
Double Cyanide	,, ,,	1	2
Boracic	,, ,,	1	2

GAUZE TISSUE.

A layer of absorbent cotton wool between two sheets of gauze, good quality per lb. 1s. 6d.

PLASTERS.

Leicester Adhesive Plaster on Cambric, in tins of ½ yard, 6 inches wide ... ... s. 0 d. 6

The Leicester Adhesive Ribbons, in tin boxes, 6 yards long.

½ inch wide ... 6d. | 1 inch wide ... 8d.

National Rubber Adhesive Plaster (Antiseptic), on spools.

		s.	d.		s.	d.
½ inch wide	5 yds.	0	9	10 yds.	1	0
1 ,, ,, ...	,,	1	0	,,	1	6
2 ,, ,, ...	,,	1	9	,,	2	3

Ditto in card box, ½ in. wide, ¾ yds. long 0 1

Ditto in tin box, 1 in. wide, ¾ yds. long, 3d. ; do. ⅜ in. wide, 3 yds. long, 3d. ; do. ½ in. wide, 5 yds. long, 6d. ; do. ¾ in. wide, 5 yds. long, 9d.

COURT PLASTER, TRICOLOUR.

Large Size, 9d. Medium, 5d. Small, 3d.