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Practical Nursing

A Text-Book for Nurses and a Hand-Book for all who Care for the Sick

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PREFACE

In writing this book, the authors have constantly kept in view a two-fold aim—first, to prepare a volume adapted at every point to use as a text-book for nurses; and second, to make this volume so simple and practical in its statements that it will be serviceable, not to nurses only, but to all who wish to acquaint themselves with the conditions and procedures necessary to the proper care of the sick. All consideration of anatomy and physiology, of the physiology of obstetrics, and of the care of the patient during and after delivery we have omitted, because these matters can only be treated to good purpose at greater length than the plan of this book permits, and because most schools of nursing provide themselves with one or another of the many books devoted solely to these subjects.

We are glad here to acknowledge gratefully the many and valuable suggestions made by friends from their wide experience, special thanks being due to W. Gilman Thompson, M.D., Linsly R. Williams, M.D., Anna Rand Young, M.D., and Frederick James Barrett, M.D., for helpful criticism.

We send forth our book—a book designed to give in the simplest and most direct way the information, which experience has taught us is most needed, upon the subjects it treats—in the hope that it will be
practically helpful. If it succeeds in aiding those who are devoting themselves to the alleviation of human suffering, we shall feel that it has accomplished its mission.

A. C. M.
A. E. P.

Presbyterian Hospital School of Nursing,
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Practical Nursing
CHAPTER I

QUALIFICATIONS OF A NURSE

Physical Qualifications: Health, Cleanliness, Fresh Air, etc., Prevention of Disease, Care of the Hands.

Mental Qualifications: Education, Perception, Judgment, Order.


Women about to enlist in the profession of nursing are inclined to approach the career with too much sentiment, and, consumed with the altruistic spirit, allow this to blind them to its practical side. That there is a very practical side no nurse of any experience can deny. Still it must be borne in mind that the calling is a noble one, the alleviation of human suffering being its primary object, and nurses should make their work their first thought, allowing no outside distractions to lure them from the path of duty. By this we do not mean to imply that they are to be debarred from all forms of recreation. They need to have their minds diverted more than the people engaged in most occupations, because upon them depends the atmosphere of the sick room, and they must provide the cheerfulness and brightness that is so often lacking there. They should, however, have a proper comprehension of the responsibility
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they assume when they allow themselves to be entrusted with human lives, and should bring to their work a capacity for self-sacrifice, at the same time keeping in mind the fact that to be able to give of one's best all self-sacrifice must be tempered with a certain amount of self-consideration.

The qualifications of a good nurse may be classified as physical, mental, and moral.

Physical Qualifications

Health.

A good constitution is indispensable. Women who are unsound of body or of excessively high nervous organisation, or who are incapable of great physical endurance ought not to entertain the idea of becoming nurses. More than this, even a strong physique will not suffice unless it be kept vigorous by strict obedience to the laws of hygiene.

Cleanliness.—Personal cleanliness must be rigidly observed. The daily bath must never be omitted. The finger nails should receive a great deal of careful attention, as they form a convenient hiding-place for germs. The cuticle should be cleaned frequently, even though it does not appear dirty, and the nails should be kept short. Nature supplies the hair with an oil that keeps it soft and pliable. When the oil is in excess, it attracts dust and if not kept clean may become a fruitful source of contagion. The hair should therefore be thoroughly washed every two weeks, brushed carefully back from the face, and dressed in a simple manner. The breath must be kept sweet by attention to the condition of the stomach and the teeth. The teeth should be washed, and the throat gargled twice a day, and it is advisable
to have the teeth examined by a dentist at least twice a year. The clothing should be scrupulously clean, underclothes and uniforms being changed often enough to secure a desirable freshness. In working over a patient, the nurse is brought in very close contact, therefore all odors or perfumes that might be distasteful to the sick should be avoided.

**Fresh Air and Exercise.**—Nothing is more conducive to good health than fresh air. Nurses should always sleep with the window open winter and summer. They should go out of doors as much as possible during their free hours, although it costs them an extra effort to do so. No amount of exercise indoors will do them so much good as a brisk walk in the open air. Walking gives exercise to almost every muscle of the body, it accelerates the circulation, clears the brain, and gives new life and vigour.

**Food and Sleep.**—Wholesome food, well cooked and taken at regular intervals in sufficient quantities, while hot, without too much haste is also of the utmost importance. The habit of rapid eating with insufficient mastication and the use of unwholesome and indigestible food taken after a hard day’s work in hospital wards is one of the frequent causes of illness amongst student nurses.

Too much stress cannot be laid on the need of rest. At least six hours’ sleep is required in order to do the best work, and recreation should not frequently be allowed to interfere with the hours for sleep.

**Prevention of Disease.**—To maintain good health it is incumbent upon nurses to take every precaution possible to check in time the inroads of disease. By attending immediately to symptoms of indigestion, constipation, sore throat, and similar
ailments and reporting them at once to the proper authority, they may often prevent a severe illness. They should not attempt to prescribe for themselves, because indiscriminate dosing often begets the drug habit which cannot be too carefully guarded against. Those in authority in a school for nurses are responsible for the health of every student. It is due to them, therefore, that they be apprised of any tendency to disease in order that they may give the advice that their experience warrants. At the same time, the student nurse must remember that her superiors do not expect her to take up their time with petty complaints of fatigue or of slight indisposition. She must inure herself to hard work and go on in spite of difficulties with the same kind of fortitude that is expected from a soldier on the field of battle.

Care of the Hands.—A nurse must always be on her guard against contagion. Proper care of the hands is one of the most important precautionary measures, and she must remember that negligence in this matter endangers not only her own life, but the lives of others. After handling infectious cases, she must disinfect her hands before touching anything with them and even before washing them, by submerging them in 1:1000 bichloride or other disinfectant for from three to five minutes. Furthermore, in order that they may be easily disinfected, she must keep them in good condition: (1) by using forceps, whenever practicable to handle infected dressings, etc.; and (2) by using after washing, as often as possible, some lubricating hand-wash, and before retiring, a reliable ointment or cold cream well rubbed in, since the constant use of water and disinfectants has a tendency to roughen the skin. To
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prevent infected fingers, she must keep a constant watch for hangnails, scratches, and cuts, protecting the latter with flexible collodion, or, if of any consequence, with sterile gauze or finger cots.

Mental Qualifications

Education.—The acquirements of the higher education, although always desirable in probationers, are not absolutely essential to their success. Women wishing to prepare for such responsible work must, however, present evidence of a high order of intelligence and of a desire to learn and comprehend the underlying principles of the profession.

Perception.—Perception is probably the mental faculty that is called into play most constantly in nursing. Nurses must be quick to observe minute details, and equally quick to act intelligently on their observations. They must note instantly any unfavourable change in a patient's condition, since a failure to do so might result in his death. If a patient's position becomes uncomfortable, if his pillows are out of place, if he be exposed to a draught, or if the light shines in his eyes, they should perceive it at once. If noise or too prolonged visits of friends are annoying the patient this should be seen and prevented. When assisting at an operation or treatment they should anticipate the needs of the doctor and when being shown how to do anything, either by the doctor or another nurse, they should pay the strictest attention, in order that it may not be necessary to have the instruction repeated.

Judgment.—The nurse's intelligence should be so keen that when two conditions are placed before her, she can weigh them quickly and decide the relative
value of each to the matter in hand. Nurses who have never held responsible positions are very apt to fail at first in this respect, but by always observing where their decision has erred they will soon learn by their failures. Women devoid of this quality have no legitimate place in the profession of nursing.

Order.—Nurses must early cultivate an orderly habit of mind. They should make an inventory every morning of their day's work, planning it so that the greatest amount can be done in the least possible time. This will obviate useless expenditure of mental and physical strength. If they cultivate this habit of mind, they will not be likely to tolerate any form of disorder in the things about them, or to allow confusion where they are working. The rule, "A place for everything and everything in its place" is nowhere more necessary than in the hospital ward or the sick room. Great indeed must be the emergency which will excuse putting anything where it does not belong. Failure to find important instruments in place and in order may cost a life.

The development of all the above qualities can be helped by the proper kind of reading. When the nurse gets time for the improvement of her mind she should take care to consume the right kind of mental food. Select good books. Life is too short to waste on books that do not give anything helpful. Read slowly to develop the perception. One book read appreciatively is better than a dozen that are half digested. Exercise a sense of fitness in your choice. There are certain books for the tired hours and others that should be read only when the mind and body are vigorous.
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Moral Qualifications

The moral qualifications of a nurse are so numerous and so important that a volume might be devoted exclusively to them.

Personal Neatness.—The Uniform: Nurses should always be immaculately clean, trig, and tidy, in the English sense “very fit.” Their uniform symbolises the discipline of the soldier, and carries with it a certain sense of moral obligation. It should consist of a simply made washable material that is easily laundered, and of a colour pleasing to the eye that does not readily fade. Stiffly starched aprons, skirts, and dresses should be avoided as a disturbing element to the patient. The uniform should be kept in perfect order. There is no excuse for rips, missing buttons, or slovenly belts. As a matter of fact, a woman with a proper sense of self-respect usually gives her appearance the attention it requires.

Economy.—Nurses should cultivate habits of economy and thrift in their personal expenditures. A systematic keeping of accounts while in the school of nursing is earnestly recommended, since those who are frugal where their own belongings are concerned are more likely to be careful of the property of others. Pains should be taken to learn the comparative cost of supplies and to use always the cheapest that will answer the requirements. It seems almost incredible that it should be necessary to dwell upon this subject, but complaints come very frequently from the homes to which nurses go of their heedless extravagance in the use of supplies and their careless destruction of expensive furniture and linen.

Courtesy.—Nurses should never be so absorbed
with their work that they cannot practise courtesy. They should be courteous toward every one with whom they come in contact. The friends of the family deserve some attention, although reports of the patient’s condition must be given with great caution. The servants, upon whom extra work always falls at such a time, when sickness is present in the family, if treated with consideration, will be friendly and helpful. People visiting the hospital frequently complain justly of the lack of consideration shown them. Patients and their friends are often very trying, to be sure, but this is no excuse for impoliteness. To enter into argument may jeopardise your self-control. If an important matter is involved, offer to refer it to higher authority and show in every way a desire to respect their wishes.

Obedience.—No one should take up nursing who is not willing to give prompt and unquestioning obedience to authority. Women are not admitted to schools for the training of nurses until they are twenty-one years of age. They enter then of their own free will; therefore, there is no excuse for disobedience. The highest order of discipline must be maintained, and the rules are in many respects very strict, but no large institution can be successfully run on any other basis. Obedience includes not only the keeping of rules but also the absolute and accurate carrying out of the doctor’s orders regarding his patients. Intelligent obedience is a rare quality, but one which the medical profession prizes most highly.

Promptness.—Promptness involves precision in regard to time. It is necessary to learn to gauge the time it is going to take to accomplish a piece of
work so that it can be finished at the moment pre-
scribed. It must not be begun when it ought already
to be finished, as this interferes with carrying out
orders and makes inroads upon the next duty.
Nurses must learn to move quickly, but quietly—
to make haste without hurry. Patients become
tired if too much time is consumed over a treatment
or the making of their toilets, and nurses who are
not quick and prompt under ordinary conditions
are likely to be found sadly wanting in emergencies.

Self-Control.—Self-control is a very important
quality in nurses. The distressing scenes they are
constantly obliged to witness call for cool heads and
steady nerves. They must, therefore, learn to master
their emotions. Patients are often extremely irritable
and it requires great self-control not to be affected
by their weakness or ill-temper, but it is necessary
to appear calm no matter what the provocation may
be.

Sympathy.—Nurses are sometimes accused of a
lack of sympathy. They should not allow their
daily work so to inure them to suffering that they
cannot feel a reasonable amount of compassion for
a person in pain. Patients are often sadly in need of
an encouraging word. A gentle touch or a kindly
smile may do much toward carrying a sufferer over
a hard place. The nurse's sympathy must not deter
her, of course, from carrying out orders that will
benefit the patient. There is, however, a way of
doing this without wounding his sensibilities.

Tact.—Tact has been defined as "the ready power
of appreciating and doing what is required by cir-
cumstances." In other words, tact is doing and
saying the right thing at the right moment, or it is
an appreciation by us of the things that those with whom we are dealing think we should do. There is probably no other qualification so indispensable to a nurse's success. It presupposes great intuitive power, a wide comprehension, and the ability to read human nature quickly. Only one possessed of this ability can really manage others or call forth the best that is in them. Tact must be deployed daily while in the hospital in keeping exacting patients content with their due share of attention to the end that others who are less exacting but who are in need of an equal, if not a greater, amount of care, may not be neglected. To secure proper discipline in the sick room is an essential part of a nurse's duty. The comfort and well being of the patient must be her first thought. To inspire the family and friends with confidence in her judgment, to make them accept her decisions readily as to what is best for the invalid is no easy task, and one often requiring infinite tact and patience. To know when to speak and when to keep silence; to know when to be present and when to retire, these are points requiring tact of high order.

Truthfulness.—It ought not to be necessary to enumerate truthfulness among the qualifications of a nurse. But it must be borne in mind that in the hospital truthfulness takes on a very broad meaning. There it means not only an unwillingness to tell a downright untruth but also the possession of an honesty of purpose that will lead to the frank acknowledgment of an error and the prompt confession of anything that has been left undone. It means also absolute accuracy of statement and avoidance of all exaggeration. Truthfulness also involves the conscientious performance of all the
minute details which have been considered necessary in constructing the different routine procedures; whether their omission is noticeable or not.

**Dignity.**—Nurses should always be dignified and cordial without being familiar. The bedside is not the place for social converse. The patient is entitled to the best skill of the doctor and nurse and should receive their undivided attention. There are always in the hospital and elsewhere those who are ready to criticise; and it must be remembered that as a rule their criticism is not of the individual nurse, but of the whole nursing profession.

**Respect for Officers.**—The etiquette of the army is repeated in the hospital, and it is insisted upon there for the same reason as in the army “Familiarity breeds contempt.” We rarely obtain unquestioning, prompt, obedience from those with whom we are too familiar, and we respect less the judgment and the decision of our superiors if they are familiar with us. Nurses are, therefore, required to stand when speaking to those in command and to give precedence at all times not only to the doctor and to their officers, but also to their seniors in the school. The members of the senior class should not be on too friendly terms with their juniors, for they may at any time be placed in charge of wards or in other positions of authority over them.

**Respect for the Secrets of Others.**—When people are ill and in trouble they are very liable to tell things which in calmer moments they would never think of mentioning. Too much stress cannot be laid upon the importance of keeping such secrets inviolable. The nature of our patients' ailments should also be a matter of trust. In fact, the safest and most
honourable course is never to discuss patients in any way. Many a nurse has had cause to bitterly regret a few careless words about the person under her care, or being drawn into a discussion of former patients and their ailments.

If nurses would follow more closely the principles of the Florence Nightingale Pledge, which is given below and which is recommended to their attention, they would be less likely to commit many of the indiscretions for which they are often justly blamed.

The Florence Nightingale Pledge.—“I solemnly pledge myself before God and in the presence of this assembly to pass my life in purity and to practise my profession faithfully. I will abstain from whatever is deleterious and mischievous, and will not take or knowingly administer any harmful drug. I will do all in my power to maintain and elevate the standard of my profession and will hold in confidence all personal matters committed to my keeping, and all family affairs coming to my knowledge in the practice of my calling. With loyalty will I endeavour to aid the physician in his work, and devote myself to the welfare of those committed to my care.”
CHAPTER II

BACTERIOLOGY


All measures for the prevention of disease are based on bacteriology. Hence, the study of this subject should be taken up early by persons who are being prepared to care for the sick. Indeed, there is no other way by which such a realisation of the existence of microscopical organisms, as will insure scrupulous obedience to the laws of asepsis and prophylaxis, can be obtained.

Important Facts in the History of Bacteriology

The minute organisms now known as bacteria (or germs) were first seen and described by Antony van Leeuwenhoek in the year 1675, but neither Leeuwenhoek nor several generations of his successors, owing to the inefficiency of their microscopes, were able to gain sufficient knowledge of these "animalcules," as they then called these organisms, to be of any practical benefit.

¹ Their power of motility led Leeuwenhoek and many of his successors to believe that bacteria belonged to the animal kingdom.
In 1749, Needham and Liebig, Dutch chemists, declared that germs developed spontaneously, as the result of chemical change.

In 1762, Marcus Antonius Plenciz, a physician of Vienna, claimed a special germ for each disease and taught the probability of the multiplication of germs within the body and their transmissibility through the air.

In 1769, Spallanzani refuted Needham's teachings, showing that if infusions of decomposable vegetable matter were put into air-tight flasks, and these flasks were allowed to remain for some time in a vessel of boiling water, putrefaction was arrested.

In 1861, Louis Pasteur, of France, proved beyond doubt that germs come into existence by reproduction, and not by spontaneous generation. He also established the validity of Plenciz's theory regarding the cause and transmission of disease, and suggested that all putrefaction, the souring of milk, the fermentation of sugar, and like processes were due, and due solely, to the work of germs.

In 1869, Hoffman commenced the classification of these organisms. It is only since his day that the term "bacteria" has been used.

Pasteur and Hoffman were much handicapped in their work by lack of proper culture media, in which to develop and study the germs. It was Robert Koch, who, in 1881, overcame this obstacle. He noticed that separate colonies or groups of bacteria appeared on the surface of potatoes or bread which had been exposed to the air for some time, and that these different colonies never became confluent. He also noticed that a scum appeared on the top of bouillon under the same conditions. Wishing to see
if separate colonies would form in the bouillon if it was solid, he added liquefied gelatine to it. Several modifications have since been made in the culture media of Koch, but the bases remain the same to this day.¹

Lord Lister, in 1876, was the first surgeon to put Pasteur’s and Hoffman’s discoveries to practical use. He soaked his instruments and dressings in carbolic, 1–40, and kept a carbolic spray, 1–20, playing constantly near the operating table while he worked. Later researches have shown that the spray was a mistake, it being impossible to disinfect air in such a manner, and that carbolic is an inefficient disinfectant for dressings and instruments. But Lister’s attempts at asepsis, imperfect as they were, gave a decided impetus to bacteriological research.

Preparation of Culture Media. Making Cultures for Tests.—Though it is not necessary for nurses to be able to differentiate bacteria, it is interesting and often exceedingly useful for them to have at least a slight idea of the laboratory method employed in the preparation of media² and in making cultures for tests.

Bouillon for Culture Media.—To make bouillon for culture media, chop finely one pound of beef, put it in a clean vessel, and add one litre of distilled water. Mix well, cover, and put in a refrigerator for twenty-four hours. Strain through a clean towel, and press until one litre of fluid is obtained. Add ten grammes of peptone and five grammes of common salt. Then

¹ Media are preparations in which germs will thrive, and a culture the propagation of bacteria in or on such preparations.
² For a detailed account of these media, see page 000.
place over a free flame to boil for half an hour. Finally filter through filter-paper and neutralise by adding a few drops of a solution of caustic soda.

If solid media are wanted, add either gelatine in the proportion of 10 to 12% or agar-agar. The latter will stand a higher temperature than the former without becoming liquefied.

Loeffler's blood serum in which many species of bacteria thrive better than in any other kind of media is also much used in laboratories. To prepare this serum, the blood which is obtained from the slaughter-house should be collected in sterile jars, tightly covered, and allowed to stand about half an hour, until clotting has begun. It should then be put on ice for twenty-four hours, at the end of which time the serum should be poured off into sterile glasses. Glucose bouillon should then be added in the proportion of one part of bouillon to three parts of serum. Transfer this to sterile test-tubes; place these in a slanting position in a steriliser; and heat until solidified.

To Test Sponges, Dressings, etc., with a View to Discovering Germs.—To detect the germs in sponges, dressings, etc., put a small piece of the material to be tested into a tube of bouillon, taking care that it comes in contact with nothing unsterile in the process, and that the sterile end of the plug does not touch the rim of the test-tube either when

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1 A sea-weed found on the coast of Japan and China.
2 It must be remembered in making tests that to obtain pure cultures, all the utensils used must be perfectly sterile.
3 Sterile non-absorbent cotton being impervious to air makes the best stopper when wishing to keep the contents of a bottle or test-tube sterile.
it is being removed or reinserted. Place the test tube where it will be in the dark and in a temperature of 90° to 98° F. If at the end of twenty-four hours the bouillon is still clear, the article therein is sterile; if the bouillon has become cloudy, the reverse is indicated.

To discover the nature of the germs which have caused the clouding of the bouillon, sterilise a platinum loop in the flame of a Bunsen burner, take up a loopful of the bouillon culture, and mix with a tube of liquefied gelatine or agar-agar. In order to procure some culture containing a smaller number of organisms, transfer a loopful of the mixture to a second tube, and then a similar amount from the second tube to a third tube. Pour these mixtures, each into a sterile Petri dish, cover quickly, and set aside. After twenty-four hours, colonies\(^1\) of bacteria will have developed, and, each kind having been able to grow in its own typical way, the different colonies may be picked out and studied.\(^2\)

To study the bacteria it is best to stain them. To do this make a cover-glass preparation by taking a clean cover-glass and placing a small drop of sterile water upon it with a sterile platinum needle. Then mix carefully with the drop of water a very small portion of a colony until the mixture is spread like a thin film over the cover-glass. Allow this to dry in the air. When it is dry, take up the glass with a pair of forceps and fix the culture by passing it through

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1 Each clump of bacteria in the gelatine is called a colony.
2 It need hardly be said, that in hospitals it is constantly necessary to make tests of sponges, dressings, etc., with a view to ascertaining whether they contain bacteria and if so of what kind.
the flame of a Bunsen burner three times. Pour on
the film a few drops of fuchsin or methylene blue,
allowing it to remain about half a minute, rinse the
film in water, dry between blotting-paper, put a drop
of balsam\(^1\) in the centre with the sterile platinum
needle,\(^2\) and place a cover-glass over it. The culture
will then be ready to be examined under the micro-
scope.

When the object to be tested cannot be put into
bouillon, rub a sterile swab\(^3\) over its surface, and then
rub the swab on some sterile, solidified gelatine in a
properly plugged test-tube. If the object is not
sterile, the tube will show a growth of bacteria within
twenty-four hours. Prepare this for examination in
the same manner as the growth from the bouillon.

Some bacteria possess certain idiosyncrasies by
which they may be distinguished. Thus many of
them are coloured—yellow, lemon, orange, red, grey,
etc.—and are called chromogenic. Some germs
liquefy the culture media. Some liberate certain
gases. Some—aërobic bacteria—need oxygen for
their subsistence, while others—anaërobic bacteria—
do not.

Another important characteristic of bacteria is
their capacity for being stained. Owing to this
property, it has been found possible, by the use of
various dyes and decolourising agents, to differentiate
between many similar bacteria. For example, tuber-
cle bacilli when stained with methylene blue, appear

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\(^1\) The sole use of the balsam is to keep the cover-glass
fixed to the slide.

\(^2\) The needle is sterilised each time it is needed by being
passed through the flame of a Bunsen burner.

\(^3\) Cotton rolled upon a stick.
blue like other bacilli to which methylene blue has been applied. But if they are stained with carbol fuchsin and then treated with nitric acid and alcohol, they persist a brilliant red, while most other bacilli when subjected to these same conditions are decolourised.

**The Nature and Classification of Bacteria**

Bacteria are the smallest organisms known. They consist of cells of protoplasm encased in cellular sacks. The power of independent motion possessed by many of them, and their ability to assimilate complex bodies as food caused much indecision formerly as to their nature; but their general shape, their method of growth, and their tendency to form threads and spores have finally led the scientists to classify them as vegetables. In many ways they are similar to the ocillaria, a low form of plant life which lacks chlorophyl.¹

All bacteria are not harmful. It is by their agency that decomposition takes place, and the chemical changes that they produce through decomposition are necessary not only to plant life, but to the preparation of much of our own food, and to the carrying on of many of our industries.

Germs are divided, according to the results they produce in a substance which has been inoculated with them, into three distinct classes: those causing suppuration in wounds; those producing disease (see Chapter XXIII); and those causing change in food and like material (see Chapter XXIV).

¹The green colouring matter of plants which enables them to decompose carbonic acid and ammonia into their elementary constituents.
The germs which do not produce disease are called non-pathogenic. They are:

- The moulds, or hyphomycetes;
- The yeasts, or blastomycetes;
- The saprophytes, or bacteria which produce putrefaction;
- The schizomycetes, or bacteria which cause fermentation.

The pathogenic bacteria are those which produce morbid changes in wounds and those which cause disease. The former gain entrance to the body through breaks in the skin and mucous membranes, the majority of the latter through the respiratory and alimentary tracts.

Although there are hundreds of varieties of bacteria, they vary but little in shape, being mostly either spheroidal, ovoidal, rod-shaped, or spiral. The spheroidal measure $\frac{1}{4}$ of an inch in diameter, the ovoidal $\frac{1}{2}$ of an inch in diameter, and the spiral and rod-shaped $\frac{1}{2}$ of an inch in length.

The spheroidal and ovoidal are called cocci (singular, coccus); the rod-shaped, bacilli (singular, bacillus); and the spiral, or corkscrew, spirilli (singular, spirillum).

There are several subdivisions of the cocci, based upon their manner of grouping themselves:

1. When single they are called micrococci.
2. When in pairs, diplococci.
3. When in clusters like a bunch of grapes, staphylococci.
4. When in a chain, streptococci.
5. When in an irregular mass, in a gelatinous matrix, zoöglia.
6. When in eights or sixteens, sarcina.
Germs Causing Morbid Processes in Wounds.—The most important bacteria to be considered in surgery are:

1. Staphylococcus pyogenes aureus, a very prevalent pus-producing micro-organism, nearly always present in the dust of surgical wards. It is generally present also in large numbers in suppurating wounds.

2. Streptococcus pyogenes, another and more virulent pus-producing germ, which is a common cause of septicæmia and post-operative peritonitis.

3. Bacillus coli communis, which always exists in the intestine, but which exists there in increased numbers in almost any intestinal disease and especially in peritonitis.

4. The bacillus of tetanus which is found especially in the soil, on rusty metal, and in and around unclean stables and cellars (see Chapter XXII).

5. The streptococcus of erysipelas which produces erysipelas, a very serious complication when occurring in wounds.

6. The diphtheria bacillus which is not only a disease-producing germ, but which will also cause a virulent and often fatal complication if it enters a wound.

Where Bacteria are Found. These, though the most prevalent, are only a few of the many germs that may cause troublesome, if not fatal, complications in wounds. They are almost omnipresent, as are the germs producing disease (see Chapter XXIII. Contagious Diseases) and the many harmless and useful germs. They are in the air, though decreasing in the upper strata. They are in the ocean to a considerable depth; in all running and standing water, particularly in the latter; and in the
soil, to the depth of four or five feet. The dust also is full of them. They are in our mouths, in our hair, under our nails, and in the glands of the skin. The glands and the internal organs of our bodies with the exception of the intestines are, in health, generally free from bacteria, but bacteria are present in all the ducts and passages leading to them. There is naturally no place where germs are more prevalent than in the wards of a hospital, therefore greater pains must be taken there to guard against their invasion, and to secure their destruction.

**Manner of Growth of Bacteria**

Bacteria multiply with great rapidity. One bacterium will multiply 16,500,000 times in twenty-four hours. That bacteria do not overrun the world is due to two facts: first, they require favourable conditions for development; and, second, they soon liberate, by their excessive multiplication, toxic material which not only checks their increase, but kills many that already exist. It was the discovery of this toxic material that led to the trial of antitoxines.

The following are the methods by which bacteria reproduce themselves:

The yeasts and moulds divide by budding; that is, small nodules appear on their surface, which, breaking off, form independent organisms.

The bacteria proper multiply by fission; that is, they become elongated, and the elongation, dividing, forms a new bacterium.

The conditions favouring the growth of germs vary with different species; the different requirements of the respective species are one of the means of recog-
nising the species. All need moisture, freedom from the direct rays of the sun, food (the kind depending on their nature), and warmth (85° to 105° F, according to the species.

**Spores.**—Spore formation is the process by which certain bacteria are enabled to enter a state in which they are more resistant to external influences. Spores are seen as round, or ovoid highly refracting bodies in the bacteria. These are eventually thrown off, and under favourable conditions, develop into bacterial forms. Some germs have not the power of forming spores, and such are easily destroyed.

**Methods of Destroying Germs**

Two most effectual means of killing bacteria are (1) heat, and (2) disinfectants or germicides. Scrupulous cleanliness, it is hardly necessary to say, is an indispensable assistant. Freezing will not destroy all germs. Cold is only an antiseptic. It arrests the development of germs, but, so soon as a favourable temperature is restored, they will be as active as ever. The use of heat to destroy germs is called sterilisation; the use of chemicals is called disinfection.

**Sterilisation.**—There are four methods of sterilisation by heat:

1. By boiling.
2. By the use of live steam.
3. By the use of live steam under pressure.
4. By hot air, or dry sterilisation.

**Boiling.**—When the articles to be sterilised are of metal with a perfectly plain surface, such as scalpels

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1 Slightly alkaline proteid material, either inside or outside the body, suits the nature of the greater number.
and needles,\(^1\) thirty seconds is a sufficient length of time to expose them\(^2\) to the influence of boiling. When there are grooves or joints, or when the object is of thin rubber,\(^3\) such as rubber gloves, catheters, rectal tubes or rubber tubing, three to five minutes are necessary. When the article is absorbent, twenty to thirty minutes, according to its thickness, is required. Water, to be sufficiently sterile for surgical purposes, should be boiled for twenty minutes; oil, for half an hour.

**Steam.**—When sterilising articles by steam, not under pressure, it is necessary to expose them to its influence on three successive days, for one hour each day. The maximum temperature of steam, not under pressure, 100\(^\circ\)C., though sufficient to kill bacteria, is not sufficient to destroy the spores, into which all the bacteria that have the time and power are transformed during the steaming. These spores become bacteria again, as soon as the temperature is sufficiently lowered. Consequently, it takes several steamings to destroy them all. To favour the development of the spores keep the articles being sterilised in a temperature of about 80\(^\circ\)F., between the successive steamings. If the articles are to be used for surgical purposes, wrap them, before beginning

\(^1\) To prevent rusting boil in a 1 % solution of soda.

\(^2\) As these instruments easily become blunted, they should not be left in longer; they should not be put in, until the water is boiling; their points should be protected by rolling in gauze or absorbent cotton, and they should be placed in the steriliser blunt end foremost. The wires must be taken out of needles before sterilisation.

\(^3\) Salt (3 1 to a litre) should be put in the water in which rubber goods are boiled, to prevent them from softening.
sterilisation, in a thick covering and keep in a scrupulously clean receptacle between and after the steamings.

The Arnold steriliser is the apparatus most frequently used, in the hospital, for this method of sterilisation. In private practice, however, an ordinary vegetable or fish-steamer may be substituted for it. If the bundle being sterilised becomes very wet in the process, dry it in a warm oven.

**Steam under Pressure.**—A much greater degree of heat being possible in an apparatus where the steam can be obtained under pressure, one sterilisation is sufficient. In the larger hospitals, steam under pressure is commonly used in the preparation of sterile surgical dressings, sterile solutions, etc. These objects are exposed to steam at a 15-pound pressure, temperature 250° F., for half an hour.

**Dry Sterilisation.**—Dry sterilisation is now little used, except in laboratories, for culture tubes and other glassware. If this process is to be of any benefit, the articles must be exposed for one hour to a temperature of 300° to 324°F., and very few materials will stand this high degree of heat without deteriorating.

Steam, being more penetrating, will be more effectual in twenty minutes, than dry air at 300°F., in an hour.

**Disinfection.**—When it is impossible to apply heat for the purpose of killing germs, chemicals are resorted to. These chemicals are called disinfectants or germicides.

**The Disinfectants.**—There are a great variety of disinfectants in use already and new ones are constantly being discovered. Some of the disinfectants in most common use are;
Alcohol.—Alcohol 70% is a disinfectant for sporeless organisms. The solvent action which it and ether (ether is not a disinfectant) have on fatty matter make them invaluable for cleansing not only the skin, but also the utensils, instruments, sutures, ligatures, etc., used for surgical purposes.

Bichloride of Mercury (Corrosive Sublimate).—To be thoroughly disinfected, articles must be soaked in bichloride, 1-1000, for twenty minutes; in 1-5000, for an hour. Bichloride will discolor clothing, and corrode metal, marble, porcelain, and wood, so it must not be used for their disinfection. It is a valuable disinfectant for the skin and for glass utensils. It was formerly much used in the disinfection of excreta, but it has been lately demonstrated that, as it hardens albuminous matter, it forms a coating over certain masses which makes them impervious to the solution, thus lessening its action. It is sometimes used for irrigating infected wounds, and for disinfecting the mouths of patients suffering from germ-diseases, in a strength of 1-10,000.

The compressed tablet is the most convenient form of bichloride for use in private practice. One tablet dissolved in a pint of water will make a 1-1000 solution. In hospitals, for economy’s sake, the solution is made directly from the powder. Such great accuracy is required in the measuring that this is done, as a rule, in the pharmacy, the wards being provided with solutions of either 1-10 or 1-20 from which the weaker solutions can be made, as required.

1 Some authorities consider 70% a more efficient disinfectant than absolute alcohol. They hold that the latter by coagulating any albuminous substance in which the germs may be, limits its action.
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(see rules for diluting solutions, page 32). When dissolving the powder, a small quantity of salt and tartaric, or other harmless acid is added to the bichloride. The salt makes the bichloride soluble in a smaller amount of water. The tartaric acid neutralises its action on albuminous matter, and thus prevents it from precipitating the albuminous secretions of the skin, which blacken and otherwise injure the hands.

Bichloride solutions should only be used when fresh, as they are converted, by standing, into insoluble calomel which is not germicidal.

*Carbolic Acid.*—A solution of carbolic acid 1:20 if brought in direct contact with sporeless organisms will kill them in a few minutes. A 1:120 solution is sometimes used for vaginal douching; in that strength it is only antiseptic.

Carbolic will not discolour white materials nor metals, so it is often used in their disinfection.

Except for hospital use, when the crystals are bought, carbolic acid is generally purchased in a 95% solution, and diluted, as required. In this strength, it is a violent corrosive, and care must be taken not to spill any over the hands or upon the skin. If this should happen, the action can be neutralised by the immediate use of alcohol.

Carbolic can be diluted with either cold or hot water. It must be shaken until all globules disappear, as these will burn any tissue with which they come in contact.

*Lysol.*—Lysol, a coal-tar derivative, is equal in strength to carbolic. It is often added to vaginal douches. It is used in solutions of from 5 to 10%. It is sometimes employed for disinfecting utensils,
but is expensive, if used in sufficient strength to be of any value.

*C*lorinated *L*ime.—Chlorinated lime is principally used for disinfecting excreta, water-closets, sinks, and hoppers. It is only good when perfectly fresh. To ascertain if it is fresh, dissolve a little in water; if the water becomes turbid, the lime is stale.

*M*ilk of *L*ime.—Milk of lime is used for the same purpose. It is made by adding one part of slaked lime to four of water.

*C*lorinated *S*oda (*Labarraque’s Solution*).—Chlorinated soda is a French preparation, which is excellent for removing stains from glass and porcelain utensils, dressing rubbers, etc. Owing to its pungent odour, irritating effect on the skin, and deteriorating effect on clothing, it is only useful as a disinfectant for water-closets, sinks, bed-pans, and the like. It is very useful for these purposes, however, since, by liberating chlorine gas, it acts as a deodoriser as well as a disinfectant.

C*reoline*.—Creoline is used as a disinfectant and deodorant for suppurating and offensive wounds, in solutions of from 2 to 5%. In diluting creoline, the water should always be poured into the flask before the creoline. The water must never exceed 98°F., or the drug will be too thoroughly dissolved, and its action will be lessened. Creoline exposed in an open dish is slightly deodorant.

F*ormaldehyde*.—Formaldehyde, a gaseous solution formed by the partial oxidation of wood alcohol, is rapidly superseding the above-mentioned disinfectants for the majority of purposes, and especially for the disinfection of clothing and utensils. Its action is quicker than that of carbolic, and less
limited than that of bichloride. Its pungent odour and its irritating effect on the throat and nose of the person using it are the only objections to it. It does not discolor metal, and a 2% solution will be effectual in thirty minutes. The fumes are used for disinfecting rooms (directions for fumigation will be found in Chapter XXIII.) after contagious diseases. Mattresses, blankets, colored clothing, metal, leather goods, and wall papers can all be exposed to these fumes without injury.

The gas is generated either from cones of compressed powdered formaldehyde, lighted as a candle, or by different varieties of specially devised apparatus. Some of the latter produce nascent formaldehyde directly from the wood alcohol, by oxidation; others liberate the gas from tablets of compressed formaldehyde, which are placed in a small compartment directly above a flame. Formaldehyde is also an excellent deodorant.

Another method of liberating gas from formaldehyde is to add crystals of permanganate to a 4% solution of formalin in the proportion of one to four. One pint of formalin will be sufficient to disinfect a room 2,000 cubic square feet. The solution must be put in a five gallon pail, and the floor under it well protected, as the solution boils violently immediately upon the addition of the crystals.

Potassium Permanganate.—Potassium permanganate is generally classed as a disinfectant, though by many it is considered only antiseptic. Some surgeons consider it a fairly good skin disinfectant, if used in a supersaturated solution and in conjunction with oxalic acid. The oxalic not only helps in the disinfection, but removes the stains made by the
permanganate. Care must be taken in using permanganate, as it makes almost indelible stains on linen, wood, and other absorbent material.

*Oxalic Acid.*—Oxalic acid is used as a disinfectant in connection with potassium permanganate.

**The Antiseptics.**—The chemicals which will not destroy germs but which will retard their growth and check their action are called antiseptics. The more important antiseptics are:

*Boric Acid.*—Boric acid is used for bladder, eye, and nasal irrigations, and for mouth washes, generally in 2 and 4% solutions. It is cheaper to buy it in powder form and make the solution oneself than to buy the solution. The solution is made by dissolving the powder in hot water. Standing the bottle or flask in a saucepan of boiling water will assist in dissolving the powder. When boric acid is used for bladder irrigation it must be sterilised.

*Peroxide of Hydrogen.*—Peroxide of hydrogen is valuable in the cleansing of infected wounds. The active effervescence which takes place as soon as it is poured into a wound carries off morbid and suppurating tissue. It is also used to control oozing of blood from capillaries.

*Salt Solution.*—Normal salt solution, though possessed of only slight antiseptic properties is much used, on account of its stimulating effect on tissue, in the cleansing of wounds, bladder irrigations, and vaginal douches. Being of the same alkalinity as the blood, and mixing well with the same, it has almost entirely superseded other stimulants for hypodermoclysis, intravenous infusions, and rectal irrigations (when given for stimulation). When employed for wounds, it must be sterilised; when intended for
hypodermoclysis and intravenous infusions, both filtered and sterilised Normal salt solution is so called because it contains about the same amount of salt as the blood serum. Formerly, \( \frac{9}{10} \) of a 1% solution was considered the correct percentage, and it is still often used as such, though it has been lately proven that \( \frac{9}{10} \) of 1% is accurate.

To make one litre of a 1% solution, dissolve 6 grammes of salt in one litre of water. To filter it, place a funnel, with a piece of absorbent cotton in the bottom, in the neck of an empty flask or bottle, line the funnel with filter-paper, and then pour the salt solution in, a small amount at a time, allowing it to filter slowly through. When preparing the solution for subcutaneous use, refilter it until it is perfectly clear. Seven or eight filterings are usually necessary. When the filtering is finished, make a large, sterile non-absorbent cotton plug for the flask, or bottle and bandage it in place. This not only provides a germ-proof stopper, but keeps the rim of the flask free from dust. The solution is best sterilised by steam under pressure. If steam without pressure is used, the sterilisation must be repeated, as in the case of dressings, three successive days. In an emergency, the sterilisation can be done by placing the flask in a kettle of water, and letting it remain there half an hour after the solution has been brought to the boiling point. The flask should never touch the bottom of the kettle, however, for it may break. This may be prevented by placing under it a pad made of a few thicknesses of old muslin or gauze.

Rules to be Followed in Making Solutions

1. To estimate the amount of drug necessary for a
solution of a specified percentage, reduce the amount of solution required to minims, multiply by the rate per cent., and point off two places. Thus it would require 614 grams or one ounce and 12 grams of boric acid powder to make one quart of a 4% solution of boric acid; and 3 drachms and 12 minims to make one quart of 2% creoline from the crude drug.

2. To estimate the amount of drug to be used when a given number of parts of the solution are to contain one part of the drug, reduce the amount of solution required to minims, and divide by the number of parts to contain one part. Thus, it would require 765 grains of bichloride powder to make one quart of a solution, 1–20.

3. To make a weaker from a stronger solution, divide the weaker by the stronger solution, use the result as the divisor, and the number of cubic centimetres required as the quotient; thus since there are 1000 c.c. in one litre, it will require 20 c.c. to make one litre of bichloride 1–1000, from a 1–20 solution.
CHAPTER III

VENTILATION

Methods of Ventilation. Heating. Prevention of Air Contamination by Proper Care of Utensils, Sinks, Hoppers, etc.

A PLENTIFUL supply of fresh air is an important factor in the treatment of disease. It is a well-known fact that soldiers cared for in open tents, in time of war, have recovered under the most adverse circumstances, when food, medicine, and nursing have all been most meagre. This result has been credited to the great quantity of fresh air and sunlight with which they were unavoidably provided, and of which patients in hospitals and sick-rooms, where everything else is furnished in abundance, are too often deprived. The gradual realisation of the curative properties of fresh air and sunlight is leading, year by year, to the opening of new sanitoria specially equipped for open-air treatment, and to the addition to hospitals of sun-rooms and rooms connecting with wide verandas so arranged that the beds can be wheeled through the window.

In cities the roofs of hospitals and dwelling houses are being utilised for this purpose.

The average composition of air, as it is inhaled, is: oxygen, 20.81; nitrogen, 79.45; carbonic acid, 0.04; a small amount of aqueous vapour; and a gaseous element named argon, about which little is known.
The proportion of oxygen and carbonic acid in the air varies considerably according to locality. In the country, there will be more oxygen and less carbonic acid than the above figures indicate, and in thickly populated cities, more carbonic acid and less oxygen.

Air which has been inhaled, deprived of as much of its oxygen as the lungs can absorb, and then exhaled, consists of: oxygen, 16.033; nitrogen, 79.587; carbonic acid, 4.38; and a larger amount of aqueous vapour, impregnated with impurities from the lungs. Both these impurities and the carbonic acid are much increased by illness.

Other factors, besides the breath, which contaminate the air are the exhalations given off by the skin, the excreta, decaying matter, dust, and combustion. A single burner of illuminating gas consumes as much oxygen as three people, and liberates sulphur dioxide, carbon monoxide, carbon dioxide, ammonium compounds, and aqueous vapour. The products freed in the burning of oil lamps and candles are somewhat less in amount and importance. Incandescent electric lights, requiring no oxygen and producing no decomposition, are, so far as ventilation is concerned, the most healthful method of lighting.

With every inspiration, from twenty to thirty cubic inches of air are drawn into the lungs, and with every expiration almost the same amount is expelled. If a patient and nurse are shut up in a room, even a fair-sized one, a whole night, at least half the air in the room will pass through their lungs before morning. The patient, being deprived of sufficient oxygen, the great energy-giver, will lose much that would have accelerated his recovery, and the nurse will be rendered tired and unfit for her work by the same cause.
If the proportion of oxygen in the air falls to 13%, ill effects are instantly felt, and if it falls to 8%, asphyxia will shortly occur.

A constant supply of "pure, fresh, flowing air" is essential to health. It is imperative in hospital wards, where there are generally from twenty to thirty patients, and where, frequently, the beds are not placed far enough apart to give each patient his proper air-space, viz.: at least 2000 cubic feet.

Out of doors the three principal renovators and regulators of the atmosphere are the winds, the rain, and growing plants. Plants are a valuable adjunct in sick-rooms and hospital wards, because they take up carbon dioxide and set oxygen free. The same is true of cut flowers while they are perfectly fresh; but, as soon as they begin to fade their oxygen-giving power is lost, for carbonic acid is always liberated in decomposition.

Gravity and diffusion are the two forces that render indoor ventilation possible. Even a small amount of cold air from the outside will fall, as it enters a room, because it is heavier than the air in the room, and it will drive up and out the air which, by being heated, has become lighter. Heat, besides making the air lighter, causes it to expand and thus compels it to find an exit through every available crack and outlet. Ventilation procured by means of these natural forces is known as "natural ventilation."

1 Always be sure of the source of your fresh air. It will not be pure if it come through a window facing a stable, garbage heap, a crowded tenement, or a court contaminated by decomposing material.
2 To secure perfect ventilation, the air must be kept in motion, or flowing, but its movement should not be felt by the people in the room. When it is felt it is called a draught.
Ventilation must be carried on continually, *day and night*. To ventilate a room well in cold weather and yet avoid draughts, the air should be admitted from the top. When it has double windows this is easily arranged; the lower sash of the outer window may be raised and the upper sash of the inner window lowered. When it has only single windows, the lower sash may be raised three or four inches and a board inserted in the opening. The air then enters between the sashes, and, being thus directed upwards, causes the necessary air currents without creating a draught. Another method of ventilating with single windows is to lower slightly the upper sash and tack one end of a piece of cotton ¹ to its upper edge and the two corners of the other end to the top of the window frame.

An open fire is one of the best ventilators. Air being always attracted toward heat, the air in the room is drawn into the fireplace and then up the chimney. Thus a vacuum is created which sucks in the outside air from all available sources. To avoid dirt, noise, or too much heat, a lighted lamp is often substituted in the fireplace for the fire.

This slight continual ventilation of the sick-room should be supplemented by flushing it with air at least every morning and evening. To do this without danger to the patient, put extra blankets over him, leaving only his face exposed. If the bed is near the window, place a screen between the two.² While the window is open, encourage the patient to take as many deep, long inspirations as he can without

¹ The cotton may be any length desired, but should be six inches wider than the window.

² An open umbrella is an excellent substitute, when there is no screen at hand.
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becoming tired. If the weather is too cold to permit opening the window of the sick-room, or the nature of the patient's disease demands an even temperature, open a window in an adjoining well-heated room, and leave the door between the rooms ajar. If even this cools the air too suddenly, keep the door between the rooms shut until you have closed the windows in the outer room and allowed the air there to become heated before admitting it to the sick-room.

Do not forget that sunlight is necessary to perfect ventilation. There are few cases except eye-affections, in which this natural germ-destroyer should be excluded from the sick-room or ward. If the light hurts the patient's eyes, encourage the wearing of a shade, or put a screen between him and the direct rays of the sun.

In cold countries, the majority of the hospitals are ventilated by mechanical means. When they are not, a sufficient number of windows are opened to keep the air pure.

Mechanical ventilation consists in the propulsion or the extraction of air, by means of blowers or of exhaust fans, driven by steam or electricity. The propulsive method is known as the plenum system, and the extractive method as the vacuum system.

Even when these mechanical means of ventilation are employed, the nurse is responsible for the condition of the air in the wards, or sick-room. If the air becomes heavy and full of odours, the ventilators are either not open, or they are not working properly,¹ and the fact should be reported to the proper author-

¹To test the output of the air, hold an opened handkerchief in front of the ventilator; if it is working properly the handkerchief will be sucked up against it.
ities. If the temperature of the ward cannot be governed by the local regulator, this fact should also be reported. Wards and sick-rooms should be kept at a uniform temperature; 68°–70°F., in the day time, and 65°–68° F., at night, has been until lately a general rule, but a much lower temperature is now advocated by many physicians.¹

To insure the regulation of the ward-heat, the majority of hospitals now provide charts closely resembling the clinical temperature charts used for recording the patients' temperatures. One nurse is made responsible for taking and charting the ward temperature every hour. Nurses should feel pride in having these charts perfect. If there are many vacant spaces, the authorities are liable to wonder how often the nurse, responsible for the same, forgot her patients' medicines and treatments. It is also important to regulate the temperature after taking and charting it. A temperature of 80° is sometimes charted apparently unnoticed.

To obtain perfect ventilation, it is not only necessary that the heating be well regulated and the supply of air constantly changed, but that the air be kept, so far as is possible, free from contamination. To this end every effort must be made to keep the patients and whatever relates to them perfectly clean.

The exudations of the skin are exceedingly deleterious. The patients must be bathed frequently, therefore, and the bedclothes must be changed often

¹An atmospheric thermometer should always be kept in the sick-room and in a large ward there should be two or three in as many different places. Never hang thermometers near windows, registers, or lights, and remember that the air is warmer near the ceiling and colder near the floor than in the intervening space.
enough to keep them odourless and clean. Bed-pans should be kept enveloped in a heavy cover, while they are being carried from the ward, and should be deodorised after a specially offensive stool. Bed-pans, urinals, and douche pans must be kept spotless. They should always be washed with hot water after use, and should be scalded, washed with hot soap-suds and sterilised or disinfected daily. A disinfectant should be kept in the bottom of all sputum cups which cannot be burned, and they should be emptied, scalded, washed, and sterilised at least twice daily. Sinks, hoppers, and water-closets must be flushed, washed, and disinfected constantly.

Trash\(^1\) and garbage cans and the receptacles for soiled dressings\(^2\) are often sources of contamination if they are not kept covered and if they are not cleansed and scalded daily. Garbage pails should be emptied at least three times a day.

Defective plumbing is another frequent source of air contamination, and any stoppage or leak should be reported immediately. Stoppage is frequently due to carelessness (throwing orange peel and other insoluble substances into the waste pipe for instance), and sometimes to dropping bandages and instruments therein. When such accidents are reported immediately little damage is done as a rule, but if the object is allowed to remain in the pipe till it is washed down, it generally lodges where it is difficult to reach, and thus entails expensive repairs.

\(^1\) Broken glass and crockery should never be thrown into the general trash can.

\(^2\) Paper flour-bags make excellent receptacles for soiled dressings. They can be taken to the wards, the dressings put into them as soon as taken off the wounds, and the bags
CHAPTER IV

CARE OF THE WARD


**General Care of the Ward**

The precautions against contamination described in the two preceding chapters will prove more or less ineffectual unless the ward itself and all its furnishings are kept spotlessly clean. Consequently, the best means of securing this indispensable cleanliness is a subject worthy of the most serious consideration.

**The Walls, etc.**

The walls of a hospital ward should be brushed once a week. A long-handled soft brush covered with dampened cheese-cloth is generally used for this purpose. Always begin at the top and brush downward taking care that every part of the wall space is swept. High chandeliers, high window-ledges, and all projections and cornices should be brushed at

and dressings burned. This obviates the necessity of handling the dressings and consequently prevents the dissemination of germs.
the same time. Low chandeliers, should be dusted daily with a dry dust-cloth as moisture effects electric lights, and window-ledges, etc., with a damp duster.

The Floor

The treatment of the floors depends upon the nature of their material. The dust should be removed daily from tiled floors with a brush covered with damp cheese-cloth, and scrubbed with soap or soap powder and warm water. Sapolio should never be used. Tiled corridor floors are sometimes mopped instead of being swept or scrubbed. In mopping, care should be taken not to use too much water, to change the water frequently, to wash only a small portion of the tile before drying it, to overlap the preceding section in washing a fresh section, and to press hard enough on the mop to remove all dirt.

Hard-wood floors, which are more common in the hospital wards proper, than tiled floors, are parafined to make them impervious to germs. The following preparation is frequently used: parafine, 12 oz., turpentine, 2 gals., soft soap, 8 oz. The parafine is first dissolved in the turpentine, the soap is added, and the whole is then allowed to stand twenty-four hours. The floor should be either mopped or scrubbed before this mixture is applied, and should be afterwards well polished with a weighted brush. This process should be repeated every two weeks.

The parafine floor calls for damp dusting—ordinary dry sweeping should not be permitted—twice during the twelve hours of each day. The dissemination of dust may be avoided by using for this purpose a soft floor brush which has first been wet and then covered with a damp, unbleached muslin duster.
In doing a large ward, the duster should be changed at least six times. The appearance of the floor will be much improved by polishing it vigorously every morning, after dusting, with a brush tightly covered with a flannel or canton flannel bag. The dusters and bag should be thoroughly washed after use. Water will spot such a floor unless its action is immediately neutralised. If any water is spilled, therefore, it should be wiped up at once, and the floor should be rubbed with a mixture of equal parts of turpentine and oil.

The Furniture

Iron and glass, owing to their non-absorbency, and the comparative ease with which they can be cleansed, are the ideal materials for hospital furniture, which should be simple and useful, absolutely without ornamentation and projecting points. It should be dusted daily with a clean, damp duster, special attention being paid to cracks, crevices, and bars, even when not in view, where dust and consequently germs will rest. Once a week, or every other week, according to the situation of the hospital, the furniture should be given a special cleaning.

Either whiting or Bon Ami is excellent for cleaning all painted or enamelled metal, nickel, and glass. To clean with whiting, mix with cold water just enough of the powder to produce a rich cream, rub the cream sparingly over the surface to be cleaned, and wash it off thoroughly with warm water, using

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1 Preferably painted white.
2 A damp duster does not scatter the germs.
3 Bon Ami is whiting made into cakes. It is expensive but is in a convenient form for use.
a clean duster. Soap, ammonia, or other alkalies should not be used for cleaning paint or glass. Alkaline substances soften and discolor paint, and, in time, remove the polish of glass.

It being necessary in the hospital ward to dust even varnished and oiled furniture with a damp (not wet) duster, measures must be taken to counteract the effect of the moisture upon the varnish. This can be done by wiping immediately with a dry duster and by the weekly application of a mixture of equal parts of oil and turpentine, or oil and alcohol. This emulsion must be applied sparingly, however, and the furniture rubbed afterwards till all greasiness has disappeared.

To Remove Stains from Wood.—To remove white stains from coloured wood, rub well with tincture of camphor, equal parts of oil and turpentine, or oil and alcohol. Stains made by heat can sometimes be removed by the application of hot milk, followed by a rubbing with tincture of camphor. If alcohol is spilled on varnished or painted wood, pour oil over it immediately, before wiping up the alcohol. Grease stains on unvarnished wood are best removed by the use of strong alkalies—such as potash or soda—dissolved in ice-cold water. Wash off the alkali, after the removal of the grease, with hot water. To remove ink stains from wood, cover the spots immediately with some absorbent substance—such as starch, flour, or shredded blotting-paper. After a few minutes, remove the application and apply another of the same sort. Continue to do

1 This does not apply to polished furniture. Cologne, or alcohol in any form should not be brought in contact with polished furniture.
this until the absorbent no longer becomes stained. Then rub the spots with lemon-pulp and common salt until they disappear. Wash the wood afterward with cold or tepid water.

Cleaning Brass, Copper, and Nickel.—The sterilisers, hot-water cans, faucets, etc., are generally made of copper or brass, and, owing to their constant use, require frequent cleaning. There are various pastes, excellent for this purpose, on the market, but they are expensive. Oxalic acid and alcohol, and oxalic acid and ammonia are both frequently used in their stead. These mixtures clean well, but, in time, cause the metal to deteriorate. The addition of kerosene oil, however, by neutralising the acid, greatly lessens its bad effect and, also, furthers the cleaning process. A very effective polish can be made by dissolving two ounces of oxalic acid and one box of silicon in four ounces of alcohol, and adding to this solution one pint of kerosene oil. To use this polish, wash the metal to be cleaned with hot pearline water, wipe it well, and rub a little of the polish energetically over its surface with a piece of soft flannel. When all marks have been removed, burnish by rubbing with a piece of clean flannel or canton flannel. To clean nickel, silicon or whiting is generally sufficient, but if the stains are very bad, a little alcohol should be added.

Cleaning Porcelain.—Stains can often be removed from porcelain tubs, basins, hoppers, sinks, and closets, by scrubbing the spotted places with tincture of iodine, and then washing them with warm pearline water. Benzine is also excellent for removing stains on porcelain, and will not injure the enamel. For the daily cleaning of enamelled objects, however,
soap or a soap powder suffices. Never use oxalic acid, or strong alkalies. They are all effective cleansers, but remove the polish and, in time, roughen the surfaces of the enamel. All sinks should be flushed daily with hot soda water, to keep grease from collecting in the pipes.

**Care of Marble.**—Acids destroy the polish of marble. Therefore, if any acid, even orange or lemon juice, be spilled on marble, its action must be immediately neutralised by the addition of an alkali, such as ammonia or soda water. It is very difficult to remove stains from marble, but fairly strong solutions of alkali may be tried with safety, and will often produce the desired effect. Stains made by oil, or other greasy substance, should be washed with a hot solution of soda water and a paste made of fullers' earth, which should be left on for twenty-four hours. It is often necessary to repeat the application several times before it is effectual.

**To Remove Rust from Iron or Steel.**—To remove rust from iron or steel, wash the metal with sweet oil and while it is still wet, cover it with powdered quicklime. Allow this coating to remain for a couple of days. Then rub it off. If the rust has not disappeared, repeat the process.

**Hospital Beds**

They average from twenty-four to twenty-six inches in height, six feet and six inches in length, and thirty-six inches in width. A three-quarters bed is often used in private rooms, but never a double bed. It would be impossible to provide a double bed with sheets sufficiently wide to be tucked in far enough under the mattress to prevent wrinkles.
Besides all moving and lifting would be rendered much more difficult for both patient and nurse.

The bedsteads must be disinfected after the discharge or death of a patient. Formaline 1% and carbolic 1-40 are the disinfectants most frequently used.

Mattresses.—Strong blue and white ticking is the best covering for mattresses, as fancy colours are liable to run when the mattress is disinfected. Ostermoor horse-hair is the best filling. It is more expensive than other varieties of horse-hair, but it wears so much better that it is cheaper in the end.

The mattress, like the bed, must be disinfected after the discharge or death of a patient. When the patient has had a contagious or infectious disease, or a septic wound, it must be either baked or exposed to formaldehyde fumes. Under other circumstances, it is disinfected by whisking it well with a whisk-broom wet in a 2% formaline solution or a 1-2o carbolic solution.

To disinfect a mattress in the ordinary manner, proceed as follows:

Protect the floor with a rubber. Bring the disinfectant to the bed in an agate basin, dip the whisk into it frequently, and whisk vigorously, paying particular attention to all seams and tuftings. The same solution made half strength by the addition of water, is used to disinfect the bedstead. As disinfecting solutions are very expensive, only the amount required should be prepared.

Air and Water Mattresses.—When patients come to the hospital with bed-sores, or when, for any reason (such as extreme emaciation, or general anæmia), there is more than usual danger of their
developing such sores, it is often well to use air or water mattresses, which are made of rubber covered with ticking or canvas. To fit a bed with an air mattress, cover the springs with a fracture board¹ and place the air mattress upon that, then blow the air mattress to the required stiffness with an ordinary force pump. There must be sufficient air in it to keep the patient from the board beneath, but not enough to cause pressure or to give the sensation of rolling.

Since the invention of the air mattress, the water mattress has not been as much used as formerly, because it is much the harder of the two to manage. It can be filled only after it is in place on the bed. When possible, the filling is done by means of a hose attached to a faucet; when not, the water has to be brought to the bed in pitchers and poured in through a funnel. The water should be 100°F.

If the patient is restless or unconscious, there is considerable danger of his falling out of bed when either of these mattresses is used. The simplest way to prevent this accident is to put on "side boards." (See Chapter VI.)

Great care must be taken of both these varieties of mattresses, as they are very expensive. Sticking pins into them is the most frequent cause of injury. They should be disinfected with formaldehyde or carbolic after use, and a small amount of air left in them.

¹ The fracture board (so called because it is used under the mattress in certain fractures to guard against any disconnection of the points of fracture, by the sagging of the mattress) should be the size of the springs. There must be several perforations in it for the admission of air.
The Pillows.—Feather and horse-hair are the best fillings for pillows for hospital use. Every bed is provided with a feather and a hair pillow, the feather one being the upper, except where the patient is suffering from high fever or profuse perspiration. In the former case, only one is allowed, and the hair being cooler is usually preferred. When there is profuse perspiration, or other conditions exist likely to cause the wetting or soiling of the pillow, a rubber pillow-case should be put on under the muslin one.

Sheets, Blankets, etc.—The sheets for hospital use should be of cotton, and for a bed of the dimensions given on page 45, they should be two and three-quarters yards in length, and two yards wide.

When sheets are removed from the bed of a patient suffering from a contagious or infectious disease, they should be enveloped in a sheet and put at once into the receptacle provided for the purpose, never on chairs or tables. Every hospital has its own method of disinfecting such clothing. Among these methods are:

Exposure to live steam, boiling, or soaking in a disinfectant, such as carbolic, 1-40, or formaline 1%. (See Chapter II.)

The blankets should be two parts of cotton to one of wool. A larger proportion of wool will not stand the frequent washings, while a smaller proportion will not give sufficient warmth nor wear well. Care should be taken to prevent the unnecessary soiling of blankets, as washing greatly deteriorates them. Never allow the ends of a blanket to drag on the floor, and see that while it is over the patient, the top is well protected by the sheet and spread. Use an old blanket when one is needed next the patient, and
when there is likelihood of its becoming soiled in any way. Blankets are best disinfected by being exposed to the action of formaldehyde fumes. Dry cleansing is recommended when not too expensive as the blankets remain the normal size.

Spreads should always be made of some light-weight material, such as dimity.

It is often imperative to protect the mattress with a rubber. The black rubber blankets used by the United States Army are excellent for this purpose. White double-faced rubber is very nice for home use, but the frequent disinfection required in the hospital discolours it so soon that its use there is not advisable.

When it is impossible to obtain rubber, oil-cloth, such as kitchen-table covers are made of, may be used, and, in an emergency, several thicknesses of newspaper, brown paper, or Japanese paper, tacked together.

**Method of Removing Stains from Linen, etc.**

A very important item in the care of the ward linen is the keeping it free from marks and stains. All stains should be removed before the articles are sent to the laundry. If they are put into cold or tepid water while the staining agent is still wet, it can usually be washed out without much difficulty.

**Bichloride Stains.**—To remove bichloride stain, soak the stained linen in chlorinated soda (Labarraque's solution)—one-quarter % for twelve hours. Then soak and wash thoroughly in hot water, for unless the soda is entirely removed the material will be destroyed.

**Blood Stains.**—If blood cannot be washed out
with soap and tepid water, cover the surface with wet starch, making repeated applications.

**Coffee, Tea, and Fruit Stains.**—Coffee, tea, and fruit stains can be removed by soaking in boiling water. If this fails, spread the spot over a bowl of boiling water and rub with a solution of oxalic acid. Rinse afterwards with, first, ammonia water, and then clear water.

**Ink Stains.**—Stylographic and red ink stains can generally be removed by washing with soap and tepid water, especially if the washing is done while the ink is still wet. Stains made with other inks are best washed with milk, or lemon juice and salt. Oxalic acid can also be used, but it will remove the fabric, unless it is washed off very carefully, as well as the ink. To use oxalic: Rub the stain until it disappears, with a soft piece of muslin wet with a saturated solution of the acid. Then neutralise the action of the acid by rinsing the article thoroughly in weak ammonia water. Turpentine will also sometimes remove ink stains, and it can be used on coloured materials where the acids cannot. To use turpentine, soak the stain therein, and then rub it gently.

**Iodine Stains.**—To remove iodine stains, wash with alcohol and then rinse in tepid water.

**Iron Rust.**—To remove iron rust, spread the stained part over a bowl of boiling water, apply to it common salt, wet it with lemon juice, and then place it in the direct rays of the sun. Repeat the process until the stain becomes light yellow. Then wash it in weak ammonia water and afterwards in clear water.

**Vaseline Stains.**—To remove vaseline stains, sponge with ether.
Amount of Linen Required for a Ward of Twenty-five Beds.—The majority of hospitals have a stated amount of linen for each ward and in order to keep this standard accurate the linen is counted at certain times during the year and all deficiencies supplied. Worn-out linen should be discarded or replaced monthly. A common standard for a ward of twenty-five beds is:

- Blankets (white) 75
- (grey) 12
- Nightingales 24
- Nightgowns 100
- Pillow-cases 150
- Sheets 224
- Spreads 40
- Towels (hand) 200
- (dressing) 160 for a surgical ward.
- “ “ 60 for a medical ward.
- (food) 50
- (medicine) 12
- (dish) 6
CHAPTER V

BED-MAKING, ETC.

How to Make a Closed Bed, an Ether Bed, a Fracture Bed, a Bed with a Patient in it. How to Change the Nightgown, the Under Sheet. How to Turn and Change a Mattress with the Patient in Bed. How to Move a Patient from One Bed to Another. Lifting and Carrying. How to Draw a Patient up in Bed. How to Sit a Patient up in Bed. How to Get a Patient up in a Chair. "Morning Rounds."

No matter how clean and tidy the ward may be, it will not look so unless the beds are well made, and patients cannot be made comfortable in a loose, sagging, uneven bed. This matter of making the beds is, therefore, one of the first things to which nurses should give their attention.

To Make a Closed Bed

When a patient sits up, remove the clothes from the bed, one article at a time, as soon as he has left it, taking care that their ends do not drag on the floor. Then turn the mattress over—from top to bottom, letting it rest on the ends to air. When the mattress is sufficiently aired, put it in position, cover it with a sheet, leaving eighteen inches of the sheet to tuck in at the head and being particular to have it perfectly straight, and tuck it in on one side, well under the mattress. Put on the rubber, which should

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extend from under the pillow to below the place where the patient's knees will rest, and cover it with the draw sheet,\textsuperscript{1} tucking them both in under the mattress. Go to the other side of the bed, stretch each of these articles tightly and tuck them in separately, beginning in the centre and working first toward the foot, and then toward the head of the bed. Fold the top of the under sheet like an envelope, and tuck it under the mattress. Put on the top sheet in the same general manner as the bottom sheet, but with the hem wrong side up, in order that the right side may be uppermost when the sheet is turned down over the blankets. Allow the upper end of the sheet to come to the edge of the mattress, leaving sufficient to tuck in at the bottom, just as the under sheet was tucked in at the top. A closed bed may be made with one or two blankets, but it will always look better if two blankets are used. In the latter case, tuck the first blanket in on the sides only. At the bottom fold it back, under itself, about six inches along the edge of the mattress. This blanket, like the sheets, should be pulled tightly before being tucked in, the good appearance of a bed depending largely upon its tautness. Fold the sides of the second blanket under the body of the blanket, taking care that the edge of the fold is on a line with the edge of the mattress, and tuck it under the mattress at the bottom. Place the upper edge of the spread on a line with the edge of the mattress, tuck it in at the bottom, fold the

\textsuperscript{1}The draw sheet is a sheet made longer and sometimes wider than the ordinary sheet, so that it will double and tuck far in on one side of the bed and allow of being frequently drawn through to the other side, thus making a fresh spot for the patient to lie upon.
corners like an envelope, and tuck in the fold, allowing the sides to hang. (See illustration.) Shake the pillows pushing the feathers to the centre, press them on a table with the forearms, until they are perfectly flat, and push their corners well into the corners of the pillow-cases. Then place them on the bed.

**To Make an Ether Bed**

Put on the lower sheets and the rubber as when making an ordinary bed. Tuck the upper sheet and blanket in at the bottom, but not at the sides and fold them down to the foot of the bed. Lay a small rubber, covered with an ether slip or towel, on the place generally occupied by the pillows and tuck it under the mattress at the sides. The only pillow used is one which is stood up at the head of the bed, to prevent the patient knocking his head against the bars, and which is kept in place by pinning the pillow-case over the bar. Place one hot-water can in the centre of the bed and another near the foot. Put a clean nightgown over the cans and cover them and the centre of the bed with two folded blankets. Move the table and chair, which stand beside the bed, to the back of the bed, to be out of the way of the stretcher, upon which the patient is brought to the bed. On the table, place a towel, two kidney basins, several gauze "mouth wipes" and a mouth gag.

1 The head of the patient is kept low to reduce the work of the heart, and, by facilitating the flow of blood to the head to diminish nausea, which anæmia of the brain is likely to increase.

2 Gardener's wooden labels make excellent tongue depressors. They are not so liable to break the teeth as metal tongue depressors and mouth gags, and they can be destroyed after use.
or tongue depressor, to be inserted between the teeth of the patient should they become clenched. Remove the hot-water cans from the bed as soon as the patient returns to it. Wrap one blanket around the feet and legs of the patient, and stretch another across his chest, where it serves to provide both warmth and restraint. The hot-water cans are not replaced in the bed unless the patient is in poor condition. When heat is necessary, hot-water bags are generally preferred to the cans, because, being smaller, they are more readily controlled and are less likely to come into direct contact with the patient. Allowing a patient to be burnt with a hot-water bag is an unpardonable crime. The greatest watchfulness must always be practised when a hot-water bag is used, especially if the patient is old, in a poor condition, under the influence of an anaesthetic, or unconscious from any other cause, since these circumstances predispose him to burns. Wounds thus produced are difficult to heal, and have caused permanent injury.

**To Make a Fracture Bed**

The only difference between a fracture bed, and an ordinary bed is that a perforated board, the size of the wire mattress, is placed between it and the hair mattress. This is to prevent any motion at the point of fracture by the sinking of the mattress.

**To Make a Bed with a Patient in it**

1. Before starting to make a bed with a patient in it, be sure that everything necessary is at hand.
2. Loosen the bed-clothes on all sides. As you
draw out the clothes with one hand, raise the mattress with the other, to avoid jarring the patient and tearing the clothes.

3. Take the pillows out and shake them. If the patient does not object to being without them, leave them to air till the bed is made.

4. Take off the spread, and, if there are two blankets on the bed, remove the upper one.

5. Change the top sheet, if necessary. When crushed but not soiled the top sheet may be used for a draw sheet.

6. Fold the lower blanket and top sheet up over the patient, leaving it just wide enough to cover him when he is turned. This answers a three-fold purpose: it gives a neat appearance; the clothes are not in your way while you work; and it replaces the discarded blanket.

7. Change the nightgown if it is soiled; if not, brush all crumbs out of it.

8. Change the under sheets, if necessary; if not, tighten the under sheet and rubber and pull the draw sheet partly through, that the patient may have a fresh, cool spot to lie on.

9. Rub the patient’s back with alcohol and powder.

10. Sweep all crumbs from the bed, either with the hand, a small whisk-broom, or a folded towel. Always use the hand, under the patient, since only with it will all crumbs be discovered.

11. Tuck in the top sheets and blankets, being careful to keep them loose at the bottom, over the patient’s feet. If the weight of the bed-clothes on the feet is uncomfortable put a bed-cradle over the feet.

12. Put on the spread. Tuck it in at the foot,
as when making a closed bed, but fold it back under the blankets at the top, and turn the upper edge of the sheet over it.

13. Replace and arrange the pillows so that the patient lies comfortably, every part of the body being supported.

These details should be carried out in the order in which they are given, since crumbs may be introduced into the bed by changing the nightgown, pillows, and upper bed-clothes after the lower sheet.

**To Change the Nightgown**

Changing the nightgown is a comparatively easy performance in the hospital, as the nightgowns used there are short and open down the back. Remove one sleeve of the gown to be discarded, and put on the corresponding sleeve of the fresh one, by passing your hand through it, grasping the patient’s hand, and drawing his arm through. Slip the fresh nightgown across the chest under the soiled gown (thus preventing exposure) and proceed with the second sleeve as with the first one. When the gown is a closed one, have the patient lie on his back with his knees flexed. If he is strong enough, have him slightly raise his thighs; if not, place one of your hands under the buttocks and raise him, while you draw the gown up with the other hand. Then slip one arm under his shoulder, and, supporting his head with that arm, draw the gown well up around his neck. Slip one of your hands through the upper armhole of one of the sleeves, grasp his arm above the elbow, and bend it, while, with the other hand, you draw the sleeve off. Then draw the gown over the
head, and off the other arm. If the front opening of the clean gown is a long one, both arms can be drawn through the sleeves, before it is put over the head. When not sufficiently long for this, draw one arm through, and put the gown on over the patient's head before drawing the other arm through. Always put your hand through the sleeve and grasp the patient's hand while drawing the arm through.

**To Change the Under Sheet**

If the patient is fairly strong, the under sheet may be changed in the following manner. Turn him on his side, or draw him to the edge of the bed. Roll the under sheet over as far as possible. Lay the fresh sheet, which has been either folded fan-shape, or rolled, next to this, and tuck its free end as far under the mattress as possible. Be sure that the sheet is perfectly straight, and, if it is rolled that the roll faces the bed. Tuck in the rubber. Treat the draw sheet in the same manner as the under sheet. Then, either turn or draw the patient on to the clean sheet. Take off the soiled sheets, stretch the fresh ones and the rubber tightly, till they are absolutely free from wrinkles, and tuck them in firmly under the mattress.

When the patient is too ill to be either moved or turned, it is oftener easier to change the sheets by working from the top to the bottom of the bed. Loosen the soiled sheet on all sides, draw it down to the nape of the neck, roll the fresh one, place it on the bed, and tuck its top edge under the mattress in order to keep it in place. Then, draw down both sheets together, slipping one hand under the patient and raising him as required.
To Turn and Change the Mattress, with a Patient in Bed

To turn and change the mattress while a patient is in the bed take off the spread and upper blanket. Fold the upper sheet and lower blanket back over the patient. Unfasten the lower sheets and roll them tightly (roll side downward), till the rolls touch the patient on each side. Take hold of the rolls and lift the patient from the bed, while an assistant\(^1\) pulls out the mattress from the foot of the bed, turns, and replaces it. Then, let the patient down and tuck in the clothes.

When it is necessary to exchange the hair mattress for an air mattress, withdraw the former in the same manner as when turning it, and slip in a fracture board before putting the air mattress in place.

To exchange the hair mattress for another hair mattress (when, for any reason the latter part of the process described above is not practicable): Lift the patient, after the sheets have been rolled up to him, to one side of the mattress, draw the old mattress half way off the bed and pull the new mattress up to it. Then, lift the patient on to the new mattress, withdraw the old mattress, draw the new mattress into position, lift the patient into the centre of it and unroll the sheets and tuck them firmly under it. A mattress may also be turned, in much the same way, if pillows for the patient to lie on during the process are placed on the side of the bed. The last two methods disturb him somewhat more than the first method, but they can be practised with fewer assistants.

\(^1\) If the patient is very heavy, two persons will be needed to lift him, and a third to pull out the mattress.
To Move a Patient from One Bed to Another

To move a patient from one bed to another, place the beds close together, loosen the draw sheet and draw the patient over by pulling the sheet. When the beds are of an unequal height, or when they cannot be placed together the patient must first be rolled in the upper sheet and blanket and then lifted and carried. Unless he is very light, it may require two persons to do the lifting and carrying. In this case both should take their stand on the same side of the bed. One should put her hands under the patient’s shoulders and buttocks and the other under his back and thighs. They should draw him to the edge of the bed (urging him to hold himself stiff if possible), lift him gently, in unison, and carry him to the second bed.

To Lift and Carry

In all lifting, the back should be bent as little as possible,¹ and, when two or more are lifting, they should act in unison. When a patient is carried, it is important for his comfort that the carriers step in unison. To lift a patient while he is in a sitting position, place your arm over his shoulder, taking a firm hold under the opposite axilla, have him clasp his hands on your far shoulder, and place your free arm under his knees. This method, though not always the most convenient, throws the strain on the lifters’ shoulders, which can stand it much better than the back.

To Draw a Patient up in Bed

When a patient has slipped too far down in the

¹ Make the knees do the bending.
Bed, and needs to be drawn up, flex his knees so that his feet will rest firmly on the bed; grasp him under his far arm, flexing your arm so that his head will rest in your elbow joint; put your other arm under his thighs, bend your knees slightly to avoid bending the back, and move him gently upward. If he is so heavy that it requires two nurses to move him, they should stand on opposite sides of the bed. One should grasp him under the arm, as if she were to move him alone, and place her other arm under the small of his back; the other should also place one arm under the small of his back, beside her companion's arm, and the other arm under his thighs.

To prevent a patient from slipping down in bed, a piece of board six inches wide and twenty-four inches long, with two holes in each end may be used. Through these holes, run pieces of rope, long enough to tie to the head of the bed when the board is at the patient's feet. Pad the board or, if necessary, place a pillow against it. A good substitute for the board is a pillow doubled over a bandage, placed at the patient's feet. This should be tied first to the side of the bed on a line with the pillow, and then to the head of the bed.

To Sit a Patient up in Bed

To sit a patient up in bed, a back rest is very helpful, since it saves the use of a large number of pillows. Without one, it requires at least six pillows to make a patient truly comfortable. If, however, pillows are employed, dispose them in such a manner that the head will not be thrown forward on the chest, and that the small of the back will be supported. If the patient is inclined to slip down in bed, either
put a small, soft pillow under him, or fix a board or pillow at his feet, as already described.

**To Get a Patient up in a Chair**

To get a patient up in a chair, proceed as follows:

Place a chair at right angles with the bed, make it comfortable by placing one pillow in the seat and another at the back.\(^1\) Put a blanket cornerwise over the pillow, lift the patient, in the manner already described, into the chair. Wrap the blanket about him\(^2\) leaving it rather loose around the arms but tucking it in snugly around the feet and legs and pin with a large safety pin. Count the pulse as soon as he is up, and again shortly afterward.

After an illness of any severity a patient should seldom remain up longer than twenty or thirty minutes the first day, and even a shorter time if the pulse changes.

**Morning Rounds**

The general work of the ward must be so planned that the taking of temperatures, giving of medicines, of nourishment, and of treatment will be strictly punctual. Much time is lost by poor calculation. It is easy to "make work fit in" if just what there is to be done and the duration of each duty are passed in review at the beginning of the day.

In the majority of hospitals, the house doctors make their rounds about 9 A.M. Before that hour the patients must have had their breakfast, the beds must have been made, the patients' daily records

\(^1\) Put the open end of the pillow-case downward.

\(^2\) A wrapper and stockings are all that the patient usually wears the first time he sits up.
written up, the dust removed from floor, beds, and furniture, and the ward put in perfect order. All the nurses should then be ready to attend the doctors; not only because their help may be needed, but because "rounds" is one of the opportunities for receiving clinical instruction. There should never be laughing or unnecessary talking at the bedside during "rounds." Each nurse should be ready to attend to her duty promptly.

It is generally the senior's work to precede the doctors and prepare the patients needed for examination. When the chest is to be examined, the nightgown is either removed, or loosened and turned, as the case may require, and the chest covered with an auscultating towel usually made of firm cambric. For a vaginal or rectal examination, see "gynaecological positions," Chapter XVIII. For examination of the feet and legs, loosen the upper bed-clothes at the foot of the bed, fold back everything except the sheet, as high as required, leave the sheet covering the legs, till the doctor is ready, then gather it in between them. As the doctor often wishes to make some measurements, or examine the throat, the head nurse or one of her assistants should carry, in addition to the Order Book and auscultating towel, a measuring tape, a mirror, a hand towel, and a tongue depressor. It is generally the duty of one of the younger nurses to put things in order after the doctor is through with the examinations, that the ward may resume a presentable condition.

1 All "statum orders" should be carried out as soon as "rounds" are over.
2 The towel is to be held in front of the patient's mouth while the doctor is listening to the sounds in the chest.
CHAPTER VI
CARE AND COMFORT OF THE PATIENT


ENTERING the hospital for the first time as a patient is in many cases a trying ordeal. A warm reception goes far towards reassuring those who entertain the misapprehensions so prevalent concerning hospitals, and dispelling groundless prejudices and fears. It should never be forgotten that the care of a patient begins the moment he enters the ward, and great, indeed, must be the stress of work which will excuse a failure to give him immediate attention.

Care of a Patient on Admission

Many hospitals are provided with a reception ward, where patients are undressed and bathed, except when they are in a very bad condition, before they are sent to the regular wards. In other hospitals they are taken to the regular wards immediately. If a newly arrived patient is very ill, he should be laid
at once upon an opened bed which has been protected with an extra rubber and a bath blanket. If he walks to the ward, he must be given a chair, either in a room adjoining it, or just within its entrance. In the latter case, he should be placed far enough away from the door to escape draughts, and to be out of the way of those passing. The nurse in charge of the ward, or if she is busy, one of her assistants, should come forward and speak to him immediately.

Even though an entering patient has been seen by the doctor before admission, he may have become suddenly worse. If the exterior of the body is cold, apply heat and extra blankets and notify the doctor at once. In the majority of cases, the temperature, pulse, and respiration of a patient are taken as soon as he is admitted to the ward, and again in a couple of hours after he has had time to rest and recover from the excitement incidental to his coming to the hospital.

Unless the patient’s condition counter-indicates, a bath is always given him on admission. If his temperature is above 100°F., or below 98°F., his pulse weak or irregular, or if he gives any history of present bronchitis, pleurisy, influenza, or other lung disease, the bath must be given in bed. In the men’s ward, the orderly usually undresses the patient; but if he is very ill, a nurse should assist. While undressing a patient, note his general appearance: whether he is fat or thin; whether there is oedema or recent loss of flesh; whether he is poorly or well nourished; and whether there is any rash or any evidence of

1 This can be told by the loose, baggy, and wrinkled appearance of the skin.
scratching.\(^1\) Note also any signs of discharge, wounds, ulcers, or even slight abrasions of the skin; any swellings, growths, loss of motion or loss of any of the special senses. Report all abnormalities present to the nurse in charge; also any previous history volunteered by him.

**Care of the Patient’s Clothes**

Take *everything* out of the patient’s pockets. Place all valuables and important papers—money, jewelry, receipts, pawn tickets, etc.—in a package, writing on the wrapper the contents, the name of the ward, the patient’s name, the nurse’s name, and the date. Give this package immediately to the nurse in charge for transfer to the office.\(^2\) The receipt therefor, which is generally given by the person who receives it in the office, should be kept by the head nurse till the patient is ready to leave the hospital.

Examine the patient’s clothes carefully for pediculi, remembering that, if they are present, they will probably be found under the seams and in the gathers. If any are found, or if the patient is suffering from an infectious disease, fold the clothes neatly and envelop in a protector,\(^3\) which is wet with formaldehyde 2\%, or other disinfectant of equal strength. List the clothes and make a record in the Clothes’

\(^1\) If there are such evidences examine all hairy portions of the body for pediculi.

\(^2\) The only valuables which ward patients should be allowed to keep are wedding rings (if they desire to do so at their own risk) and a small amount of change. Otherwise, loss followed by unpleasant consequences is likely to occur.

\(^3\) In many hospitals the patient’s underclothes are tied up in squares of unbleached muslin. They are then kept together and free from dust.
Book of the patient's name, your own name, and the date. Pin with a safety-pin a tag inscribed with the name of the ward, the patient's name, the nurse's name, and the date, to the bundle, and transfer it immediately to the Sterilising Room.¹

When the clothes do not need disinfection, fold the underclothes, shoes, and stockings in a protector. Include the hat if there be room for it, if not give it a separate cover. Dresses and coats should be hung, not folded, and must be properly tagged. Put them in the locker provided for the purpose, and enter the number of the locker in the Clothes' Book. If possible, send badly soiled clothes home by the patient's friends; if not, write the patient's name and the number of his ward on tapes, with indelible ink, sew the tapes firmly on the clothes, and send them to the laundry.² It is a great unkindness on the part of nurses to mishandle or be careless about patients' clothes, as, no matter how old they may appear, they are probably of value to the owner.

Methods of Making Patients Comfortable

Making her charges comfortable is quite as important a part of a nurse's duty as giving them medicine or treatments of which they cannot reap the full benefit if they are disturbed by mental or bodily discomforts.

Mental Condition.—The patient's mind should be kept free from worry or excitement, his wants

¹ Formaldehyde fumes are now almost universally used in the disinfection of clothing, steam or dry heat being used for the destruction of vermin.

² These arrangements, are, of course, not exactly the same in all hospitals.
anticipated, his mind diverted from himself, the small irritations of daily life as far as possible removed, and a quiet restful atmosphere of cheerfulness established. The nurse should find out the subjects that interest her patients and inform herself upon those subjects. The discussion of family histories, previous experiences, either in the hospital or in families where she has practised her profession should be avoided.

In private homes the nurse should strive to make her services indispensable by assuming household responsibilities when they are the cause of worry and distress to the patient, or by the performance of some of the slight offices of kindness that help to lighten the burden when sickness is present.

Tiresome or garrulous members of the family or friends must be excluded or tactfully entertained to relieve the patient from that necessity and the servants who often object to the presence of a nurse must be propitiated.

The nurse must sink her own personality in that of the patient and family. One who "understands" and is adaptable, who is neither officious nor a martinet, and still has the required force to control others will prove herself a joy and a comfort to all.

The fullest confidence in the doctor and his professional ability should be encouraged, and no circumstances will excuse invidious comparisons with other doctors or disloyalty to him.

The nurse who knows herself and the psychic influences that control our relations with others will feel intuitively if she is in harmony with her patients. If she fails to gain their confidence and becomes the cause of increasing irritability, her presence interferes with recovery. When the proper relations
exist and the nurse is conscientious, she will feel at once anything that will be disturbing, and protect her patient. In other words, she becomes the buffer between her patient and all disturbing elements.

**Bodily Comfort.**—Some of the many devices tending to increase bodily comfort are: rubbing the body, particularly the back, with alcohol; pulling the draw sheet partially through, that the patient may be on a cool spot; changing the pillows when they have become disarranged, when their position ceases to be comfortable, and placing them in such a manner that they will fit into the contours of the body and give support. Small pillows, or hot-water bags, partially filled with cool or warm water, fit into the hollow of the back better than large pillows. A folded hair pillow, tied firmly together, placed under the knees will relax strain on the abdominal muscles. A triangular hair pillow specially made for this purpose is used in some hospitals, its base rests on the bed, and the knees are firmly supported in the fixed position over the top.

Patients who, owing to dyspnœa, are obliged to sit up in bed continually are often more comfortable if they have something on which to lean forward. To such, give a bed tray with a pillow on it. In a private house a board with a block of wood nailed to either end, or even raised on a bundle of magazines tied firmly together, will answer the purpose. In such cases it is generally necessary to take measures to prop the patient up well in bed and to prevent him from slipping down.

In cases of rheumatism, neuritis, etc., pain is sometimes lessened if the affected parts are fixed by means of splints or sand bags. When there is inflammation
in an extremity, relief will often be given by elevating the affected part. An extremity thus elevated, however, must be supported its entire length, and the elevation should be gradual. When the weight of the bed-clothes causes discomfort to any part of the body, a bed cradle should be used to support them. When the patient is very thin, either rubber air-rings, rings made of cotton batting and bandage, or pads made of cotton batting and gauze will relieve pressure if they are placed under or bound over the bony protuberances.

Much discomfort is experienced when waiting for a drink, for delayed dressings, for a hot-water bag, and especially for the bed-pan.

To Give and Remove the Bed-Pan

When giving a patient the bed-pan, first flex his knees, so that the feet will rest firmly on the bed, then pass one hand under the lower part of the back and raise him as you insert the pan with the other. Raise him in the same way before attempting to remove the pan. If the bed-pan is cold, it must be warmed before being used. After a defecation, remove the bed-pan and when possible replace with a clean one and cleanse the parts thoroughly. As soon as it is taken out it should be covered, either with rubber or with a cover of thick washable material.

Care of the Patient’s Mouth

The mouths of fever patients on liquid diet should be washed after every feeding. Improper care of

1 A cradle can be improvised by using half barrel-hoops tied at each side to a stick or by placing a long pasteboard box on a thin board or a bundle of magazines.
the mouth may result, not only in ulceration of it and of the tongue, but also in infection of the ears and glands. The increase of tympanites and the reinfection of typhoid patients have also been traced to this source. In fever, the lining of the mouth becomes dry and cracked and a considerable amount of milk and broth collects in these cracks, affording food for germs which multiply rapidly. This mixture of dried epithelium, food, and germs, is called sordes.

To cleanse the mouth, wrap a piece of gauze or absorbent cotton around the index finger (or around a small piece of whalebone), wet this in the mouth wash, and clean every part of the mouth thoroughly. Be particularly careful of the tongue. Several pieces of the cotton or gauze will be required, as the same piece must never be dipped in the solution twice. There are various mouth washes in common use. The best one for a given case will depend upon the condition of the mouth. Listerine, half strength, and Dobell's solution are always good. When the mouth is in a very bad condition it is well to use peroxide, diluted to half strength with either water or salt solution, before the regular mouth wash. A mixture of equal parts of albolene and of boric acid 2% with a small amount of lemon juice is often effective for a very dry mouth. Glycerine can be substituted for the albolene, when the mouth is not very dry, but should not be used when it is, as, owing to its property of extracting fluid from the tissues, it increases the dryness.

Prevention and Care of Bed Sores

A bed sore is gangrene, or death of the tissue. It is the result of defective nutrition of the part where it
occurs. The bony prominences—such as the back of the head, ears, shoulder blades, elbows, lower end of the spine, the buttocks, and the heels—are most likely to be affected.  

The predisposing causes are: lowered vitality (as in old age), continued high fever, paralysis, extreme emaciation, and general oedema. The immediate causes are: moisture, wrinkles, crumbs, and a too long continuance in one position. Therefore, see to it that the patient’s bed is always dry. When a patient has involuntary micturition or bowel movements, put a large oakum pad, with a foundation of several thicknesses of newspaper, under him. If he is restless, bind the pad in place with a three-cornered piece of old muslin or gauze, putting the muslin or gauze on like a child’s diaper. Look for crumbs after every meal, and brush them out, as already directed. Keep the draw sheet tight, to avoid wrinkles. Bathe and rub the affected parts with alcohol and powder at least thrice in the twenty-four hours. When the patient can be turned, frequent change of position will do much to prevent the forming of bed sores; when not, the affected parts must be relieved from all pressure by the use of rings. If rubber rings are used, they should be inflated only just enough to keep the parts off the bed;
because when too hard they are very uncomfortable, and can be themselves the cause of bed sores. They should either be put in a pillow-case or wound with bandages. Small rings to fit the back of the head, ears, elbows, heels, and ankles can be made by tying a piece of cotton batting into a ring the required size, and winding it with bandage. When there is imminent danger of the breaking of the skin, the patient should be put on an air bed, and the affected parts should be washed gently with warm water and soap at least four times during the twenty-four hours, and rubbed with alcohol and powder at least every three hours. A preparation of flexible collodion (equal parts of collodion and of castor-oil), painted over the surface, will sometimes prevent the skin from breaking, by forming a protective covering. The doctor should be notified when there is any indication that the skin is to break. Once it does break the resulting sore is often very hard to heal; and not only does it become a cause of unnecessary suffering but the constant discharge from it is a severe drain on the patient's system. In fact, this drain may prove fatal, if it is not checked in season.

The treating of bed sores belongs properly to the doctor's province, but, for some reason, it seems to be relegated very often to the nurse. A bed sore demands the same antiseptic precautions, and the same cleansing as any other wound but an ointment may be applied to it instead of the regular gauze dressing. An ointment of equal parts of castor oil and alcohol, thickened with zinc-oxide powder is frequently used. Massage and electricity, owing to their stimulating effect upon the circulation, are sometimes applied to the surrounding tissue with good results,
Restraining Patients

It is very often necessary, especially at night, that a patient be restrained, to prevent him from getting out of bed, or otherwise injuring himself. Nurses are cautioned to make restraint perfectly effectual. Careless tying, which is only a pretence, is much worse than no restraint at all, because the patient, left to himself, may make his escape or do himself injury. In cases of mild delirium, "side boards" on the bed are all that are needed. These boards should be one inch thick, fourteen inches high, and two inches longer than the bed. If the bars at the head and foot of the bed are horizontal, the ends of the boards are shaped so that they will fit between them. A hole should be made in each end of each board in order that the boards may be kept in place by being tied to the bed.

When handcuffs and anklets are resorted to, watch the patient's wrists and ankles for signs of chafing and pressure sores, and bind pads of soft cotton or gauze under the cuffs and anklets, if such signs appear. Stopping the circulation by a too tight adjustment of the restraint is another danger always to be guarded against. When no regular handcuffs or anklets are to be had, use squares of gauze (never bandage) folded cornerwise and tied in a modified clove hitch.

To tie the clove hitch, proceed as follows: Make two loops forming the figure eight with both ends on top and going in opposite directions; put the loops together and pass them over the hand or foot as the case may be, drawing them just tight enough to prevent the hand or foot being slipped through; make a knot in the ends about twelve inches from the extremity and tie them to the bedstead. Great care must be taken to follow these directions implicitly, for,
when the clove hitch is improperly made, either it will not hold, or, worse still, it will tighten and shut off the circulation. A variety of camisoles, or strait-jackets, for restraining the movements of the body are in use.\(^1\) When no such appliance is at hand, or when severe measures are not necessary, the body of a patient may be restrained in the following manner: Fold a sheet cornerwise and lay it under his shoulders; bring the ends up under the axilla,\(^2\) over the shoulders, and under the sheet at the back; cross them under the pillow and tie them to the head of the bed. This restraint will only be effectual when the hands and feet are also tied. A folded sheet put lightly over the knees, the upper part of the legs, and the abdomen,\(^3\) and secured to the side of the bed by twisting around the bars, will sometimes also be required. When the patient is only slightly restless, this last method is sometimes sufficient.

**Preparing the Patient for the Night**

To prepare a patient for the night wash his face, hands, arms, axillae and back with hot water and soap; rub his back with alcohol and dust it with powder. Freshen his bed by shaking and turning the pillow, drawing a portion of the draw sheet through, (in order to give him a cool, new portion to lie on) sweeping out the crumbs and straightening the top clothes.

\(^1\) The Bradford frame (see Chapter XVII) is one of the best appliances for restraining children.

\(^2\) Never put the restraining sheet across the chest of the patient suffering from lung or cardiac disease as it may restrict the movements of respiration.

\(^3\) Never put a tight sheet across the abdomen of a patient suffering from any abdominal complaint.
In the hospital before the day nurses go off duty they must see that the ward cupboards, lavatories, etc., are in perfect order, and that there is on hand a plentiful supply of all necessaries, such as dressings, medicines, solutions, milk, broth, etc. They should also remove all cut flowers from the ward, and see that no soiled clothes or garbage are left to create odours.

**Care of the Patient at Night**

Owing to stress of work, it is often necessary to waken ward patients early in the morning. They should, therefore, have every opportunity to get to sleep early. The lights should be turned down and quiet be insisted upon by 8 p.m.

It must be remembered that anaemia of the brain is one of the prerequisites to sleep. Hot-water bags at the feet or on the abdomen; hot drinks, particularly hot milk; and gentle friction of the forehead, or of the back of the neck, are a few of the many means of bringing about this condition. In hot weather or when the patient is suffering from high fever, moving him to the side of the bed and fanning the bed-clothes cool both the patient and the bed. Narcotics and anodynes should not be given, except under special circumstances, until all the mechanical means of inducing sleep have been tried. The majority of such drugs are cardiac depressants and producers of constipation. Above all there is a risk of generating a craving for them, and creating a drug habit.

A night nurse must be constantly watchful. Patients are always likely to be worse at night, and sudden changes take place then much more frequently than in the day time.
As the night advances, the air grows colder, and the patient's vitality becomes less. Give extra blankets toward morning, not only to those who complain of cold, but to all whose lowered condition makes extra warmth advisable.

The morning work of the nurse is very much the same as her evening work, but it involves, in addition, the arranging of the patient's hair. Only a patient in extremes should be considered too ill to have the hair brushed. If it is done daily, and in a proper manner, it calls for no exertion whatever on the part of the patient. To arrange a woman's hair, part it in the middle, and brush and comb each strand separately, beginning at the ends and working upward, holding it firmly between tangles and the head. Wetting the hair with a little alcohol will greatly assist in getting out snarls. It should be braided in two parts, above the ears, tied at the ends, and looped at the side of the face.

Patients who are able to brush their own teeth, but who have no tooth-brushes, should be provided with a substitute, viz.: toothpicks, the tops of which have been wound with absorbent cotton. The mouths of all the sick patients should be cared for, as already described.

The night nurse should write a clear and concise, but detailed, report of all treatment, medication, and nourishment given during the night. She should also record significant symptoms and all changes in the patient's condition.

Care after Death

Death is caused by the failure of one of the three vital organs—the heart, the lungs, or the brain—to
perform its function; in other words, by asthenia, apnoea, or coma.

It is the nurse's duty in case of a serious change in a patient's condition to get permission from the doctor to summon the friends, but she should never give more than the most casual information regarding a patient's condition, or the cause of a patient's death, without being authorised to do so by the doctor.

As soon as a patient has stopped breathing, straighten the extremities, close the eyes, and place a support under the chin to hold the jaw in position. In the hospital, nothing more is done till the doctor has seen the patient and pronounced life extinct. After this formality has been gone through, wash the body with a disinfectant; comb the hair,¹ apply a Barton bandage to hold the jaw in place; fasten a triangular binder, with a large oakum pad (twenty-five inches square) in the centre around the loins like a child's diaper;² put on the shroud; and tie the knees, ankles, and hands in position with a broad bandage. Cover the body with a sheet and keep it covered till it is taken from the ward.

In the hospital it is necessary that a card bearing the patient's name and age, the name of the ward, the date and hour of death, should be attached to the wrist for purposes of identification.

Notice of the death should be sent, immediately after its occurrence, to the hospital office.

¹If the patient is a woman, braid the hair.
²In former years the orifices were all plugged to prevent the escape of the post-mortem discharges and gases. The body so often became bloated and disfigured that it is now rarely done.
CHAPTER VII

SYMPTOMS

Difference between Subjective and Objective Symptoms.
Respiration. Restlessness. Tongue. Tremor or Subsultus.
Tympanites or Flatulence. Vomiting.

As the physician is able to spend relatively little time with each one of his patients, it is of the utmost importance that the nurse should be keen in noting and prompt and accurate in recording and reporting the phenomena by which the disease of a patient is diagnosed and his condition is judged. These phenomena are known as symptoms.

Symptoms are subjective and objective. Subjective symptoms are those which are complained of by a patient, and objective symptoms are those which are observed by an onlooker. Subjective symptoms are often, owing to the youth or condition of the patient, impossible to ascertain; and, when they can be ascertained, they cannot always be relied on. Objective symptoms, on the other hand, are almost always highly significant to an intelligent nurse. The following are the most common objective symptoms:
Chill

Chill, or rigour, indicates an unequal distribution of heat between the interior and the exterior of the body. The blood-vessels of the skin are contracted, and the blood is driven to the interior. This condition may be caused by contact with something colder than the body; or it may be the result of nervous irritation, due, either to some disorder of the nervous system, to the toxic poisoning of disease, or to cerebral pressure. Chills vary in intensity, from slight shivering sensations to movements sufficiently powerful to shake the bed. They may last from a few seconds to an hour or more. Their severity and duration should always be charted; also their effect upon the temperature, pulse, and respiration. After a chill, the temperature is usually taken and recorded every hour till it falls to the average degree registered before the attack. A chill frequently marks the onset of certain diseases, such as pneumonia and the exanthemata.

Colour

Change of colour will often be one of the first indications of a change in a patient's condition. The colour is also of great diagnostic value in many diseases. Among the colour symptoms are: the yellow that denotes jaundice or lead poisoning; the sallow complexion of opium slaves; the sallow, waxy skin of carcinoma; the waxy, yellowish shade often accompanying Bright's disease; the extreme pallor of haemorrhage and shock; the white skin and white

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1 Chills due to nervousness are not, as a rule, followed by any marked rise of temperature. When due to other causes the rise may be very great, reaching 105–106° F.
mucous membranes of anaemia; the bluish tint of cyanosis; the flushed face of high fever; the hectic flush of phthisis; and the single red cheek often present in pneumonia, when only one lung is consolidated. A grey colour is typical of silver nitrate poisoning. A bronze shade is typical of Addison's disease; it is also often present, to some extent, in diabetes and cirrhosis of the liver.

Coma

Coma, or stupor, is a state of mental depression due to a paralysis of the cerebrum, which produces complete unconsciousness, and is always a very grave symptom, as it shows almost complete prostration of the vital forces. In coma-vigil, the patient lies with open eyes, but is unconscious and often delirious.

Convulsions

Convulsions almost always indicate some cerebral or nervous irritation. There are two varieties "tonic" and "clonic." In the former, irritation either of the brain or nervous system is constant, and the muscles are continually contracted. In the latter, the irritation is inconstant and the muscles are alternately contracted and relaxed. In children, convulsions are frequently caused by reflex nervous irritation due to worms, indigestion, etc. The diseases which, in the adult, begin with a chill are, in the infant, ushered in with convulsions. The points to be noted in connection with convulsions are: the frequency and duration of the paroxysms; whether they are general or whether only certain parts of the body are involved; whether the eyes are affected, and in what way; whether there is any frothing at the mouth;
whether the colour, pulse, or respiration changes; and whether the attacks are followed by a rise of temperature. (See Chapter XXIII.)

Cough

A cough is generally a symptom of irritation in some part of the respiratory tract, but is caused, at times, by a reflex nervous irritation. Its character will often indicate the cause. There is the short, sharp cough of nervousness; the deep, forcible cough of bronchitis; the wheezing, distressed cough of asthma; the small, hacking, constant cough of phthisis; the shallow, painful cough of pneumonia; the peculiar, hoarse, crowing cough of croup; the convulsive cough followed by a whoop, of whooping-cough; the peculiar, ringing cough, often present in aneurism of the aorta; and the distressed, breathless cough which is so frequent an accompaniment of heart disease and which is due to the constant irritation caused by dyspnoea.

The nurse should note not only the character of the cough but also whether it is worse by day or by night, and whether it is accompanied or not by pain and expectoration.

Cry

Even a cry, especially in a child, is sometimes diagnostic. The moaning, wailing cry of an infant while ill, is very different from its cry of temper. The cry of colic is continuous and loud, and the child, when emitting it, writhes and twists its body. There is a peculiar sharp, ringing cry typical of meningitis.

Cyanosis

Cyanosis indicates the imperfect oxygenation of
the blood. It is a grave symptom in pulmonary and cardiac diseases and should be reported to the physician.

**Delirium**

Delirium is a state of mental excitement due to poisonous irritation of the cerebrum. It is of more serious import in some cases than in others. Nervous and alcoholic subjects are very apt to be delirious, when suffering from an illness of any gravity. In severe cases of pneumonia and typhoid, delirium is always to be expected. In heart disease, sepsis, and peritonitis it is a very untoward symptom.

Certain forms of delirium are typical of certain diseases. Thus, there are: the low muttering delirium of typhoid; the hallucinations of alcoholism; the noisy, restless, and often violent delirium of delirium tremens and toxic poisoning; and the various delusions of patients bordering on insanity.

The possibility of delirium must always be borne in mind in caring for the sick, as it often comes on very suddenly, and the patient unless he is watched, may get out of bed or injure himself.

**Dyspnœa**

Difficult breathing, like cyanosis, indicates imperfect oxygenation of the blood. It may be due to improper heart action (either too much or too little blood being sent to the lungs for purification), or to some impediment in the lung circulation.

**Excreta**

The various excreta of the body always afford important indications of a patient's condition. They should be carefully examined, therefore, and any
abnormalities found in them should be reported. The excreta are: sputum, fæces, sweat, and urine.

Sputum.—The sputum should be carefully studied, especially in lung and bronchial diseases. There are typical stages of the sputum in pneumonia (see Chapter XXIII). Any increase of blood, or darkening of colour in the pneumonia sputum is an adverse symptom. If it becomes very dark, it is known as prune-juice sputum. Prune-juice sputum is a very bad sign, as it denotes increased disintegration of the lung tissue. A thick, viscid sputum, the thinning and lessening of which indicate the approach of convalescence, is characteristic of bronchitis. In abscess of the lung, there is a yellow purulent mucus and pus (muco-purulent), or pure pus sputum. In gangrene of the lung, the sputum is dark, purulent, and offensive. In tuberculosis of the lung, the sputum is thick and yellow, and contains the tubercle bacilli.

The character, odour, and approximate quantity of the sputum should be charted.

Fæces.—See Chapter XIII.

Sweat or Perspiration.—Sweat, or perspiration, when not caused by natural means, such as heat or vigorous exercise, is usually indicative of weakness. If it is accompanied by a high temperature and a cold exterior it is a very serious symptom, since it denotes that the weakness is excessive. In certain diseases, such as phthisis and rheumatism, its presence is diagnostic. In certain other diseases, where there has been a continued high temperature, perspiration is a favourable symptom because it shows that the circulation is improving, and that the skin is once more resuming its normal function. It is sometimes an
indication of nervousness. It is the natural result of some drugs (diaphoretics), and is a sign of an over-dose of others.

The odour of perspiration, its duration, the hour of its appearance, its quantity (whether slight or excessive), and its position (whether general or local) should be charted.

Urine.—See Chapter XI.

Expression

A pinched, anxious expression is characteristic of many forms of heart disease in all their stages, but, in the majority of illnesses, it generally signifies a change for the worse. It is also a symptom of hæmorrhage. A dull, apathetic expression usually indicates a serious illness; it is particularly marked in typhoid fever, and its disappearance is always hailed as a sign of improvement. An over-alert, excited expression indicates mental derangement. It is of special moment when a patient has an alcoholic history, since it is often the first sign of an attack of delirium tremens.

Eyes

The condition of the eyes is an index of much that is occurring in the interior of the body, especially in diseases that affect the brain. A fixed, staring gaze, a shifty, restless movement of the eye, and a wild, excited look all indicate mental disturbance. In examining the eyes, the condition of the pupils particularly should be noted. Contraction of the pupils is one of the first symptoms of an overdose of many drugs—such as morphine and several narcotics, while other drugs, such as belladonna, advertise
their use in excess by a dilatation of the pupil. Strabismus (a deviation of the visual line of an eye), dilatation, uneven dilatation, or unnatural, and even more frequently, contraction of the pupils denote pressure on the brain, either from traumatism or disease. In certain brain diseases, photophobia, or sensitiveness to light exists. In jaundice, the sclerotic coat is streaked with yellow. In high fever, the eyes are glassy and often bloodshot. In wasting diseases, they are sunken, while in exophthalmic goitre, they are very prominent. Lachrymation (a running from the eyes) is frequently a forerunner of measles. Puffiness under the eyes may indicate kidney complications or arsenical poisoning.

For the symptoms of local disease of the eye, see Chapter XXIII.

**Hearing**

In some diseases, especially those of nervous origin, the hearing may be very acute. In others, either through injury to some portion of the ear, or to those nerve centres in the brain which govern the sense of hearing, deafness or partial deafness may be present. Any suspicion of deafness, discharge from, or pain in, the ear, should be immediately reported, since disease of the inner ear is likely to complicate many diseases,—particularly, the exanthemata, diphtheria, meningitis, typhoid fever, and pneumonia. Improper care of the mouth is one of the frequent causes of the infection.¹ Temporary deafness and ringing in the ears often follow even small doses of

¹ The Eustachian tube is the channel of the infection (see Anatomy).
quarine. They also occur in weakness and general debility.

Pain

Pain is, of course, a subjective symptom, but a nurse has often to judge of its presence by such objective signs as position, expression of the face, restlessness, and crying. Pain may be general or local, dull or sharp, shooting, throb- bing, and lancinating; it may be continuous or it may come on in paroxysms. Its presence, character, and the measures employed for its relief, if any, should be charted.

Paralysis

Paralysis denotes pressure, either on some section of the brain, or on some other portion of the nervous system. The locality of the pressure is determined from the seat of the paralysis, each part of the body being under the control of special nerves which have their origin in certain regions of the brain or spinal cord.

Position

As a patient involuntarily assumes the position that will give the least pain and discomfort, position is often a symptom of importance. Thus, in abdominal pain caused by inflammation, the patient will lie on his back with his knees flexed, to relax the abdominal muscles; and, then, even the weight of the bed-clothes may disturb him. On the other hand, pain caused by colic, and other disorders of a like nature, is relieved by pressure, and a person suffering from these disorders will probably lie on the abdomen. In diseases of the lungs when only one is involved,
the patient will usually lie on the affected side, in order to give the normal lung more freedom to perform its function. In certain respiratory and heart diseases, a sitting posture is the only one in which he can find comfort. In aneurism he leans forward. In some forms of meningitis the head is generally retracted and the legs flexed.

Pulse

For pulse as a symptom, see Chapter VIII.

Rash

Always examine carefully any appearance of rash, for an eruption is often one of the first diagnostic symptoms of the exanthemata. It is also one of the first signs of over-dosing with certain drugs, and must be watched for when these drugs are given. Various forms of rash, or urticaria, are caused by diseases of the skin, syphilis, indigestion, nervousness, and many minor disorders. Characteristic forms of erythema are associated with certain diseases. Such are the rose spots and sudamia of typhoid fever, and the roseola of cholera, while another form of roseola is often seen in Bright's disease. In meningitis, there is frequently a profuse eruption, but it is not constant in character. Herpes is a very common associate of meningitis and pneumonia.

Some forms of purpura of hæmorrhage under the skin resemble erythema. They are called petechiae, or ecchymosis, according to the size and form of the spots. They are due to changes in the blood, to obstruction in the blood-vessels, and to traumatism. They occur principally in cerebro-spinal fever, the exanthemata, and yellow, typhus, and rheumatic
Symptoms

fevers. A rash-like irritation of the buttocks in young infants, when not due to lack of care, is often an indication of intestinal trouble, or of improper feeding. An excess of sugar in the food, for instance, will cause the stools to have an acid reaction which frequently produces this result.

Any appearance of rash should be reported immediately. Note where a rash first appears and the manner in which it spreads, as this is often of diagnostic value. When there are scratches on the skin as well as a rash, examine the pubes and axilla, and hunt for pediculi. (See Chapter VI.)

Singultus or Hiccough

Hiccough is a very serious symptom, when it is due to any of the following causes:

1. Exhaustion, as in typhoid, shock, or advanced chronic diseases.
2. Central nervous disease, such as brain tumour and meningitis, and such as is caused by toxæmia diabetes, uræmia, etc.
3. Local irritation, due to gastric carcinoma, peritonitis, intestinal obstruction, etc.

Respiration

For respiration as a symptom, see Chapter VIII.

Restlessness

When a patient is convalescent or not very ill, restlessness is to be expected, but in severe illness, it is generally regarded as an unfavourable symptom; and the intense, irrational form associated with delirium is not more so than the mere restless plucking at the bed-clothes known as “carphology,” which is one of the primary symptoms of delirium tremens.
Temperature

For temperature as a symptom, see Chapter VIII.

The Tongue

The membrane covering the tongue being continuous with that which lines the whole alimentary tract, any change in the latter is advertised by some change in the former. There are also conditions of the tongue which are typical of certain diseases, when it is white and furred, intestinal disorder is indicated, and in some intestinal diseases, it is partially denuded of epithelium. It is apt to be red and swollen in diabetes; scarred, in epilepsy; punctated like a strawberry, in scarlet fever; ulcerated, in mercurial poisoning, stomatitis, or syphilis. Its condition varies also with the different stages of typhoid. (See Chapter XXIII.) The clearing of the tongue from the edges is always a sign of beginning convalescence.

Tremor or Subsultus

Tremor or subsultus is an involuntary trembling of the body. It is characteristic of alcoholism. Occurring in the course of a disease, it indicates excessive weakness.

Tympanites

Tympanites is distention caused by an accumulation of gas—e.g., flatulence—in the stomach or intestine. It is generally due either to the fermentation of their contents, or, as in pneumonia, to the fact that carbon dioxide is generated and is retained on account of defective heart or lung action. In severe illness, flatulence is not only a serious
Symptoms

Symptom, but, also, a serious condition, since, by increasing the work of the already wearied heart and lungs, it may cause death. In peritonitis, it is a very grave symptom, signifying the loss, or the partial loss, of the peristaltic action of the intestine.

Vomiting

The character of vomiting is of infinite importance. The frequency of vomiting, and the average amount and character of the vomitus should always be charted. "Character" includes the consistency, odour, and colour of the liquid; also, at times, the manner in which it is ejected. Projectile vomiting is always a very grave symptom. It occurs most frequently in brain disease, and in advanced cases of peritonitis. Green vomitus indicates the presence of bile. It is seen after the taking of anaesthetics and when there is any disorder of the liver. It is not of importance, unless long continued, except in diseases of the liver, when it points to some obstruction of the bile-duct. Dark, acid, brownish-green vomitus is a very grave symptom, pointing to peritonitis. Dark vomitus having an appearance of coffee-grounds is another very grave symptom, and it generally means that hæmorrhage has taken place in some part of the alimentary tract and the blood is digested. When vomiting occurs immediately after a hæmorrhage in any part of the alimentary tract (hæmatemesis), the blood, not being digested, will have much its ordinary appearance. If vomited blood is frothy, it has come from the lungs (hæmoptysis). A faecal odour to vomitus is of serious import, being generally the result of intestinal obstruction.
Mucus in the vomitus indicates gastritis, and mucus streaked with blood, gastric ulcer.

Vomiting is frequently caused by reflex nervous irritation, when there is no local disease or irritation of the stomach. Thus, the vomiting of pregnancy, cerebral disease, appendicitis, etc., are not always caused by disorder of the stomach.

Vomiting after fracture of the skull is a favourable symptom, as it shows that the pressure is not sufficiently severe to paralyse the reflex action of the nerves. It is also a favourable symptom in shock. (See Chapter XVI.)

The Voice

Hoarseness denotes congestion of the vocal cords. Aphonia (loss of voice) may be due to hysteria, to inflammation of the vocal cords, or to paralysis from pressure on the nerves of the vocal cords by tumour, etc. Aphasia (loss of speech) may be due to paralysis of the cords, or, to a cortical lesion. There are several varieties. Aphasia amnesic is a want of memory for words. Aphasia ataxic is an inability to articulate words correctly.

Charting

In the majority of hospitals, a separate record, or chart, is kept for each patient. On this should be recorded his temperature, pulse, and respiration, and all the treatment and medication given him, with the result of the same. Thus: If a patient is given a narcotic, state whether or not, he slept; if so, how long, and how soon after taking the medicine. When stimulation is given, mention the effect upon
Symptoms

the pulse; a few days after starting a tonic, and periodically afterward make some remark about the appetite, never failing to report any abnormality therein. When a patient is on a liquid diet, or when, as in various forms of kidney disease, the amount of liquid taken is a matter of importance, measure and chart it accurately.

All symptoms, whether subjective or objective, should be recorded. The frequency, and, with a very sick patient, the character, of each bowel movement should never be omitted. The urine should be measured and the result and time of voiding recorded in the following cases: in all kidney and heart diseases; for the first twenty-four hours after a patient's admission to the hospital; after an operation; whenever there is any suspicion of the passing of an abnormal amount; when it is necessary to catheterise; in fact, whenever there is an abnormality of any description. When urine is voided involuntarily, the average amount should be estimated. With practice, a fairly accurate estimate can be made.¹

Catamenia, and any attendant abnormality, such as menorrhagia or dysmenorrhœa, should also be recorded.

Charting should be done neatly and plainly. To avoid wasting paper and making the record too bulky, employ small characters. Everything of any importance must be mentioned, but as clearly and concisely as possible, without using a single, unnecessary word.

¹When in doubt, pour measured water over a sheet, and see how much it takes to cover the same space as that wet by the urine. The amount of blood lost in a hæmorrhage can be estimated in the same way.
CHAPTER VIII

TEMPERATURE, PULSE, AND RESPIRATION


No symptoms are more significant than those which have to do with temperature, pulse, and respiration. The organs controlling the temperature, pulse, and respiration are all so intimately connected, that whatever affects one generally affects the others, in a greater or less degree.

In health the body has a constant temperature the result of the action of two opposite processes; namely, heat production and heat elimination.

The heat is produced in the individual cells by the oxidation of food, both food and oxygen reaching them by means of the blood. Since the muscular cells form so large a part of the active cells of the body, as a matter of fact, most of the heat is the result of muscular activity. The heat so produced is disseminated by the blood throughout the body, the whole having practically the same temperature.
The elimination of heat is accomplished in two ways; first, by radiation from the blood-vessels, which pass near the surface of the skin, and those of the mucous membranes exposed to the air; particularly the mucous membrane of the lungs; and second, by the actual loss of warm substances from the body.

The balance between heat production and heat elimination is controlled by the nervous system. When anything interferes with this rate of production or elimination, or with the balance between them, the temperature of the body changes. In toxic diseases, the poison causes an excessive burning up of the tissue (as is shown by the rapid emaciation) and there is a rise of temperature. When the surface of the body is chilled, the superficial blood-vessels are contracted and radiation of heat through the skin is partly lost, sometimes causing a very great rise of temperature. Excessive vomiting, diarrhœa, hæmorrhage or shock will often cause a decided lowering of the temperature through the prostration of the nervous system.

The normal temperature of the human adult body is 98.6° F., but it is subject to diurnal physiological fluctuations of from a fraction of a degree to a degree and a half. In health it rises gradually from 7 or 8 A.M. until the same time in the evening, when it gradually falls. Thus it reaches its maximum between 5 and 8 P.M., and its minimum between 2 and 6 A.M.

In infants and children, the average temperature is generally somewhat higher than in adults, while in old people, it is somewhat lower.

Certain conditions will also produce small deviations of temperature. The process of digestion, excessive
exercise, excitement, constipation, or indigestion may cause the temperature to rise slightly, while profuse perspiration or diarrhoea will lower it.

The degree of temperature compatible with recovery from disease depends considerably upon the disease. Patients have recovered from sunstroke after a temperature of 112° F. and even 115° F. In pneumonia 105° F. is a frequent temperature, but 104° F. is considered alarming in diphtheria.

That the body can stand a greater increase than decrease of temperature is shown by the following table:

<table>
<thead>
<tr>
<th>Temperature Category</th>
<th>Degree Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hyperpyrexia</td>
<td>106° and over</td>
</tr>
<tr>
<td>High fever</td>
<td>103° - 106°</td>
</tr>
<tr>
<td>Moderate fever</td>
<td>101° - 103°</td>
</tr>
<tr>
<td>Subfebrile</td>
<td>99.5° - 101°</td>
</tr>
<tr>
<td>Normal</td>
<td>98° - 99.5°</td>
</tr>
<tr>
<td>Subnormal</td>
<td>97° - 96°</td>
</tr>
<tr>
<td>Collapse</td>
<td>96° - 95°</td>
</tr>
<tr>
<td>Algid collapse</td>
<td>below 95°</td>
</tr>
</tbody>
</table>

The course of the temperature varies in different diseases, and is therefore of great diagnostic value. In typhoid fever, it rises gradually, remains high for a certain length of time, and then declines as gradually as it rose. In pneumonia, the rise is sudden, and the fall may be either gradual or immediate. When the fall is sudden, the fever is said to terminate by crisis, when gradual, by lysis.

Fever is classified, according to the course it runs, as continuous, remittent, or intermittent. It is continuous, when it is constantly high with but slight fluctuations, as in pneumonia; remittent, when
it remains above normal but with a considerable range between its highest and lowest points, as in typhoid; intermittent, when it alternately rises to febrile height and falls to or below normal, as in malaria.

Owing to the diurnal variations, which take place in disease as well as in health, it is necessary that the temperature be taken at the same time each day, if an accurate conception of its course be desired.

**How to Take the Temperature of the Body.**—The clinical thermometer is the instrument used for ascertaining the body-temperature. The temperature can be taken in the rectum and vagina, under the tongue, and in the axilla and groin, the large blood-vessels in all these places being near the surface. Before using the thermometer, shake the mercury down to 95°, but be careful not to shake it into the bulb or the thermometer will be rendered useless.

When taking the temperature by mouth, be sure that the patient has not had anything cold or hot in his mouth recently. Place the end of the thermometer containing the mercury under the tongue, on either side, close to the arteries. See that the lips are kept tightly closed all the time the thermometer is in the mouth and do not leave it there longer than is necessary. The length of time required will depend on the thermometer used. Hick's best Kew Observatory Certificate Thermometer registers in half a minute, but, as it is necessary for the mouth to be closed at least two minutes to insure its temperature being unchanged by the outer air, the thermometer should be left in that length of time. Cheaper grades of thermometers require from three to five minutes for registration.
Never take the temperature of a young child, of a delirious or unconscious patient, or of a patient troubled with dyspnoea by mouth, since there is danger that the bulb will be bitten off. True, mercury in its metallic form is inert and would probably be discharged through the intestines without any harm, but it is better not to allow the accident to happen. If it does occur, see that there is no glass left in the mouth and notify the physician. Sometimes, white of egg, the antidote for mercurial poisoning, is given. In these cases, it is safer to take the temperature by rectum. It is also advisable to take a rectal temperature, when the patient is very ill, as the rectum, being a closed cavity, gives a greater degree of accuracy.

Before inserting the thermometer in the rectum, oil the bulb and see that the cavity is free from faeces. Allow from five to ten minutes for registration. The temperature will be one degree higher than it would be if taken by mouth. Never take the temperature by rectum when the rectum is diseased, and never allow a sick patient to insert the thermometer himself. If an infant struggles while you are taking its temperature, turn it on its face, or hold it face downward on your knee. When inserting the thermometer with the child so placed, point it downward, toward the umbilicus, for the axis of the rectum is changed by this position.

The axillary temperature will be from three tenths to half a degree lower than the temperature taken by mouth. Wipe the axilla thoroughly before placing the thermometer vertically in the hollow. Keep it in place by holding the arm close to the side and flexing the elbow so that the hand rests on the
Temperature, Pulse, Respiration

opposite shoulder. From ten to fifteen minutes will be required for registration, according to the grade of thermometer used.

Children, hysterical, delirious, or fractious patients, should never be left while their temperature is being taken. Hysterical patients often resort to many mechanical devices, such as moving the thermometer in the mouth, holding it on a hot-water bag, etc., to obtain high registration.

The temperature must not only be accurately taken but accurately recorded.

A patient should never have access to his chart, and all questions regarding his temperature and condition should be evaded as far as possible.

Care of Thermometers.—Keep the thermometers, when not in use, in a glass containing a solution of bichloride of mercury 1:1000, with a pad of absorbent, or other soft, cotton in the bottom. Wipe a thermometer carefully before giving it to a patient, and if you use it for more than one patient, wash it in a disinfectant and wipe it thoroughly between uses.

Even the best thermometers should be compared occasionally, with some standard, as the bulbs gradually contract and they then register incorrectly. Owing to the constant breakage in the hospital, it is necessary to use cheap thermometers there. Therefore, it is necessary to test them weekly. To do so, put them into a glass of water, 100°F., with a reliable chemical or dairy thermometer. Allow them to remain there five minutes. Then, discard those which show any considerable variation from the standard thermometer. Such can, as a rule, be returned to the makers for repairs.
The Pulse

The pulse is the distention of the arteries by a wave of blood forced through them by the contractive or systolic action of the heart. The interval between the pulse-beats is the period occupied by the diastole or relaxation of the ventricles of the heart as they fill with blood.

Wherever an artery approaches the surface, this pulsation can be readily be felt and counted. The arteries in which the pulse can most readily be felt are the temporal, carotid, radial, femoral, anterior tibial and dorsalis pedis. For the sake of convenience, the pulse is generally taken at the radial artery, just above the wrist, on the thumb side. To count it, place the index and middle fingers over the artery, making a slight pressure. Count for a full minute, dividing the minute into quarters, the object of the division being to show whether the frequency of the pulse is regular or irregular.

When taking the pulse of a patient for the first time, always take it in both wrists to ascertain if it can be felt equally well in both. Sometimes, owing to an unusual distribution of the arteries, an aneurism, or traumatism, there is an appreciable difference between these two pulses.

The principal points to be considered in connection with the pulse are its frequency, force, volume, rhythm, compressibility, and tension. The normal pulse is even and regular in force and frequency, slightly compressible and devoid of hardness.

Frequency.—By frequency, is meant the number of pulsations in a given time. This varies—even in health—according to persons and conditions.
Temperature, Pulse, Respiration

The average pulse is:

<table>
<thead>
<tr>
<th>Group</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>In men</td>
<td>60–70</td>
</tr>
<tr>
<td>&quot; women</td>
<td>65–80</td>
</tr>
<tr>
<td>&quot; children, above seven years</td>
<td>72–90</td>
</tr>
<tr>
<td>&quot; &quot; from one to seven</td>
<td>80–120</td>
</tr>
<tr>
<td>&quot; infants</td>
<td>110–130</td>
</tr>
<tr>
<td>At birth</td>
<td>130–160</td>
</tr>
</tbody>
</table>

Food, exercise, excitement, and sudden emotion, will all cause an increase in the frequency of the heart-beat. Position will also cause slight alterations, the pulse being quicker when a person is standing, than when he is sitting, and when he is sitting than when he is lying down.

In describing the frequency of the pulse, use the following terms: "frequent," for a pulse of 100–115; "rapid," from 115–140; "running," when over 140. Never speak of a quick or slow pulse in this connection, since these terms are only applicable to the rate of the individual beat.

The ratio of the pulse to the temperature and respiration varies slightly in different diseases, but any great divergence is a grave symptom. When the pulse becomes accelerated in an undue ratio to the rise in temperature, haemorrhage or cardiac weakness is indicated. On the other hand, a disproportionate slow pulse points to cerebral pressure.

Force.—The force of the heart-beat should be described as feeble, sluggish, normal, or forcible; or if some beats are feeble and others forcible, it should be described as irregular.

Volume.—When the volume of the pulse is greater
than usual it is said to be large or full; when less than usual, it is said to be small.

**Rhythm.**—The rhythm of the pulse may be regular, irregular, intermittent, or dicrotic. In an irregular pulse, the interval between the beats is unequal. In an intermittent pulse, a beat is now and then lost—a less serious indication than an irregular pulse. In a dicrotic pulse, there is a secondary weaker beat (caused by the closure of the aortic valve), which indicates a relaxed condition of the arteries, and often accompanies acute fevers, particularly typhoid. It is difficult for the young student to detect a dicrotic pulse, but when the pulse is apparently much accelerated and every other beat is weaker than the preceding one she may at least suspect that the pulse is dicrotic. The two beats, representing only one contraction of the heart, should be counted as one.

**Compressibility.**—When a pulse can be easily stopped by pressure with the finger, it is said to be compressible. Conversely, when it is harder than usual to obliterate, it is said to be incompressible.

**Tension.**—The tension of the pulse, when not normal, is either high or low. In a high-tension pulse—which is due either to contraction of the smaller arteries or increase in the force of the heart-beats, the artery remains persistently full, between beats, and is resistant to the finger-pressure. In a low tension due either to a weakened condition of the heart or relaxation of the peripheral blood-vessels—the pulse, though full, is soft and easily compressible.

The other abnormal pulses—hard, soft, jerking, bounding, thready, wiry, and flickering—are accurately and sufficiently described by their names.
The primary object of respiration is the purification of the blood. This is accomplished by the inhalation of oxygen and the exhalation of carbonic acid gas and of the impure, effete matter resulting from the combustion continually going on in the body. Oxygen has a greater affinity for blood than for air, and, when inhaled, readily leaves the latter to unite with the blood in the lungs. Carbonic acid gas, on the other hand, has a greater affinity for air than for blood, and as readily leaves the blood to unite with the air. This interchange of gases, known as osmosis, is assisted by the exceeding thinness of the walls of the air-cells and lung capillaries.

The power which controls the respiratory movements (known as "the respiratory centre") resides in the medulla oblongata.

Every respiration consists of two parts: inspiration, in the course of which the chest expands, and pure air is drawn through the trachea and bronchi into the lungs; and expiration, in the course of which the chest contracts, and air, which has been deprived of its oxygen, is expelled. The lungs take in from twenty to thirty cubic inches of air at each inspiration; but they are only partly filled and emptied by each respiration, hence, fifteen or sixteen respirations are necessary to completely renovate their contents. The air remaining in the lungs after expiration is called "stationary or residual air." The air introduced with each inspiration is called "fresh or tidal air." The extra amount of air drawn into the lungs by deep inspirations is known as "complemental air."

The respiration and the circulation are so intimately
connected, that anything affecting the blood will immediately cause a corresponding change in the respiration. In fever the blood, owing to the increased combustion of the tissues, is laden with an excessive amount of impurities. Therefore, the respirations become accelerated in endeavouring to supply an amount of oxygen sufficient to purify the blood. The respirations are also quickened by abdominal or thoracic pain, and often in hysteria. On the other hand, the respirations are diminished by such causes as narcotic poisoning, cerebral traumatism or disease.

Oxygen, being essential to life and health, patients should always have a plentiful supply of fresh, pure air, and should never be allowed, especially if they are helpless or unconscious, to lie with their heads thrown forward on their chests, since this position interferes with the passage of air to and from the lungs.

The respiration being to a certain extent under the patient’s control, it should be counted without his knowledge. To do this, count it while holding your fingers on his wrist, as though still taking the pulse. Watch the rise and fall of the chest-wall, and count an inspiration and expiration as one breath.

In men and children the respiration is deeper than in women. The normal rate of respiration is:

16–18 per minute in adults,

Respirations above forty or below eight are extremely dangerous.

The normal ratio of the respiration to the pulse is one to four.
Temperature, Pulse, Respiration

Respirations are described as regular or irregular, quiet or noisy, easy or laboured, deep or shall w.

Other abnormal respirations are: Cheyne Stokes respiration, dyspnœa, Òedematous breathing, ster-torous breathing and hiccoughs.

**Cheyne-Stokes Respiration.**—Cheyne-Stokes res-piration is a common accompaniment of advanced brain, heart, and kidney-diseases. It has also been noticed in perfectly healthy children during profound sleep. It appears in two forms. In one, the respira-tions gradually increase in force and frequency up to a certain point and then as gradually decrease until they entirely cease—a short pause ensuing before they begin again. In the other, the respirations gradually increase in force and frequency, likewise, but cease suddenly instead of decreasing gradually. This phenomenon may continue for some time. The causes of Cheyne-Stokes respiration are as yet im-perfectly understood.

**Dyspnœa.**—In dyspnœa the respirations are forced and laboured. This condition is caused by a greater amount of blood being sent to the lungs than they are able to purify. It may be due to an increase in the heart-beat, or to an obstruction in the air-passage shutting off the required amount of air. It may also be due to congestion in the pulmonary capillaries and to nervousness. When it is so bad that the patient is unable to breathe in a recumbent position, it is known as orthopnœa. Apnœa means a complete suspension of the respiration.

**Óedematous Breathing.**—In Òedematous breathing, dyspnœa and cyanosis are extreme, and loud moist râles which are caused by the infiltration of serous fluid into the air-cells of the lung may be heard. This
condition is very serious, and unless it is relieved immediately death must ensue.

Stertorous Breathing—Stertorous breathing is more common and less serious. It is characterised by a deep, snoring sound in connection with each inspiration. In cerebral hæmorrhage the breathing is stertorous and the cheeks are puffed out with each breath.

Hiccough.—Hiccough, which is caused by a sudden spasmodic contraction of the diaphragm, accompanied by a spasmodic closure of the glottis, is of little import in health, but it is an adverse symptom in all abdominal diseases, especially when it persists after abdominal operations.
CHAPTER IX

BATHS AND PACKS


In relieving unfavourable and painful symptoms and in regulating the varied phenomena of temperature, pulse, and respiration, a leading rôle has latterly been assigned by physicians to the bath.

The Principal Uses of Baths

Baths are used principally (1) for cleansing, (2) for general stimulation, (3) to induce perspiration, (4) for the reduction of temperature and inflammation, (5) as nerve sedatives and nerve tonics, and (6) as counter-irritants. Medicated baths are also used in specific cases, either for their local effect on the skin or for their general action upon the systems.¹

¹ A bath with a temperature of between 33° and 65° F. is known as a cold bath.

A bath with a temperature of between 65° and 75° F. is known as a cool bath.
The Cleansing Bath.—The skin serves the body not only as a covering, but also as an excretory organ, being in this respect quite as important as either the lungs or the kidneys. The skin performs this function through the agency of the sweat glands. Hence, if these glands become clogged, its work is interfered with. Especially in illness must this be prevented, as the waste products of the body are then particularly injurious and their presence in the system increases the danger of bed sores, boils, small abscesses, and a general toxic condition. The sweat glands can be clogged quite as readily by the secretions they are endeavouring to exude, as by anything from without. It is a mistake, therefore, to suppose that, when a patient is in bed, and does not appear dirty, a bath is not needed. The majority of patients should have at least a sponge bath every day if possible. In the hospital ward, this would be impossible, but, even there, every patient must be bathed at least twice a week, on regular days appointed by the head nurse.

The ideal time for the bed bath is in the morning, an hour before breakfast; but in the hospital ward, where each nurse has several patients, the baths must be given at odd times during the day, as the work of the ward permits. It is imperative, however, that an hour intervene between eating and

A bath with a temperature of between 75° and 85° F. is known as a temperate bath.
A bath with a temperature of between 85° and 92° F. is known as a tepid bath.
A bath with a temperature of between 92° and 98° F. is known as a warm bath.
A bath with a temperature of between 98° and 112° F. is known as a hot bath.
bathing, unless the meal consists of liquids, milk toast, custard, or other very easily digested food, in which case, half an hour will be sufficient. The reason why this delay is necessary is that the blood always flows in greater abundance to the part that is doing the most work. During digestion it directs itself, in accordance with this law, to the stomach and intestines. If a bath is given, or violent exercise taken, however, it is diverted toward the surface, the digestion of the meal is interfered with, and proper assimilation fails to take place.

The Bed Bath.—To give a bed bath: See that the windows are closed, and that the room or ward is sufficiently warm and devoid of draughts. Bring to the bedside everything required, namely; a large bath blanket, or preferably, two small ones, at least two towels—face and bath—wrapped about a well-filled hot-water bag, two wash-cloths, a toilet basket containing soap, ammonia, alcohol, nail-brush, etc., a foot-tub half full of water, 110° F., and a pitcher of hot-water to keep the bath at the required temperature. Draw the patient to the side of the bed. Place a folded bath blanket over the chest; tuck a corner of it under the mattress, on both sides, to keep it from slipping down; turn down the bed-clothes, unfolding the blanket at the same time; slip the second blanket, or, if one large blanket is used, one half of it, under the patient; and take off the nightgown. Then proceed with the bath, washing first the face and ears, and afterwards the neck, chest, arms, back, abdomen, legs, and feet successively. In washing exert a firm but gentle pressure. Dry each part immediately. Wash and dry the ears, the spaces behind the ears and between the fingers and toes, the axillæ
and the pubic region particularly well. When washing the feet put them in the tub. Rubbing the patient at the end of the bath with alcohol, which evaporates rapidly, will further the drying process, and, also, harden the epidermis, thus lessening the danger of bed sores. Never expose your patient. The whole bath can be given under the blanket.

The bath must not be considered finished till the finger and toe nails have been inspected, and, if necessary, cleansed and pared. If the patient is exhausted after the bath, put a hot-water bag at his feet and give him a drink of hot broth.

**Washing the Hair.**—To wash the hair: Have ready a pitcher of soap solution, a good supply of both hot and cold water, a jar into which to empty the water, an extra-soft towel, and a rubber to protect the pillow. Bring the patient well over to the side of the bed, pin one end of the rubber round his neck, and make with the rest of it a trough extending into a foot tub or basin, which should be placed a few inches lower than the head. Pour first the soap solution and afterward the water from a pitcher, rubbing the scalp and hair well at the same time. Dry the hair as well as possible with a hot towel and by fanning. Do not braid it until thoroughly dry.

While washing the hair of a new patient, examine the head carefully for pediculi and nits. The latter look like dandruff, but they cling tenaciously to the side of the hair, while dandruff will brush off readily. When there are many pediculi present, they are easily discovered. If there are only a few, however, they may escape detection. Therefore, in most
Baths and Packs

hospitals, it is a rule to rub tincture of delphine\(^1\) into the scalp after washing. When there is any sign of either pediculi or nits, comb the hair with a fine tooth comb, use an extra supply of delphine, and bind the hair up in a towel. If there are many nits, wash the hair with hot vinegar after applying the delphine. Repeat this treatment daily as long as necessary. When the hair is tangled, rub a little vaseline into the scalp and wet the hair slightly with alcohol while combing it. Always hold the hair between the tangle and the head.

The hair will not need to be washed often if it is kept well brushed, and is rubbed once in a while with a wash-cloth dampened in alcohol, one eighth per cent, or dusted with talcum powder.

It is a general rule in hospitals that all patients, if their condition warrants it, shall have a bath on admission. Patients often object to this, and nurses must exercise the greatest tact to carry their point without offending. When the body temperature of the patient is subnormal, when he is suffering from shock or loss of blood, or is otherwise in a bad condition, baths must not be given without a special order from the doctor. Before giving a patient a bed bath, on admission, put a rubber sheet under the blanket, as it is often necessary to use a large amount of soap and water. When he is very dirty, add some ammonia, or borax, to the water. Wrapping the feet with compresses soaked in one fourth per cent. green soap, or in soft flax-seed poultices, and leaving them so wrapped for two or three hours, will soften

\(^1\) See *Materia Medica*. Crude petroleum is very efficacious for the same purpose, but it stains everything it comes in contact with, and is disagreeable to the patient.
callouses and make it easier to get them clean. If there is any appearance of body lice, follow the cleansing bath by a 1-5000 bichloride bath (see Chapter VI on Admission of Patient).

When the patient's pulse is fairly strong and regular, temperature normal, and general condition good, a full tub bath generally is allowed. For a tub bath, fill the tub half full of water 100° F. and see that towels, wash-cloths, and soap are at hand. Even when patients are able to take their own baths they must not be allowed to lock the bath-room door nor be left long alone.

**Infant's Cleansing Bath.**—Have the temperature of the room in which a baby is to be bathed 72-75° F. The proper temperature of the water may be determined by the following table:

<table>
<thead>
<tr>
<th>Age</th>
<th>Temperature (°F)</th>
</tr>
</thead>
<tbody>
<tr>
<td>For an infant under three months</td>
<td>95-100</td>
</tr>
<tr>
<td>Three months and upward</td>
<td>90-100</td>
</tr>
<tr>
<td>One year</td>
<td>85-90</td>
</tr>
<tr>
<td>Two years</td>
<td>75-80</td>
</tr>
</tbody>
</table>

As a rule, a baby is not put into a tub until it is two or three weeks old. To bathe a baby under this age, envelop it in an old soft blanket or piece of eider-down flannel and hold it in the lap, protecting the lap by wearing an apron of Turkish towelling or similar material.

Before giving the first bath after birth, rub the skin gently with vaseline or olive oil to facilitate the removal of the sebaceous matter adhering to it.

Pay particular attention to the eyelids, ears, buttocks, and all surfaces where two folds of skin come together. In little girls, separate and cleanse the two outer lips of the vulva. In little boys, draw the
fore-skin back once or twice a week to see that there is no dried urine, etc., adhering to the penis.

In giving a baby a full bath in a tub, have sufficient water to cover the chest, and support its head on your left arm and its back with your left hand.

Do not allow a baby under three months old to remain in the bath more than two or three minutes.

After the bath, roll the baby in a warmed towel, dry by rubbing the hand briskly over the towel and powder lightly, especially where two folds of skin come together, taking pains not to leave sufficient powder to cake, or the object of the powdering—to prevent chafing and irritation of the skin—will be defeated.

Sedative Baths.—When given as nerve sedatives, baths should be about 96° F. The patient usually remains in the tub an hour, the water being kept during that time, at the required temperature.

Packs

Packs are employed more frequently as nerve sedatives, perhaps, than baths. There are many methods of giving packs. One of the most common is the following: Cover the patient with a blanket, remove the upper bed-clothes, and pass a large rubber covered with a soft blanket, under him. Wring out two doubled sheets in water, 85° F., slip one under the patient’s back, so that it will extend from the neck to the feet and come well up under the arms, and put the other under the top blanket, over the chest, around the arms, and between and over the legs. Bring the ends of the under blanket up over

1 Warm baths are a sedative, cold baths (when not long continued), a stimulant, and hot baths, a depressant.
the patient, and tuck the upper one snugly around him, making it particularly secure around the neck. Place cold compresses to the head, and a hot-water bag at the feet. Leave the patient in the pack from twenty minutes to an hour. At the end of that time, if the pack has been given to induce sleep, and has had the desired effect, remove the sheets, disturbing him as little as possible, and wipe him dry with a heated towel. If the pack has not had the desired effect, or if it has been employed as a nerve tonic, remove the blankets; but, before unwinding the sheets, give him a cold affusion (either by pouring water slowly from a pitcher, or by squeezing it from a sponge continually dipped in water 75°F.), rubbing him with one hand while pouring with the other. Continue this treatment five or ten minutes, then remove the sheets, cover him with a blanket, and rub him briskly with hot towels.

**Packs and Baths for General Stimulation in Nervous Exhaustion, etc.**

The pack, as described above, is often used for general stimulation in nervous exhaustion.

**The Drip Sheet.**—The drip sheet is used for the same purpose, when the patient is well enough to get up. Before starting the drip-sheet treatment, see that the room is at least 70°F., and have twelve inches of water 105°F. in the bath tub. Make the patient stand in this, with a blanket or sheet around him, wring out a sheet in water 75°F., pass it under the blanket and wind it around him, removing the blanket at the same time. At intervals of three minutes, pour water, ten to fifteen degrees colder than that in which the sheet was dipped, over the
shoulders and down his spine, rubbing briskly in the interim. Continue this procedure for ten to twenty minutes. Then, withdraw the sheet quickly, and envelop the patient in a dry, hot sheet, giving friction over this till all moisture is absorbed.

**Cold Tub Baths.**—Cold tub baths, 65°F., are also often given as nerve tonics and for general stimulation. They are seldom continued longer than from three to five minutes, and should be followed by a brisk rub with hot towels.

**Baths in Hyperpyrexia**

At one time, the reduction of temperature was the only result looked for in the giving of cold baths. Now, it is considered but one of the minor benefits, a far greater one being the stimulation of the vaso-motor system and of the general circulation, with a view to preventing local congestions of blood in the vital organs. Other effects of cold baths are the stimulation of the processes of oxidation and nutrition, and the elimination from the body, by the skin, of toxic materials. Frequent bathing also prevents the chafing of the skin and the formation of bed-sores, which, formerly were a frequent complication of fever, especially typhoid.

As the primary effect of cold upon the peripheral vessels is their contraction and the driving of the blood from the surface to the interior, a cold compress or ice cap on the head is necessary in all cold baths to prevent retrostasis with determination of blood to the head.

A hot-water bottle is always placed at the feet during packs and bed baths, and immediately after tub baths. Keeping the feet warm prevents rigour
or chill, which is always to be guarded against, it being an evidence of muscular contraction and of a too decided difference between the temperature of the central and peripheral portions of the body and the good effect of the bath may be counterbalanced thereby. Friction is also given for the same reason and is a very important item in administering cold baths. Friction must be continuous and light; since the patient soon complains of soreness of the skin and muscles, if it is too heavy. To prevent this, as well as for its greater effect on the deeper blood-vessels, it is well to alternate the friction with a light kneading of the muscles.

A stimulant,¹ given fifteen or twenty minutes before the bath, is another means often taken to prevent chill and to counteract any bad effects the shock, caused by the sudden immersion, may have on the system of the patient. After the bath, a hot drink is given him, and, as a rule, a thin blanket is put over him. The blanket should be left on until reaction has taken place and the danger of chilling is over. The time required for reaction depends on the individual. Old people, children, and adults in a run-down condition will not react readily. A high temperature furthers a speedy reaction.

Baths for hyperpyrexia are generally given every three or four hours while the temperature is 102.5° F. or over. Their temperature varies from 95° to 65° F. Their duration also varies, ten to twenty minutes being the average.

The patient’s temperature, pulse, and respiration should always be taken an hour after a bath, to see

¹ Whiskey is the form of stimulation most frequently used.
what effect it has had upon him. The after-bath temperature, etc., is charted with red ink.

**Brandt Bath.**—The tub bath, as a treatment for hyperpyrexia which was introduced into Germany by Brandt in 1861, and which first came into common use in this country in 1890, has reduced the mortality of typhoid fever from 25 to 7%. To give this bath, it is necessary to have a portable tub which can be wheeled to the bedside, and to stretch a stout binder of muslin, in the centre of which an air ring is fastened, across the head of the tub, to support the patient's head. The other requisites are: a rubber sheet to protect the bed, a muslin sheet in which to roll the patient while drying him, an ice-cap, or a basin of ice with compresses for the head, a bottle of alcohol, a watch, non-absorbent cotton for the patient's ears, to prevent water from getting into them, safety-pins, a binder to pin around the abdomen, a bath-thermometer, and ice to keep the water at the required temperature.¹

Almost the only objection to these tub baths is that, unless the lifting is most carefully done, there will be considerable strain on the abdominal muscles of the patient, thereby increasing the danger of hæmorrhage and perforation. The best way to lift is to use a stretcher. This stretcher should be made of strips of webbing, one inch in width, and so latticed together as to leave open spaces two inches square, and should have a doubled strip of canvas stitched on every side through which poles may be run. The stretcher is first passed under the patient, and the poles are then slipped in, the bath tub being provided with hooks, one on each end, for the support

¹ The tub should be filled three-quarters full of water.
of the poles. The stretcher has several advantages: the lifting can be done by two people; it entails no exertion whatever on the part of the patient; and it supports him while in the tub.

When there is no stretcher, there should be three people to lift the patient in and out of the tub. One takes the head and shoulders, another, the feet, and the third, reaching across the tub, passes her hand under the buttocks. Instruct the patient to hold himself as stiff as possible, and draw him to the edge of the bed before attempting to lift him. Begin rubbing him the minute he is in the water, commencing with the spine and extremities.

Exposure of the patient can be prevented by stretching a sheet across the bed and tub, holding it in place by tucking one end under the mattress and pinning the other end to a bandage tied around the bath tub.

As it may be necessary to take the patient out of the bath at any time, prepare the bed immediately for his return to it. Once daily, the mattress is turned and the bed remade. If this has already been done, tighten the under bed-clothes, cover them with an extra rubber, and put a hot-water bag at the foot of the bed.

It is not an untoward indication if the pulse of the patient becomes smaller at the beginning of the bath, as this is due to the contraction, by the cold, of the superficial blood-vessels; but if it does not improve after a minute or two, if it becomes soft and intermittent, and the face becomes cyanosed he should be taken out of the bath.

The bath is generally continued for from ten to fifteen minutes. Take the pulse frequently. If com-
presses are used on the head, instead of an ice-cap, change them every two or three minutes.

In lifting the patient out of the bath, hold the stretcher above the tub for a few seconds to drain off the water before placing the patient on the bed. Then, roll a warm sheet around him, dry him well, by rubbing over the sheet, take out the stretcher poles, roll the stretcher, rubber, and binder from under him at the same time, place the hot-water bag at his feet, cover him with a thin blanket and sheet, the former being next him, and rub with alcohol. As soon as possible, give him a hot drink.

In cases where it is impossible or undesirable to give tub baths, cold sponge-baths, slush baths, alcohol baths, or cold packs are substituted.

Cold Sponge-Baths.—In general, the same preparations are made for giving a sponge bath as for giving the tub bath; but cotton need not be put in the patient's ears, and the water should be brought to the bedside in a foot tub instead of in a portable tub. A large sponge should be used. A sponge of Turkish towelling, gauze or old counterpane, is preferable to a sea sponge. Such a sponge provides a certain amount of friction. Furthermore it can more easily be reserved for an individual patient and can be changed oftener. Be careful, however, not to let its ends drag over the patient. If a sea sponge is employed, it should be soaked daily in a disinfectant.

Protect the bed, from its head to its foot, with two rubbers, putting a muslin sheet between them. Pin a binder around the loins. Leave the rest of the patient exposed during the bath, in order to obtain

1 These are left on until reaction has taken place and chilly sensations cease.
a greater radiation of heat. Place a hot-water bag at his feet, and cold compresses on his head. When practicable, this bath should be given by two nurses, since continuous friction may then be secured. It is quite possible, however, for one nurse to give it, and give it well by rubbing with one hand and sponging with the other. While sponging, keep the sponge full of water and take long, downward, sweeping strokes, squeezing the water from the sponge at the same time. Mop this water up constantly with the sponge and squeeze it back into the tub. Counteract the rise in the temperature of the water in the tub, occasioned by the introduction of the water from the sponge, by constantly adding ice to the former.

During the first half of the bath time, bathe and rub the patient anteriorly. Then, turn him and bathe and rub the back. Before restoring him to his original position, mop up well the water on the top rubber, take out this rubber and the binder, roll the patient in a sheet, and give light friction until all moisture has been absorbed. The rest of the treatment is the same as in the bath tub.

Slush Baths.—For a slush bath, protect the bed in the same way as for the sponge bath. The top rubber, however, should be long enough to extend into a pail placed on the floor at the foot of the bed. If it is not, make it the required length by the addition of a second rubber, sliding it up three or four inches under the first. Raise the rubbers on both sides by placing under them pillows which have been folded and tied,¹ thus forming a trough. Elevate the head of the bed to aid further in the drainage.

¹ In the absence of sufficient pillows, blankets which have been rolled and tied can be used instead.
There are two methods of giving slush baths. One method is to proceed as in the sponge bath, only using more water and not mopping it out so constantly. The other method is to place a tub, or large pail of water, on a stand, two or three feet higher than the bed, and to use a shower, or ordinary rubber tubing with a sprinkler attached, to convey the water. Move the sprinkler back and forth, holding it a couple of feet above the patient, that the water may fall with some force. Rub the patient and proceed in all respects as in the sponge bath. When no shower or sprinkler can be obtained, pour the water from a watering can or pitcher.

Hot Baths and Packs

The most frequent uses of hot baths and packs are to induce perspiration and relax spasms. Their employment for the latter purpose is due to the fact that heat relaxes muscular tension.

Baths to Relax Spasms.—Baths to relax spasms must be very hot, 112° to 118° F. Apply cold to the head, as soon as the patient is put in the bath, or vertigo and fainting may result from the dilatation, and consequent congestion, by the heat, of the cerebral blood-vessels. Watch the pulse very carefully, for the high degree of heat has a depressing effect upon the heart. Mustard is often added to these baths for its counter-irritant effect, though this, on account of the heat of the water, will be slight (see Mustard, Chapter X). If there are no bad results, the patient is kept in the bath from twenty to thirty minutes, unless the spasms cease sooner. On taking him out, roll him in a blanket. Keep the cold application on his head for some time.
**Baths to Induce Perspiration.**—Baths to induce perspiration need not be so hot. A temperature of \(105^\circ\) to \(110^\circ\) F. is sufficient.

**Hot Packs.**—The hot pack is often used, especially for adults, in preference to the bath. To give the hot pack: Cover the patient with a blanket, folding down the upper bed-clothes to the foot of the bed. Slip two blankets with a rubber between them under him. These must extend from the head to the feet. Put an ice-cap or an ice compress on his head, changing the latter every two minutes. Line a foot tub with a large rubber sheet—rubber side upward. Put in the tub hot-water bags—four, if possible. Soak two small blankets—one of which is kept doubled—in water \(150^\circ\) F., leaving out two ends to hold while twisting. Wring the blankets quite dry, put them in the tub with the hot-water bags, and cover with the ends of the rubber sheet in order that they may be kept hot while being taken to the bedside. Slip the doubled blanket under the patient. Stretch the other blanket over his chest and around his arms and legs, without exposing him, and tuck it snugly around him, especially at the neck. Place one of the hot-water bags at his feet, one under his knees, and one in each axilla, and cover all with the rubber which has been lining the tub. Draw up the ends of the under blankets and rubber tightly around the

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1 Stone bottles make excellent substitutes for hot-water bottles. Even glass bottles can be used. To fill the glass bottles, stand them in warm water to avoid breaking. Stockings will make good hot water-bottle covers.

2 Exposure is avoided by working under the blanket which covers the patient.

3 Never put the hot-water bags next to the wet blanket.
patient, tuck them in, and pull up the bed-clothes. Take the pulse frequently, at the temporal artery. Encourage the patient to drink copiously—hot drinks, seltzer, or vichy. After twenty to thirty minutes remove the wet blankets and rubbers, and roll the dry blankets tightly around the patient. Let him remain thus for an hour, keeping the ice-cap on his head and the hot-water bag at his feet. At the end of the hour, give him an alcohol rub and remove the blanket. Rubbing the body with alcohol, under such circumstances, energises the nerve centres and transforms the passive activity of the skin into active vascular excitability.

Hot packs are frequently ordered when the kidneys are not working properly. The profuse perspiration they induce eliminates through the skin a certain amount of the waste matter, which is poisoning the system, because it is not being secreted by the kidneys, as it should be. The heat also causes an increased oxidation of proteid waste and stimulates the kidneys, as is evidenced by the increased amount of urin often voided after the pack.

Modified Hot Packs.—Modified hot packs are sometimes given in connection with diaphoretic drugs: to further their action. To apply such a pack, remove the patient’s nightgown, roll him in a hot, dry blanket, place hot-water bags at his feet and along his sides, and cover him with a rubber sheet tucking it firmly under the mattress. Leave him thus for half an hour, an hour, or longer, if necessary.

Hot Air and Vapour Baths

Hot air and vapour baths are frequent substitutes
for the pack. To give a hot-air bath in bed, the following articles will be needed:

An ice-cap.
A hot-water bag and cover.
Three blankets.
Two large rubber blankets.
Bed cradles, the number depending on their size.
A bath-thermometer.
A hot-air pipe and support.
Asbestos to put around the top of the pipe.
A Bunsen burner or alcohol lamp.
Hot drinks.

For a vapour bath, a croup kettle will be needed instead of the hot-air pipe, and a gas or large alcohol stove will be better than a Bunsen burner.

In a private house, the elbow of a stovepipe five or six inches in diameter can be substituted for the hot-air pipe, and an old screen, clothes-horse, or wooden chairs, for the bed cradle.

METHOD OF GIVING BATH.—Cover the patient with a blanket. Fold down and remove the top bed-clothes. Put a sufficient number of bed cradles over him to extend from his neck to his feet and cover these with a rubber. Draw out the blanket covering him and pass it up over the cradle under the rubber. Take off his nightgown, put the ice-cap on his head and the hot-water bag—covered—at his feet, wrapping the latter in a portion of the blanket on which he is lying.¹ Hang the atmospheric thermometer on the cradle at the top. Draw the ends of the rubber and blanket, which are under the patient, up over the cradle, under the rubber and blankets

¹The steam or hot air comes in almost directly over the feet.
covering it. Tuck in the latter under the patient on both sides and around the shoulders and neck. At the bottom, tuck them in under the mattress folding them around the air pipe. Put the top end of the air pipe in under the cradle three or four inches and cover this part of the pipe, and as much more of it as the clothes are likely to touch, with asbestos or old blanket dampened. Tie the pipe to the cradle at least four inches above the feet. See to it that the feet and lower part of the legs are securely covered and apart. Put the bed-clothes over the cradle. Tuck them in only at the foot and treat them there in the same manner as the blanket, taking care that the asbestos protects them from the hot pipe. Put the lamp or burner in the pipe and light it, so regulating it that the temperature inside the cradle will be raised from 150 to 175°F. Give the patient hot drinks or vichy while he is in the bath, and watch his pulse carefully. The bath is generally continued twenty minutes after the stated temperature is reached. The after-treatment is the same as for the pack.

For a vapour bath, the croup kettle filled with water is used instead of the hot-air pipe. If its spout is not sufficiently long to go inside the cradle, attach to it a piece of tin or rubber tubing.

Cabinet Baths.—When the patient is well enough to get out of bed, the cabinet bath is often used. To take this bath, he sits in a cabinet (with a thin blanket wrapped loosely around him) on an old chair under which an open saucepan of water is kept boiling on a gas or alcohol stove.¹ The cabinet is closed in such a fashion that the head is the only

¹ When an alcohol stove is used, it should be placed in a small pail.
part of his body exposed to the outer air. The treatment during and after this bath is the same as for the pack.

**Local Baths**

Local baths are most frequently used for the purpose of reducing inflammation.

The Sitz Bath.—The sitz bath is given for the relief of inflammation or congestion of the pelvic organs or rectum. The heat, by dilating the superficial blood-vessels and relaxing the tension of the muscles, exercises a powerful analgesic effect upon the painful tissue. In the sitz bath, only the thighs and the trunk to the waist line are immersed. To give this bath, fasten a large blanket around both the patient and the tub, and wrap a second blanket around the patient’s feet and legs. The water should be about 110° or 112°F. The duration of the bath is generally from five to ten minutes.

Foot Baths.—Foot baths are used for the reduction of both local and remote inflammation (see Chapter X). To give a foot bath: Fold the bed-clothes up from the foot of the bed to above the patient’s knees, replacing them with a double blanket. Turn part of the doubled blanket over the feet and back under the legs. Flex the knees and place the foot tub, half filled with water 115°F., lengthwise on the bed, between the folds of the blanket. Lift the feet with one hand and, with the other, draw the tub under them. Put them into the water slowly, that

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1 The sitz bath is best given in a tub specially shaped for the purpose.

2 Be careful not to expose the patient while doing this.
they may become gradually accustomed to the high temperature. Fold the blanket around the tub and knees, and bring down the bed-clothes. In about ten minutes add hot water, being careful not to pour it in near the feet. The bath lasts about twenty minutes. Take out the feet in the same manner as you put them in, drying them well, and place a hot-water bag against them.

**Continuous Baths**

Continuous baths, both local and for the entire body, are often used in the treatment of badly suppurating wounds, such as those resulting from burns, etc.

**Local Continuous Baths.**—Tubs made especially for local continuous baths can be bought, but a foot tub can be made to answer the purpose. To give a local continuous bath: Tie a sling of muslin, for the support of the limb, loosely across the tub. Have sufficient of the prescribed solution in the tub to cover the inflamed area. Change this solution frequently and keep it at a uniform temperature. The specially made tubs are provided with taps for the purpose of drawing off the fluid. The foot tub will be emptied most easily by siphonage. To empty by siphonage, attach a funnel to a piece of rubber tubing, fill the funnel with water, put the tubing into the tub, and invert the funnel quickly.

**General Continuous Baths.**—To give a continuous bath for the entire body; Suspend the patient in a hammock made of soft webbing, and put a rubber air-pillow or ring under his head. Have the water come up to his neck and keep it at a uniform tem-
Temperature. Put some slats of wood across the tub and cover them with a blanket and sheet. When it becomes necessary for the patient to use the bed-pan, raise the hammock so that the body will be out of the water. Lift the patient out of the tub twice during the twenty-four hours and change the water. Scrub and disinfect the tub before refilling it.

Medicated Baths

Sulphur Baths.—To prepare a sulphur bath, dissolve sulphate of potassium (twenty grains for every gallon of water) in warm water, 95° F. Sulphur baths must never be given in metal-lined tubs, as sulphur discolours metal.

Bran Baths.—To prepare a bran bath, boil a pound of bran in a bag for twenty minutes, drain off the fluid and add it to the bath water, which should be about 95° F. The bath tub should be half full of water.

Starch Baths.—To prepare a starch bath, dissolve half a pound of starch in cold water, mix this with two quarts of hot water and add it to the bath water, the quantity and temperature of which are the same as for a bran bath.

Bicarbonate of Soda Baths.—The bicarbonate of soda bath is used to allay itching of the skin. To prepare this bath, dissolve bicarbonate of soda in the bath water, allowing eight ounces of soda for every gallon of water.

Sulphur, starch, bran, and bicarbonate of soda baths are all employed in certain skin diseases. The patient lies quietly in the bath for from five to twenty

1 To keep the coverings of the tub out of the water.
minutes at the end of which he is enveloped in a hot sheet and dried gently, by patting—never by rubbing—with hot towels.

Salt Baths.—Salt baths are given for their tonic effects. To prepare a salt bath, dissolve ten to fifteen pounds of sea salt in a tub half full of hot water, allowing it to cool to 65 or 70° F. In giving this bath, rub the patient well while he is in the tub and rub him again briskly with hot towels after he leaves the tub.

Carlsbad and Nauheim Baths.—Artificially prepared salts, for both the Carlsbad and Nauheim baths, which are supposed to have about the same chemical composition as the waters found at the kurs, can be bought in this country. These salts are dissolved in the bath water, which should be about 70° F. The patient lies quietly in the water the required length of time—about three to five minutes the first day, one or two minutes more the next day, and so on till the maximum time of twenty minutes is reached. After one of these baths, the patient should be enveloped in a hot sheet over which friction should be given until all moisture is absorbed. He must not be allowed to exert himself in the least after the bath, and must rest quietly for a full hour.
CHAPTER X
COUNTER-IRRITANTS


Inflammation

INFLAMMATION is a complex morbid process caused by injury, chemical\(^1\) or physical\(^2\) irritation, or bacteria. The nature of it depends on its cause. Its cardinal symptoms are: redness, swelling, heat, pain, and local loss of function. It is characterised further by dilatation and congestion of the blood-vessels of the affected part and by the exudation of the red blood cells, leucocytes, and blood plasma into the tissue.

It is known, according to the character of the exudation, as fibrinous, serous, or purulent. The last-named variety is always associated with suppuration, and is the result of germ invasion.

Repair takes place either by "resolution" or by "suppuration." In "resolution," the exuded ma-

\(^1\) Such as may be produced by corrosive poisons.
\(^2\) Such as may be produced by excessive heat, cold, or electricity.
terial is reabsorbed. In "suppuration," the white corpuscles and cellular tissue become disintegrated, resulting in the formation of pus—a composition of disintegrated cellular tissue, white corpuscles, and blood plasma.

Counter-irritants

When, from any cause, there is inflammation of any of the tissues or organs of the body, an increased amount of blood collects therein.

Counter-irritants are often applied for the relief of this condition, it having been shown, by experiments on animals, that, when the vessels of the skin are dilated by the application of an irritant, those of the subjacent viscera are often reflexly contracted, thereby relieving any congestion and pain\(^1\) that may exist in these viscera.

Counter-irritation may be made either directly over the seat of the inflammation or at a distant part of the body. Thus, a hot foot-bath is given for the relief of pain in the head or abdomen, for colds in the head and for sore throat. Counter-irritation may also be made at a spot known to be connected intimately with the diseased area by nerve-fibres. Thus, in diseases of the eye the blister is sometimes applied at the back of the ear.

There are three varieties of counter-irritants: the rubefacients or reddeners; the epispastics, vesicants, or blisterers; and the caustics or escharotics.

**Rubefacients.**—Great care must be taken in

\(^1\)It is to be understood that this is a reflex nervous action, in no way due to the withdrawal of blood into the dilated vessels of the skin.
using rubefacients not to allow them to blister, as the resulting wounds are often very hard to heal. The rubefacients in general use are: heat, both dry and moist (obtained by the use of hot-water bags, poultices, and fomentations); mustard, turpentine, iodine, ammonia,¹ certain liniments, cupping, and the actual cautery.

Moist heat is more penetrating than dry. It eases pain more quickly and more efficiently than dry heat but it also promotes suppuration by increasing the activity of the leucocytes or white blood corpuscles and softening the tissues. Its continued use, therefore, is contra-indicated, unless the area of inflammation is deeply seated, as in pneumonia, or unless it is desirable to hasten suppuration.

**Hot-Water Bags.**—Water bags, when used for counter-irritation, should be very light and very hot. Hence they should have very little water and no air in them. Their effect upon the skin must be very carefully watched.

**Mustard.**—Mustard, as an external counter-irritant, is employed in baths, foot baths, pastes or sinapisms, and poultices. The chief constituent of mustard is a substance known as sinalbin, which, upon the addition of water, is changed into sulphocyanate of acriny1, a volatile oil with a caustic, irritating action. Heat lessens the irritating property of the acriny1. Therefore, when a strong counter-irritation, dependent solely upon the mustard, is desired (as in a sinapism), the water used in mixing must not exceed 100°F. In a poultice, on the other hand, and, as a rule, in baths and foot baths, heat

¹Ammonia is also used as a vesicant.
is the primary object, and the mustard is added only for the purpose of increasing the irritation in a slight degree.

**Mustard Baths and Foot Baths.**—To prepare a mustard bath or foot bath: Dissolve mustard in hot water in the proportion of two tablespoons full of the former to a gallon of the latter. Stir the mixture well just before giving the bath (see Chapter IX).

**Mustard Sinapisms.**—There are two varieties of mustard sinapisms, (1) the paste, and (2) the leaf.

**Mustard Leaf.**—To prepare a mustard leaf for use dip the leaf in tepid water and fold over the face one thickness of gauze and over the back three or four thicknesses. When the patient is ready for the application of the sinapism carry it to him between the folds of a towel. Apply the side which has only one thickness of gauze to the skin, and lay the towel over it. The sinapism should remain on till the skin is well reddened, which it generally will be in fifteen or twenty minutes. After removing the sinapism, wash the skin with soap and warm water, as any adhering particles of mustard will continue their work, and blisters will result. If the skin is too much irritated, rub on a little vaseline or oil.

**Mustard Paste.**—To make a mustard paste, mix one part mustard with three to six of flour for an adult (ten to twelve for a child), crushing all lumps, and add sufficient tepid water to make the mixture thin enough to be spread on gauze or cheese-cloth. When the patient's skin is tender, it is advisable to add either white of egg, oil, or vaseline, also since any one of these substances will lessen the irritating action of the mustard without detracting from its strength. The paste should be enveloped in gauze
Poultices. — Large poultices are best spread on muslin and covered with gauze or cheese-cloth. Small poultices can be spread on the thinner material, and should be covered in the same manner as the mustard paste. A poultice should always be covered with a protector of oiled muslin or old flannel in order to keep in the heat, and held firmly in place with a binder or bandage. A poultice for the chest should always be shaped to fit around the neck and armpits.

To Make a Mustard Poultice. — A mustard poultice for an adult should contain one part of mustard to six or eight of flaxseed, and about equal proportions of water and meal. Three cups of water and two and a half of meal will be required for a poultice of ordinary size for the chest or lumbar region.

To Prepare the Poultice. — Mix the flaxseed and mustard together, crushing all lumps. Add them slowly to boiling water, as it boils, stirring the water all the time with a knife or spatula. When the mixture is just thick enough to drop from the spatula remove it from the flame, beat it well, to make it lighter by introducing air, and spread it thickly and evenly, a quarter of an inch thick, on muslin or gauze. When spreading it on muslin, leave a two-inch margin all around the poultice to turn back over it. Cover the poultice with a piece of gauze large enough to extend at least three inches beyond it on every side. Fold the margin under, between the muslin and the

1For a child, the proportion should be one part of mustard to ten or twelve of flaxseed.
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protector. Carry the poultice to the bedside rolled in a warmed towel.¹

To Apply a Poultice.—Before applying the poultice, test its temperature by holding it to your face. Put it on slowly, for the patient will be able to stand it hotter, if it is let down a small piece at a time. Cover with a binder, or bandage. When the poultice is for the chest or lumbar region, slip the binder under the back, roll up the nightgown above the seat of application, and cover the latter with a hot towel in which the poultice was rolled. Then slip the poultice under the towel, thus avoiding exposure. Remove the towel before fastening the binder.

A poultice should not be left on longer than one hour, as after that it is not even as warm as the body. After removing it, dry the surface of the skin and, if the skin is very red, apply a little oil or vaseline to allay the irritation. If another poultice is not to be applied immediately cover the spot with a piece of flannel or a pad, made of absorbent cotton quilted between two layers of gauze, the same size and shape as the poultice.

Flaxseed Poultice.—A flaxseed or linseed poultice is made in the same manner as the mustard poultice except that the mustard is omitted.

Digitalis Poultices.—To make a digitalis poultice: Soak digitalis leaves—two ounces to the pint—in warm water, until they are soft, drain off the water and boil them. Then proceed as for an ordinary

¹To spread the poultice a small board or platter can be used, and time will be saved if a towel is first placed upon the board then the oiled muslin, and above that the muslin. When the poultice is finished roll in the towel, and wash all utensils used before leaving to apply the poultice.
linseed poultice. Add the boiled leaves just before spreading the poultice on the muslin.

Digitalis poultices are applied to the lumbar region, in nephritis and other kidney diseases, to stimulate the secretion of urine.

**TURPENTINE AND FOMENTATIONS OR STUPES.**—Turpentine, when used as a counter-irritant, is usually applied as an addition to fomentations (stupes). It is mixed with oil in proportions varying from equal parts of oil and turpentine to four of oil for adults, and one part of turpentine to from six to ten of oil for children. Put this mixture over the prescribed area and apply the stupes. Make as many applications of the turpentine after every two or three stupes, as the skin will bear.

*To Apply Stupes.*—When about to apply stupes, have, if possible, a gas or alcohol stove near the bed, on which to place a dish of boiling water. Get ready: two pieces of thick soft flannel¹ twice the size of the area of application, a towel,² a protector,³ and, if the stupes are for the abdomen, an old blanket with which to cover the trunk. When these articles are all ready, double the stupe flannel and roll it in the wringer. Dip it into the boiling water, and, when the water has penetrated to the centre, remove it and wring it out well by twisting the two dry ends of the towel or wringer in opposite directions. Wring very dry, or the patient will surely be blistered and the bed made damp. Open the towel, take out

¹ An old blanket is best.
² In the hospital, a special crash towel, known as a stupe wringer, is provided.
³ Oiled muslin or oiled paper is the best, but a piece of dry flannel will answer the purpose.
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and shake the flannel quickly (to incorporate air) and pass the doubled fold under the protector. Fold the bed-clothes down to the edge of the blanket which covers the trunk. Slip the protector under the blanket, upon the area of application, and apply and remove the stupes without displacing the blanket—thus saving exposure of the patient.

Stupes, when used to reduce tympanites, are as a rule changed every two or three minutes, during ten or fifteen minutes of the hour. In other cases they are changed every ten or fifteen minutes during several hours. After stupes have been applied, it is well to cover the spot on which they have been placed, as after the application of a poultice, with flannel or a pad made of absorbent cotton.

Fomentations for the Eye.—When applying fomentations to the eyes, the pieces of flannel must be of very light weight. For this reason, absorbent cotton or surgeons' lint are often preferred to flannel. When there is any suppuration, the same compress must never be applied twice, neither must both eyes be covered with the same compress. The compresses should be small—about two inches square.

Fomentations of the Breast.—When applying fomentations to the breast, cut a hole in the centre of the flannel for the nipple, as it must never be covered.

Iodine.—Tincture of iodine is frequently employed as a counter-irritant. It is painted on both the skin and the mucous membranes. To apply iodine, use a camel's-hair brush or a swab of cotton rolled round a small stick. Never put the brush into the bottle, but pour a little of the tincture into a medicine glass. Apply either one or two coatings, according to the amount of irritation required, allowing the liquid to
dry between applications. If the irritation proves too severe, wash the surface with alcohol, ammonia, or oil.

Ammonia.—Ammonia is occasionally used as a counter-irritant. Saturate a small piece of linen, gauze, or absorbent cotton with ammonia. Apply to the required spot and cover with oiled muslin, binding the cover on so as to exclude the air. Leave the ammonia application on for about five minutes unless a blister is desired. If a blister is desired leave it on for about ten minutes.

Chloroform.—Chloroform is sometimes used in the same manner.

Liniments.—There are many liniments, containing irritating substances, which are frequently used as counter-irritants, to allay muscular pain. The majority of these are applied by being well rubbed in with the hand. The part should first be washed with hot water, in order to remove all secretions from the skin and increase the blood circulation in that part, thereby hastening absorption.

Guaiacol and Glycerin.—A mixture of guaiacol and glycerin is painted on with a camel’s-hair brush or pledget of cotton. It should be applied very thin, as it blisters easily. After the application the part should be covered with gauze or absorbent cotton and bandaged.

Cupping. There are two kinds of cupping, wet and dry.

Dry Cupping.—Dry cupping is usually employed. In the hospital glasses with rimmed edges, specially fabricated for cupping, are generally provided; but almost any small glasses\(^1\) will answer the purpose.

\(^1\)About six glasses are required.
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The requisites for cupping, in addition to the glasses, are: Matches, a glass containing alcohol, a spirit lamp, a metal rod with a swab of cotton rolled around the top, extra cotton, an extra glass in which to throw the charred swabs, a piece of gauze or soft towel, and a blanket. Before beginning the cupping, double this blanket and put it, open end to the top, under the patient's head and back, fold one end over his hair and turn back the spread and upper sheet leaving the bed blanket exposed. The patient being thus surrounded with the blanket, the danger of fire is minimised. As a further precaution against fire, the lamp should stand between the patient and the alcohol. To do the cupping: Dip the swab in the alcohol, ignite it in the flame of the lamp, hold it in the glass for a few seconds—till the heat has expanded and driven off the air—then place the glass quickly on the flat surface of the body, bony prominences being avoided. Repeat this procedure till the prescribed area is covered with glasses. The tissue under the glasses is drawn up to fill the vacuum made by the expulsion of the air. Watch the tissue under it and as soon as it becomes a deep red,\(^1\) remove the glass by inserting one finger under the rim. Never pull a glass off without inserting the finger, as to do so causes unnecessary pain. Wipe the glass with a gauze compress or a soft towel before reapplying. Never put a glass in the rim left by a former one. In order not to burn the patient, take care not to get on the swab enough alcohol to drip, not to have the edges of the glasses too hot, and not to use

\(^1\) If the glass be left on too long till the capillaries become congested the object of the cupping is defeated.
a swab till it becomes charred, since the charred ends are likely to fall off. Always stand facing your patient while cupping, that you may observe any change in his condition.

Cupping is generally continued for ten to fifteen minutes at a time. It is principally employed for the relief of dyspnœa, œdema of the lungs, and congestion of the kidneys.

*Wet Cupping.*—Before wet cupping is begun the surface to be cupped is shaved and washed with green soap, alcohol, ether, and bichloride, and the doctor makes four or five incisions with a scarificator or a scalpel. The cups are placed over these cuts, and a small amount of blood is drawn from them. After the removal of the cups, the surface is washed with salt solution or sterile water, and a dressing of sterile gauze is applied. In other respects, the procedure is the same as for dry cupping.

**The Actual Cautery.**—Cauterising is the application of heated metal to some part of the body. Pacquelin's thermo-cautery is the instrument generally used in the hospital for this purpose. The newest style consists of a hollow platinum tip that screws into a metal tube, on the end of which rubber tubing (provided with two bulbs, one of soft rubber covered with netting, to prevent its too free expansion, and another of harder rubber) is fitted. When the thermo-cautery is about to be used a small sponge which is in the metal tube is soaked with benzine. The platinum tip is then held in a flame, and the hard rubber bulb is squeezed till the tip becomes red. It may be kept hot till needed by gently squeezing the bulb at short intervals.

Be careful not to let the platinum tip come in
contact with anything while it is hot, for not only will it burn whatever it touches but it will itself easily become dented and spoiled. If there are any particles of tissues, adhering to it, after use, they must be burned off, by bringing it to a white heat. *Never* cool it by putting it in water.

The cautery is used as an escharotic, notably to control hæmorrhage,¹ and to counteract the effect of stings of poisonous insects, the bites of mad animals, etc. It is also used for the relief of pain in torticollis, lumbago, and other forms of muscular rheumatism. When used for the last-named purpose, however, the implement is not, as a rule, allowed to touch the body, but is passed quickly too and fro near the surface of the skin, till the skin is well reddened.

A flat iron is sometimes substituted for the cautery for the relief of pain in lumbago, etc. A thick piece of brown paper is placed upon the part of the body affected, and the iron is passed lightly to and fro over this, until the skin is well reddened.

**Vesicants.**—Vesicants are used when a prolonged irritation is desired, and to cause the absorption or removal of inflammatory deposits after true inflammation has ceased.

**Cantharides.**—Cantharides² is the usual vesicant. It is employed either in the form of a plaster or of a solution of cantharides powder in collodion.

A definite order regarding the area to be covered should be obtained from the doctor. This area should seldom exceed three inches square. Otherwise, not only will the resulting sore be unnecessarily large, but too much cantharides may be absorbed into the

¹ In certain abdominal operations, for example.
² See *Materia Medica*.
system and an acute nephritis or strangury ensue, cantharides having a very irritative effect on the kidneys. For this reason, the urine should be watched and measured for twenty-four hours after its use.

Before applying cantharides, prepare the skin by shaving and by washing with water and green soap, and alcohol, bichloride or other disinfectant.

Application of the Plaster.—When the plaster is used, lay it on the skin and hold it in place with a bandage. Never use adhesive plaster nor put the bandage on tightly, or there will not be sufficient space for the blister to rise, and unnecessary pain will be caused.

If the plaster is not perfectly fresh, oil its surface before applying.

Never apply a plaster over broken or abraided skin. The average time required for the blister to rise is four to eight hours. Even if it has not formed at the end of this time, remove the plaster and apply a hot poultice. The heat of the poultice will generally bring about the desired result.

Removal of the Plaster.—In taking off the plaster, be careful not to tear the skin. Clean off any adherent particles by washing gently with oil. Unless it is desirable to have the liquid reabsorbed, make a puncture in the bulb at its lower edge with a pair of sterile scissors, and hold a piece of sterile gauze or absorbent cotton so that it will catch the escaping liquid. Apply a dressing of boric acid ointment or oxide of zinc spread on lint or gauze. The wound is generally dressed every day, the dead skin being taken off as it loosens. If aseptic precautions are taken, the wound will heal without the formation of pus, and will leave no scar.
**Cantharidal Collodion.**—When cantharidal collodion is to be applied, prepare the surface as for the plaster and outline with oil the space to be painted, in order to prevent the spreading of the vesicant. Cover the prescribed surface with one layer of collodion (a camel's-hair brush is the best applicator), and this in its turn with a piece of lint or gauze and oiled muslin or rubber tissue. Treat the resulting blister in the same manner as that from the plaster.

**Local Applications other than Counter-Irritants**

**The Local Application of Cold.**—The local application of cold is in many cases of inflammation a valuable substitute for counter-irritants. Unlike moist heat, it retards instead of accelerating suppuration, and its action is more penetrating than that of dry heat. Cold is applied locally with two objects in view: (1) to cause localised contraction of the blood-vessels, thus relieving congestion; and (2) to anaesthetise or benumb the nerve-fibre.

**Instruments for the Application of Cold.**—The most common instruments for the local application of cold are ice poultries, ice-caps, ice coils, and ice compresses.

**Ice Poultries.**—To make an ice poultice: Cut two pieces of oiled muslin the required shape and size, place them together and turn over the edges about an eighth of an inch all round. Bind with adhesive plaster leaving unbound a small section at the top till the ice has been put in. Fasten the corners securely, strengthening them with extra pieces of adhesive plaster. Mix the ice after breaking it into pieces the size of a walnut, with one-third as much flaxseed or bran, which will absorb the water as the
ice melts, and with a small amount of salt, which will intensify the cold.

Cover the poultice with gauze before applying, and hold it in place either with a binder or a four-tailed bandage, as the position requires.

Ice-Caps.—These are bags of india-rubber. There are various shapes, long narrow ones for the neck and spine, helmet-shaped for the head, round and oval ones of varying sizes which can be used for any part of the body. Bladders, which can be bought at any butcher shop can be used as a substitute.

To fill an ice-cap: Break the ice into pieces about the size of a walnut. Expel the air from the cap by rolling up its ends, and fill it only half full of ice. Cover it with gauze or other protector, squeezing it above the ice before putting on the cover. The weight of the cap often irritates the patient, and, when such is the case, the nurse must improvise some way of suspending it above the required spot, so that it will barely rest there. After use, dry the cap well, and put it away with a piece of gauze or cotton in the bottom. This is done to prevent the sides from sticking together.

Ice Coils.—Ice coils are coils of rubber tubing a quarter of an inch in diameter, held in a circle by means of rows of tape. There are two loose ends which make the tubing act as a siphon. To use the coil, attach the end coming from the centre to a special tank, or, in the absence of tank, put it into a pan of ice water placed about three feet higher than the patient and let the other end fall into an empty slop jar at the side of the bed. To start siphonage from the pan of water, fit a funnel into the upper end of the tubing, fill this funnel with water,
and, before it has all run through, turn the funnel quickly into the pan of water. The regular tanks have faucets at their lower edge, to which the tubing fits, and siphonage starts naturally.

Before applying the coil, wrap it in a piece of gauze.

The ice in the tank or pan should always be wrapped in doubled gauze or old muslin, to prevent foreign particles from entering and obstructing the tubing.

Compresses for the Head.—A common way of applying cold to the head is by means of ice compresses. To make an ice compress: Fold two pieces of gauze, half a yard square, or old handkerchiefs, so that they will not be wide enough to wet the hair or come down over the eyes, nor long enough to wet the pillow. Turn in the raw edges, that threads may not annoy the patient. Place a block of ice, with a very little water, in a small basin, wring out the gauze in the water, and spread it over the ice till cold. One compress should always be kept on the ice while the other is on the head.

Compresses for the Eye.—A compress for the eye should be made of a piece of lint, or three or four thicknesses of gauze, cut a little larger than the eye. They must never come over the bridge of the nose. If compresses are ordered for both eyes, a separate one should be prepared for each. When there is any discharge from the eye, the same compress must never be used twice, and a proper receptacle must be at hand into which to throw the discarded compresses.

Antiphlogistine.—Antiphlogistine, as its name implies, is an antiphlogistic. Its composition—beyond the fact that it is a variety of Denver mud with certain medicinal ingredients incorporated—is unknown, except to the compounder. To use
antiphlogistine, spread it about a quarter of an inch thick on a piece of old muslin of the required size, placed on a tray or plate, and put in a warm oven or under the flame of a gas-stove, till the surface of the antiphlogistine is heated. Apply and leave on for several hours. Wash the skin with soap and warm water after removing.

**Starch Poultices.**—Starch poultices are often used in skin diseases. To prepare a starch poultice, mix the starch with a little cold water, then add enough boiling water to make a thick paste, boil for a couple of minutes and spread the paste. Apply the starch poultice in the same manner as the mustard sinapism.

**Ointments.**—Ointments are applied either spread on lint or muslin and kept in place by a bandage, or by inunction. The former method is adopted when the skin is broken. When the latter method is employed, wash the skin first with hot water, to soften it and make absorption quicker, and rub the ointment in with the heel of the hand, rather than with the fingers. If mercurial ointment is used, protect the hand with a rubber glove, or you may become salivated. Furthermore, as there is generally a suspicion of syphilis, when mercurial inunction is ordered, it is well to take every precaution against infection.

**Leeches.**—Leeches are not now employed as much as formerly, but they are resorted to occasionally, especially to relieve congestion around the eye and ear, and from the os uteri.

Leeches can abstract as much as half an ounce of blood at a time. They should never be placed over large blood-vessels, but rather over bony surfaces, where pressure can easily be made in case of hæmor-
rhage. To apply a leech, first wash the skin with soap and water, and dry it well. Place the leech in a small glass test-tube, or bottle, with its head to the opening, and invert the glass over the required spot. If the leech does not take hold readily, prick the spot with a needle to draw a drop of blood, or stroke its back with a dry towel. When the leech is full, it will drop off. If it is necessary to take it off sooner, sprinkle a little salt on its tail. Do not force it off, or its teeth may be left in the wound and serious inflammation result. After the removal of the leech, the bleeding can be increased, if necessary, by the application of hot poultices, or can be checked by pressure over the wound, by the application of ice, or by touching with nitrate of silver.

Leeches should be kept in a jar of water with a little sand in the bottom till needed for use. The jar should have a perforated cover. After use, the leeches should be burned.
CHAPTER XI

THE URINE


The urinary organs are among the most important secretory and excretory organs of the body. They are the kidneys, the ureters, the bladder, and the urethra. The kidneys secrete a considerable portion of the waste matter of the body and discharge it, in the form of urine, through the ureters into the bladder, whence it is periodically expelled through the urethra. Urine is secreted from the blood in two ways; by transudation, and by the secretory action of the cells lining the uriniferous tubules.

Urine is a very complex substance. It contains some forty parts of solid matter held in solution in nine hundred and sixty parts of water. Some of its principal constituents are: urea, uric acid, kreatinin, pigments, fat, sulphuric acid, phosphoric acid, chlor-
The Urine

The Urine

Urine, ammonia, potassium, sodium, calcium, magnesium, phosphates, aromatic substances (such as hippuric acid, indoxyl, and skatoxyl), and two gases (nitrogen and carbonic acid).

Normal Urine

Normal urine is a yellowish or light amber liquid having a characteristic odour, a slightly acid reaction, and a specific gravity of 1012 to 1030, 1020 being the average. The specific gravity indicates the relative proportion of solid matter in the urine. The urinometer is the name of the instrument used for testing the weight of the urine. To test: Fill a test-tube or urinometer glass three-fourths full of urine. Put the urinometer in the glass, making it touch the bottom. Release it and wait till it finds the correct level. The scale should be read through the liquid from below upward. The last mark below the surface will be the correct specific gravity. The urine must always be cold when tested.

Quantity.—The ordinary capacity of the bladder is about one pint. The average amount of urine voided during the twenty-four hours, by a healthy adult, is from forty to fifty ounces; by a child of two to five years, fifteen to twenty-five ounces; five to nine years, twenty-five to thirty-five ounces; nine to fourteen years, thirty-five to forty ounces. Causes likely to diminish the quantity of urine are: the consumption of a small amount of liquids, free perspiration, high fever, diarrhoea, vomiting, hyperæmia, most cases of nephritis, and the approach of death

1 By specific gravity is meant its weight as compared with distilled water at 60°F. the water weighing 1000.
in all diseases. Causes likely to increase the quantity of urine are: the consumption of a large amount of liquids, nervousness, hysteria, diabetes mellitus, diabetes insipidus, convalescence from acute diseases in general, convalescence from some cases of nephritis and the action of diuretics.

Oliguria.—Oliguria signifies the voiding of only a small amount of urine.

Polyuria.—Polyuria signifies the excretion of a large amount of urine.

Retention.—In retention, the urine is secreted by the kidneys; but, owing to some obstruction in the urethra or neck of the bladder, paralysis of the bladder, nervous contraction of the urethra, or dulling of the senses so that there is no desire to pass urine, it is not expelled from the bladder.

Retention with Overflow.—By retention with overflow is meant over-distention of the bladder in conjunction with either incontinence or the constant voiding of small quantities of urine. Other symptoms are pain and the emission of a dull sound, when percussion is applied over the bladder. If there is much distention, the outline of the bladder can usually be distinctly felt. Such a condition should always be reported to the doctor, catheterisation being indicated.

Suppression and Anuria.—Suppression and anuria are terms applied to cases in which the kidneys fail to secrete urine. Anuria is highly dangerous to life, as toxic poisoning will ensue, unless it is quickly relieved.

Colour.—The conditions causing variations in the quantity of urine are also likely to change its colour. When its secretion is diminished, it is generally
highly coloured, the amount of solids being comparatively large. When its secretion is abnormally increased, it will be a pale straw colour. Diabetes mellitus is a notable exception to this rule. In this disease, owing to the presence of sugar, the urine is always highly coloured.

The colour of urine is also changed by: (1) Certain drugs. Over-dosing by iodoform, carbolic acid, and other coal-tar derivatives, such as salol and guaiacol, is always marked by dark smoky urine. Rhubarb and senna give a reddish-yellow colour, and santonin, a brilliant yellow. (2) The presence of decomposed blood pigment, which will render it dark and smoky. (3) The presence of bile pigment, which gives a greenish tinge, the colour becoming deeper as the urine stands. (4) The presence of chyle, which gives it a milky appearance due to finely divided fat, fibrin and albumin. Chyluria is a symptom of Filariasis, a parasitic disease occurring chiefly in tropical countries. (5) The presence in excess of many of its normal constituents. (6) The presence of bacteria, which cause a marked turbidity, especially in alkaline urine. (7) The presence of pus, which invariably makes it turbid. (8) Alkaline decomposition, which also makes it turbid.

Odour.—As the quantity and colour of urine are variable, both in health and disease, so also is the odour. Normally, urine, when first voided, has only a slight, aromatic odour, due to the presence of certain volatile acids. On standing, the odour becomes ammoniacal, owing to the rapid decomposition of urine when exposed to the air. If urine has an ammoniacal odour when first passed, it shows that it has decomposed within the body.
An odour of sulphurated hydrogen may accompany the evacuation of an intestinal abscess into the urinary tract.

The odour of urine is also changed by the ingestion of certain drugs and vegetable substances. Turpentine imparts an odour of violets. Asparagus, copaiba, sandalwood oil, cubebs, and tolu, all give their specific odour.

Reacction of Urine.—The normal reaction of urine is acid; but it will become temporarily alkaline after a hearty meal has been taken or after it has stood some time, especially in a warm atmosphere. This alkalinity is due to the presence of ammonia, as a product of fermentation, and must be distinguished from the alkalinity due to the fixed alkalies of potash or soda.

To determine the reaction of urine, test it with litmus paper. If it is acid, it will turn blue litmus paper, red. If it is alkaline, it will turn red paper, blue; but if the alkalinity is due to the presence of ammonia, the paper will shortly resume its red hue.

Urea.—Urea is the chief organic substance of the urine, constituting one-half of the total amount of solids therein. It is the principal component of the nitrogenous waste of the body, and, when its elimination fails to take place, its accumulation in the system leads to toxic poisoning and death. Though eliminated by the kidneys, the urea is formed chiefly in the liver and, probably, to some extent, in the spleen, lymphatic and secreting glands.

The amount of urea in the urine is increased by strenuous exercise,¹ hot baths, proteid food, fever in its early stages,² and a few other diseases.

¹ The last two increase metabolism.
² The last three increase tissue waste.
The quantity of urea is diminished by a small consumption of proteid food, free perspiration, the continued drinking of large quantities of water, excessive vomiting, diarrhoea, and by many diseases, especially those that involve the kidneys.

To Detect Urea.—The presence of urea may be detected in several ways, of which two of the simplest are the following:

1. Place a drop of urine on a glass slide, add a drop of pure nitric acid, and allow the mixture to evaporate. If urea be present, crystals of nitrate of urea will be visible under the microscope.

2. To a drop of urine, add a drop of saturated solution of oxalic acid. If urea be present, crystals of oxalate of urea will be visible under the microscope.

Uric Acid.—Uric acid is, next to urea, the medium by which the largest quantity of nitrogen is excreted from the body. It was formerly considered that uric acid was an intermediate product between the nitrogenous substance and urea; but it is now believed that it is formed in the body from nucleic acid, which is the product of the oxidation of a certain complex constituent of proteid food known as nuclein.

Uric acid is not usually found in its free state in normal urine, but in combination with potassium, sodium, ammonium, etc. Such combinations are known as urates. The reddish deposit often seen in urine, after standing, is due, as a rule, to these urates. The presence of this deposit does not necessarily mean an excess of uric acid. It may be due solely to a high degree of concentration, or a marked acidity of the urine.

Uric acid is increased by an abundant nucleo-proteid diet; by most of the acute diseases, especially
pneumonia, and other diseases affecting the lungs; by diseases of the liver and spleen; by certain forms of anaemia; and by gout, rheumatism, and diabetes mellitus. It is diminished by a non-nitrogenous diet; by the drinking of large quantities of water; by the majority of chronic diseases; and by all kidney diseases in their advanced stages.

When it is in excess, it occurs in crystals, and these crystals often serve as a nucleus for urinary calculi.

Test for Urates.—To test for urates pour a small quantity of nitric acid into a test-tube. Add an equal amount of urine, pouring it in gently, so that it will not mix with, but just lie on top of the acid. If a white ring appears at the point of contact, either albumin or an excess of urates is present. To determine which, boil the mixture for a few seconds. If the precipitate is due to urates, it will disappear; but if to albumin, it will increase.

Crystals.—Other crystals present in urine are oxalate of lime, cystin, phosphates, ammonia, and magnesium—the last three in alkaline urine only. They are precipitated by heat, but will disappear on the addition of acid.

Epithelium.—Epithelial cells from the entire urinary tract are usually present in both normal and abnormal urine, these cells being but the product of the normal waste of the mucous membrane. The cells are classified and their origin determined principally by their shape.

Pathologic Constituents of Urinary Sediment

Albumin.—Albuminuria, the presence of albumin in the urine, must always be regarded with suspicion, but it does not necessarily indicate renal disease.
The Urine

It is a frequent complication of many febrile diseases, and of pressure on abdominal walls, from tumours or a pregnant uterus. Albuminuria of this sort, with proper care and treatment, will probably disappear after convalescence.

The most frequent causes of albuminuria are:
1. Inflammatory or degenerative changes in the kidney structure, which, on account of its abnormal state, allows the albumin to transude.
2. Abnormal changes in the quality of the blood entering the kidneys, which renders its serous albumin more diffusible.
3. Alteration in the blood pressure in the kidneys.
4. Diseases of the urinary tract below the kidneys.

Heat Test for Albumin.—To test for albumin: First, filter the urine. Then, fill a test-tube to one-third of its depth, and, if the urine is not acid, render it so by adding two or three drops of 10% acetic acid. Finally, boil it for a minute, holding the test-tube so that the upper part of the urine will boil first. Any opacity appearing will be due either to albumin or to earthy phosphates. If it is due to the latter, it will disappear on the addition of two or three drops of acetic or nitric acid; but, if to the former, the presence of the acid will cause the albumin to be further precipitated.

Bacteria.—Normal urine, while in the body, is sterile; but it becomes contaminated in its passage through the urethra, that passage, especially around the meatus, being seldom absolutely free from germs, though many of them are non-pathogenic. This fact makes it necessary to resort to catheterisation, when a specimen of urine is to be examined for any specific bacteria. The germs of tuberculosis, typhoid
fever, erysipelas, ulcerative endocarditis, glanders, and septic processes are all found in the urine of patients suffering from these diseases.

**Bile.**—Urine containing more than a minute trace of bile is always abnormal in colour, varying from a yellow brown to nearly a pure green. Bile pigment occurs in urine in all cases of jaundice due to obstruction of the passage of the bile through its proper channel, its constituents being then secreted by the blood and eliminated through the kidneys.

**Blood.**—Blood in the urine—haematuria—always indicates a diseased condition of some portion of the urinary tract. The most frequent causes are: advanced stages of both acute and chronic nephritis, active hyperæmia, tuberculosis of the kidney or bladder, pathogenic growths, urinary calculi, purpura hæmorrhagica, trauma involving the urinary organs, and overdoses of certain drugs, such as cantharides, turpentine, etc.

**Glucose.**—Glucose is often found in normal urine after a large quantity of saccharine food has been taken. It is also occasionally present, for a short time, after recovery from febrile diseases, and may occur during pregnancy, after injury to the head, etc. When the presence of glucose is only temporary, the condition is known as glycosuria; when persistent, it is known as diabetes mellitus.

Diabetes often complicates diseases of the pancreas and, in such cases, is supposed to be caused by the prevention of the formation of the glycolytic ferment; but the exact causes and nature of diabetes mellitus are as yet unknown.

**Fehling's Test for Glucose.**—To test for glucose with Fehling's solution, add to the solution, drop by
The Urine

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drop, an equal amount of urine. If sugar is present, an orange precipitate will appear. Fehling's solution consists of equal parts of sulphate of copper and tartrate of sodium, and, as it is easily decomposed, it is well to test it before adding the urine. To do this, dilute it with five times its bulk of water and boil; the appearance of any precipitate shows that the solution is worthless.

THE FERMENTATION TEST FOR GLUCOSE.—To apply the fermentation test for glucose, place a small piece of ordinary baker's yeast in a test-tube full of urine, and invert the tube (covering the opening with the thumb to prevent the escape of the liquid) on a plate of mercury. If any sugar is present, fermentation will take place, causing carbonic acid gas to accumulate in the upper part of the tube, displacing the urine.

Hæmoglobinuria.—Hæmoglobinuria is characterised by the presence of blood pigment—derived from the hæmoglobin of the red blood cells—in the urine.

Pus.—A few pus cells, or leucocytes may be found in the sediment of normal urine, but when they are present in any quantity, a pathogenic condition, such as chronic suppuration in the tubules, abscess of kidney, chronic pyelitis, or urethritis, is indicated. In the female, the pus may be from the uterus or vagina; this can be determined by obtaining a catheterised specimen.

Renal or Tube Casts.—There are several theories regarding the origin of renal or tube casts: (1) That they are the solidified coagulable elements of the blood, which, owing to a diseased condition of the renal tubules, have penetrated into them and, have afterward been expelled in the urine. (2) That they
are solidified secretions of the epithelial lining of the renal tubules. (3) That they are the result of the disintegration of the renal cells.

**Urinary Calculi.**—Urinary calculi consist of deposits of solid matter that have been precipitated from the urine. They may form in any part of the urinary tract, from the tubules of the kidneys to the meatus urinarius. The most frequent causes of their formation are changes in the reaction of urine,\(^1\) the secretion of a smaller amount of water, and an increase in the less soluble constituents of the urine. They vary greatly in size, shape, and composition, the size and shape depending largely on their composition and on their location.

**The Collection and Care of Urine Specimens for Analysis**

As food causes many temporary changes in urine, that voided in the morning, before food is taken, is best for analysis.

It is a rule in the majority of hospitals that a specimen of urine be sent to the laboratory the morning after a patient has been admitted to the ward, and the morning before and after an operation. The reason for the specimen on entering is twofold: First, diseases of the kidneys often complicate other maladies, and recovery from the renal disturbance may depend on its early recognition and treatment. Secondly, the condition of the urine is often of great diagnostic value. The reason for examination of the specimen before an operation is that, under many conditions of the kidneys, it is unadvisable to give

\(^1\) Abnormally acid and abnormally alkaline urine tend alike to produce calculi.
The Urine

an anaesthetic, owing to its irritating effects. The post-operative specimen is required in order to ascertain if the anaesthetic has had any undesirable influence upon the kidneys.

For such specimens, four or five ounces is all that is generally required. Before taking a specimen, see that the urine glass is perfectly clean. After taking the specimen, tie a paper cover securely over the mouth of the glass and attach to its neck a tag on which you have written the date, the name of the patient, the ward, the hour at which the specimen was obtained, and the reason for taking it, that is whether after the admission of the patient, before or after an operation, or for a special examination.

Sometimes, the whole amount of urine voided during the twenty-four hours is required. In that case, to determine accurately just how much the kidneys are secreting, note the hour the first time the patient voids urine. Throw away that urine, but save all that he passes subsequently until the same hour the next day. A five-pint glass bottle is a convenient receptacle for urine thus collected. The bottle must be perfectly clean, it must stand in a cool place, and must be kept tightly corked, otherwise decomposition will begin before the end of the twenty-four hours. If a sterile specimen is required, sterilise the bottle, either by boiling it for five minutes or by soaking it in bichloride of mercury 1-1000 for twenty minutes, rinse it with sterile water and plug it with sterile non-absorbent cotton (see Chapter II). Sterilise the bed-pan also. When it is not in use, keep it filled with bichloride 1-1000,

1 This bottle can also be made to serve as a measure by marking the ounces on a strip of paper or adhesive plaster.
but rinse it with sterile water before use, as bi-chloride might alter the nature of the urine. With women, it is necessary to use the catheter to obtain a sterile specimen. When a specimen from an infant is desired, bandage a small slim bottle in position to catch the urine when voided, adjusting the diaper firmly so that it will assist in holding the bottle in place.

**Catheterisation**

There is no part of the human body more easily infected than the bladder. Urine decomposes very readily under the influence of bacteria, and, if the latter are introduced into the bladder, the former will further their growth and development, thus starting an inflammation of the mucous lining of the bladder. This inflammation causes a disease which is known as cystitis. Unsterile catheterisation is a channel by which germs frequently find entrance to the bladder. Hence, the greatest care must be exercised, when catheterising, to have everything used in the operation perfectly sterile.

**Preparation for Catheterisation.**—When about to perform catheterisation always have ready two catheters, in case one should be rendered unfit for use by touching an unsterile surface. Glass catheters are preferable for women, being easier to keep clean. To prepare the catheters, cleanse them thoroughly with soap and water, and then boil them for five minutes in a dish kept specially for the purpose. Examine them carefully to be sure they are intact, take them both to the bedside in the same water and basin, placing the basin on a tray and covering it and the tray with a sterile towel. In the centre of the towel, put a sterile dish containing 2% boric acid,
four sterile gauze sponges, and, when a rubber or silk\(^1\) catheter is used, some sterile oil with which to lubricate it before inserting, covering the dish with the unused end of the towel. Leave uncovered a corner of the tray, on which to put the kidney basin, intended for the reception of the sponges after use. Cover the patient with a sheet, or, if necessary, with both a sheet and a small blanket and fold the bedclothes neatly at the foot of the bed. If the patient is a woman put her on the douche or bed pan, flex and part her knees, drape the lower end of the sheet around her legs, gathering it up in the centre to expose the vulva only. Then wash and disinfect your hands with as much care as though preparing for a surgical dressing.

**Manner of Using the Catheter.**—To catheterise, separate the labia with the thumb and first finger of the left hand. Wash the region around the meatus urinarius\(^2\) very carefully, and place a fresh sponge below the meatus so that, if the catheter slip, it will not be rendered unsterile. Be careful, while doing this, to keep your fingers on the sponge, so that they will not come in contact with any unclean surface. Be careful also, while introducing the catheter, not to touch the end which is to be inserted. Never use force in inserting the catheter, since any obstruction will probably be due to a nervous con-

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\(^1\) Rubber and silk catheters are cleansed in the same manner, but the latter should be boiled in corrugated trays, each catheter being placed in a separate division and stretched full length. The water in the steriliser must be just deep enough to cover the catheters, but not to allow them to float.

\(^2\) The meatus urinarius is situated directly above the small prominences at the head of the vagina.
traction of the urethra, caused by its introduction. By waiting a few seconds this will often pass away, and the catheter will enter freely. If it does not, withdraw it slightly and change its course. So soon as the bladder is reached the urine will begin to flow. If it ceases to flow, before a reasonable amount has been passed, turn the instrument slightly or push it, very gently, a little farther into the bladder.

When the bladder is much distended, do not empty it entirely at once, as the sudden collapse of the walls might start a cystitis. Draw off sixteen or twenty ounces and repeat the process in three or four hours.

While withdrawing the catheter, keep a finger over the opening, that the fluid remaining in it may not fall on the bed.

Catheters are cleansed and sterilised after use in the same manner as when being prepared for use.

The use of the catheter, being fraught with so much danger, to the patient, should never be resorted to till various expedients, likely to make her void urine voluntarily, have been tried. Some of these are: the application of hot fomentations or a hot-water bag over the bladder; pouring hot water over the vulva into the bed pan; pouring water from one vessel into another; or, if near the bathroom, allowing the water to run from the faucet. When troubled with difficult micturition, the patient should be encouraged to drink large quantities of water, especially vichy and seltzer.

The doctor should be told if a patient goes longer than ten hours without voiding urine.

A nurse should always note the character of urine before emptying the bed-pan and if there is anything
unusual in its appearance, should save a specimen for the doctor's inspection.

**Passing a Catheter upon a Man.**—It is a rare thing for a nurse to be obliged to pass a catheter upon a man, but she should have some idea how to proceed, in case of emergency.

Always use a rubber catheter.

Raise the penis to an angle of about 60° from the body. Draw back the prepuce. Cleanse the glans with boric acid solution, then wrap a small piece of gauze around the corona. The gauze covers any secretion which may remain and prevents the prepuce from slipping back over the glans. Hold the penis with the second and third finger of the left hand, separate the lips of the meatus with thumb and forefinger and cleanse them. Oil the catheter, and introduce it slowly until an obstruction is met, which will generally occur even in the normal urethra when it has passed in about six inches. Wait fully a minute, then make gentle pressure, and the catheter will readily enter the bladder. A medium size, or large catheter is passed more readily than a small catheter in normal urethras.

**Bladder Irrigation**

Irrigation of the bladder is sometimes indicated in cystitis. Its object is two-fold; to cleanse the organ of all abnormal secretions, and to reduce the inflammation. The solutions most frequently employed for this purpose are normal salt solution and boric acid, 2%. They must always be sterile, and should have a temperature of 100°F. to 115°F. A glass irrigator or a small funnel and tubing are needed.
to introduce the solution. Otherwise, the preparations are the same as for catheterisation.

To Irrigate with a Recurrent Catheter.—The patient should always be catheterised before bladder irrigation. To irrigate with a recurrent catheter, connect the irrigator tubing (which must not be longer than eighteen inches) to the straight end of the catheter, and allow the solution to run in.

To Irrigate with Ordinary Catheters.—Glass recurrent catheters are hard to procure and metal catheters are not generally considered safe, because it is impossible to know whether they are perfectly clean. Therefore, the ordinary glass or rubber catheters are generally used for bladder irrigation, the preference being given to the rubber over the glass because the former will not move so readily in the bladder during the operation. To irrigate with an ordinary catheter, proceed as with a recurrent catheter until eight or ten ounces of the solution have run in. Then, shut off the current, and disconnect the tubing and catheter in order that the injected fluid may return. This process is generally repeated until the fluid returns clear.

When a glass irrigator cannot be obtained, it is better to use a funnel and tubing, in order that the amount of fluid running in may be gauged. In this case, it is unnecessary to disconnect the catheter, as siphonage can be obtained by lowering the funnel.
CHAPTER XII

DOUCHES


One of the simplest and most effective prophylactic and therapeutic agencies is the douche. The principal douches are known as vaginal, intra-uterine, spinal, nasal, and aural, according to the part of the body to which they are applied.

Vaginal Douches

Vaginal douches are given for their cleansing effect, for local stimulation, for reduction of inflammation, and to arrest hæmorrhage.¹ When given for either of the last two purposes, they must be very hot, 120° F., and great care must be taken not to burn the patient. The temperature of the ordinary cleansing douche varies from 110° F. to 115° F. Various solutions are employed (the quantity being prescribed), normal salt solution and carbolic 1-120 being, perhaps, the most common. Creolin 10% and lysol 5% are frequently resorted to, when there is a profuse discharge.

¹It must be remembered that a warm douche, by diluting the blood-vessels, would increase the hæmorrhage.
The appliances necessary for vaginal douching are a douche pan, a douche can or bag, and a douche nozzle. The nozzle should be boiled before use and attached to the rubber tubing of the douche can, the can being first filled with the necessary solution. When douches are given after an operation, the tubing and can must also be disinfected before use.

To carry these things to the patient's bedside, hang the nozzle inside the can, place the can inside the pan, and cover the whole with a sheet.

To administer the douche get the patient into the dorsal recumbent posture. Place the douche pan in position. Dispose a soft pillow under the small of the back of the patient, in such a way that its end will come over the end of the douche pan and cover the patient with a sheet. Turn down the bed-clothes. Twist a corner of the lower end of the sheet around each of her feet and the lower part of her legs, gathering it up in the centre enough to be out of the way while giving the douche, but not enough to expose her. Place the douche can about three feet above her. Insert the nozzle gently, pointing it downward and backward. Move it round, while it is in the cavity.

After use, wash the douche can and pan thoroughly with hot water, and dry them well. Wash and boil the douche nozzle.

1 Douche pans are made from three to eight inches high. Pans of the size last named are used when a large quantity of water is required. Vessels of this size also have the advantage of raising the pelvis and thereby making the douche more effective.

2 Agate cans or glass irrigators are preferred for hospital use.

3 In cases of perineorrhaphy a glass catheter is often used instead of the regular douche nozzle.

4 The pan should first be warmed.
Douches are always best given to a patient while she is in bed, and in order to derive the greatest benefit from them she should remain there for an hour or two afterward.

**Intra-Uterine Douches**

The intra-uterine douche should be given by the physician, except in an emergency. The only instruments required, unless it is to be supplemented by other treatment, will be the intra-uterine douche nozzle, the bi-valve speculum, and the uterine dressing forceps. These must be sterilised by boiling for five minutes. The other articles necessary are: about 12 sterile sponges; 2 sterile towels; lysol 10%, (or other sterile substance with which to lubricate the speculum); sterile rubber gloves; the douche pan; the sheet with which to cover the patient; liquid green soap 50%; and a disinfectant for cleansing the vagina before the introduction of the nozzle into the uterus. The solution for the douche, the irrigator or can in which this is put, and also the rubber tubing attached to it must be sterilised, preferably by boiling.

Prepare the patient for the intra-uterine douche by washing in and around the vagina with green soap and a disinfectant. Many physicians order also a vaginal douche.

After the physician has inserted the speculum, he generally further cleanses the surface around the cervix, and, then, having first let water run through the nozzle to expel the air, inserts its tip gently into the uterine cavity until it is felt to touch the fundus.

**The Spinal Douche**

To give a spinal douche when the patient is not confined to his bed, have him sit on an unvarnished
stool in the bath tub, drape a sheet over his chest and around his legs, leaving his back exposed. A shower which can be attached to the faucet is the best appliance to use, but when this cannot be obtained, dash water over his back from the pitchers, using some force. The affusions are alternately hot and cold as a rule and the treatment should be finished with massage of the back.

When the patient is unable to get out of bed, protect the bed with a rubber ¹ sufficiently large to cover it, and to extend into a pail placed at its foot. Make the rubber into a trough, by placing rolled blankets or pillows, folded and tied, under it, along the sides. Elevate the head of the bed. Drape the patient (leaving the back exposed) with bath towels, a sheet, or an old blanket. Have ready several pitchers of water, of the required temperatures. Pour their contents slowly up and down the spine. Follow with a brisk massage of the spine. A hot-water bag at the feet is often desirable.

Nasal Douches

For a nasal douche, a small irrigator or fountain syringe, a nasal tip, a basin to catch the liquid, a towel, and a handkerchief will be required. The temperature of the douche solution should be about 110° F.

The great danger in nasal douching is that if improperly performed the discharge will be washed into the Eustachian tubes. To prevent this the following points must be observed: The irrigator must not be

¹When a rubber sufficiently large cannot be obtained, two or three smaller rubbers may be used. The rubbers should overlap each other by three or four inches, the one at the head of the bed being always the uppermost.
hung more than eighteen inches above the patient. The patient must be instructed not to breathe through his nose, not to blow his nose while it is filled with water, nor to attempt to swallow the water; he must keep his head bent forward, otherwise some of the solution will drop from the naso-pharynx into the pharynx and in the effort which he makes to dislodge it, it may be forced into the Eustachian tube.

To give the douche, have the patient bend his head over a basin and breathe through his mouth, then, insert the end of the nozzle in one nostril. The solution will flow into the naso-pharynx, around the septum, and through the other nostril. When one side is thoroughly cleansed the nozzle is inserted in the other nostril.

The Aural Douche.

The best appliance for douching and washing out the ear is the "return aural syringe." To employ this syringe, attach to it two pieces of rubber tubing a quarter of an inch in diameter and eighteen inches long, fitting the tubing, which is to be attached to the irrigator, to the straight end where the opening to the inside channel is, and the tubing which is intended to carry off the return flow, to the side opening. Place the other end of the latter in a basin. Fasten a dressing rubber and towel around the patient's neck.

The orifice of the ear is not in a straight line with the auditory canal. It is higher in children, and, owing to the shrinking of the bones, as they harden, lower in the adult. While irrigating, to make the canal as straight as possible, hold the auricle of the child's ear upward and outward, and that of the adult downward and outward. Dry the auditory
canal after it has been irrigated. To do this, make small pointed pledgets of absorbent cotton, hold the auricle in the proper position, insert a pledget, leave it in for a few seconds to absorb the moisture, and then remove. Repeat the procedure, using dry pledgets each time, till the cotton, when removed is perfectly dry. Never put a pointed instrument into the ear.
CHAPTER XIII

ENEMATA


A LARGE portion of the waste of the body being carried off through the large intestine, it is absolutely indispensable that this organ be kept, in all respects, in good condition. With this object and a number of others in view, various liquids are introduced into it by way of the rectum. Liquids thus introduced are called enemata. The principal enemata, which derive their names from the nature of the liquids themselves or the purpose for which they are given, are:

1. Anthelmintic enemata, given to destroy worms.
2. Antiseptic enemata, given to destroy germs.
3. Astringent enemata, given to contract the tissue and superficial capillaries and used both in case of hæmorrhage and in certain forms of diarrhœa.
4. Carminative enemata, given to relieve flatulence.
5. Emollient enemata, given to soothe irritation of the mucous membrane of the intestine, thereby checking diarrhœa, etc.

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6. Nutritive enemata, given to afford nourishment when it cannot be taken by the mouth.
7. Purgative enemata, given to increase peristalsis and wash out the intestine.
8. Sedative enemata, given as a sedative, either local or general.
9. Stimulating enemata given for general stimulation.
10. Saline enemata given to relieve thirst.

The articles required for the giving of enemata are:
1. A sheet or blanket or both, with which to cover the patient.
2. A rubber to protect the bed.
3. A bed-pan or douche pan. Even when the enema is to be retained it is well to have a pan at hand.
4. A dressing towel.
5. A rectal tube or catheter. The catheter is preferable when the enema is to be retained.
6. An irrigator, douche bag, a funnel, and tubing, or a Davidson syringe.
7. A pitcher or graduate-glass to hold the liquid, if the funnel or Davidson syringe is used.
8. The liquid, which varies according to the nature of the enema.

Method of Giving Stimulating, Nutritive, and Other Enemata where Only a Small Amount of Fluid is Used

Quantity of Liquid.—The amount of liquid ordered for an enema, unless it be purgative or saline, seldom exceeds six to eight ounces. The

1 The carminative enema in some of its forms is also an exception.
Enemata must be retained and absorbed, and it will not be, if the bowel is over-distended by the introduction of a large amount of fluid.

Put the solution in a pitcher or graduate glass and stand this in a basin of hot water to keep it from cooling while the patient is being prepared. Cover with a small rubber. Put this rubber under the patient to protect the bed, during the giving of the enemata.

**Temperature of Liquid.**—Enemata, with the exception of those required for stimulation, are generally given at a temperature of 100° F. When stimulation is desired, the temperature should be higher, namely, 110°–112° F., heat, in itself, being a valuable stimulant.

**Position of the Patient.**—For small enemata, the patient is usually placed in the dorsal recumbent position (see Chapter XVIII). After placing him in this position, cover his chest and abdomen with a folded sheet or blanket and turn down the bed-clothes to its lower edge. Pass your hand between the two to insert the tube without exposing him.

**The Rubber Catheter.**—When the enema is to be retained, it is well to use a small rubber catheter instead of a rectal tube, since its insertion and removal cause less irritation of the intestine. Lengthen the catheter, if necessary, by the addition of ten to twelve inches of rubber tubing. Insert a small funnel in the free end of the tubing, or, if this is not used, in the catheter.

**Manner of Using the Catheter.**—To avoid getting air into the intestine, and so causing the patient unnecessary pain, pour some of the liquid to be used into the funnel and allow a portion of it
to run through the tubing and catheter, before inserting the catheter. When medication is used, the liquid must run back into the pitcher. Be careful while giving the enema never to allow the funnel to become empty. Lubricate the catheter well, before introducing it, with an emulsion of castile or ivory soap.¹ Insert the catheter as far as possible, and inject the fluid slowly. Hold a folded towel pressed closely to the anus during and for some time after the giving of the enema, to insure its retention.

Remove the catheter quickly, but gently. If, however, the enema is not easily retained, remove the funnel and tubing, but clamp the catheter and leave it for twenty minutes to half an hour. If no clamp is at hand, fold the end of the catheter three or four times and pin a safety-pin across the fold.

Carminative Enemata.—The carminative enema for the expulsion of gas from the intestines is generally given in conjunction with the purgative enema. Emulsions of asafoetida and turpentine are the carminatives most frequently used. Turpentine, owing to its intensely irritating property, is best made into an emulsion with oil or some oily substance.

To prepare such an emulsion, heat the oil to 100° F., and add the turpentine. This enema is given in the manner already described, and the patient should be encouraged to retain it for at least an hour. It is followed by a soapsuds enema. If the oil should not flow readily through the tube, disconnect the funnel and tubing and force the oil through the catheter, by means of a glass or metal syringe.

¹ Oil and vaseline may be used, but they soften the tubes, make them harder to clean, soil the bed-clothes, and favour the propagation of germs.
Emollient Enemata.—The emollient enema in most common use is starch. To make a starch enema, dissolve one heaping teaspoonful of starch in a little cold water, add slowly six ounces of boiling water and boil one or two minutes, at the end of which time it should be of the consistency of a thick syrup. Allow it to cool to 103° F. before giving. When opium is ordered, add it just before giving the enema. The starch, like the oil, can, if necessary, be forced through the catheter with a syringe.

Nutritive Enemata.—Great care must be taken in the preparation of nutritive enemata, as the substances generally used, viz.: egg, peptonised milk, beef peptones and salt, are very apt to curdle if mixed or heated too quickly. The warming is best done in a double boiler or a bowl placed in a saucepan of boiling water.

To make a nutritive enema with the above ingredients, heat the milk, add the peptones, which, if solid or gelatinous, must be first dissolved or liquefied, then the egg, which must be stirred till broken,¹ and raise to a temperature of 115° F. If brandy or whisky is ordered, add it slowly to the mixture after it has been removed from the fire.

Peptonized foods which are partly predigested, are used for nutritive enemata, because the large intestine has no digestive power.

Patients who are receiving nutritive enemata should also be given a daily purgative enema. Otherwise, absorption in the large intestine being slow and incomplete, there is danger of an accumulation of residue which will cause such irritation of the

¹ The egg should never be beaten as too much air would thereby be incorporated.
mucous membrane of the intestine, that the chances of the retention and absorption of the nutritive enemata will be much lessened.

**Purgative Enemata.**—The process of digestion is completed in the small intestine, whence the residue or waste is propelled onward by the peristaltic action of the bowel, into the large intestine to be expelled through the rectum. If, for any reason, expulsion fails to take place, this waste material ferments, decomposes, and forms a toxic substance which, unless removed, will be absorbed, and cause general poisoning of the system. That the bowels should be well regulated is, then, an obvious necessity, and catharsis, in some form, must be given when they fail to move naturally.

Purgative enemata are given in the following cases: when an immediate action is required, when nausea or other ill effects are feared from the taking of catharsis by mouth, when a thorough cleansing of the intestine is desired, or when the action of catharsis is to be furthered by emptying the lower bowel. There are several varieties of purgative enemata, but the soapsuds enema is the most common. To prepare a soapsuds enema: make a thick soapsuds by agitating white castile or ivory soap\(^1\) in water about \(110^\circ\) F, and remove the froth, since this contains air and will cause pain if injected. Two to four pints will be required for an adult and one to one and a half for a child.

A long rectal tube attached by means of a glass connecting-tube and rubber tubing to the douche can

\(^1\) Never use brown or other laundry soaps. They contain strong alkalis, and their use is often followed by irritation of the mucous membrane of the intestine.
or fountain-syringe bag, is the best appliance for the giving of this enema. In using this appliance never place the can or bag more than three feet above the patient, for, if the water flows in too quickly, there will be a too sudden distention of the bowel, resulting in the immediate expulsion of the enema, which, to be of much benefit, should be retained fifteen to twenty minutes. Have a stop-cock on the tubing to enable you to regulate the flow and to shut off the water when required.

Purgative enemata are often given in the same general manner as the other varieties of enemata, (see page 171) but the tubing should be longer (24 inches) and the funnel larger.

They are also given occasionally with the Davidson syringe, an apparatus which has been almost entirely superseded by the long rectal rubber tube, because the flow of water through the latter is more even and, therefore, causes less distress. The Davidson syringe is useful, however, when the lower bowel is impacted, as the water can be introduced with more force than with any other apparatus. To use it: Screw on the hard rubber tip. Put the free end of the tube in the pitcher of soap-water and, by pressing the bulb, force the water through the syringe to expel the air. Then, insert the tip in the rectum, or, if the impaction is high up, introduce a rectal tube into the intestine, and put the tip in the rectal tube. Finally, drive in the water by squeezing the bulb slowly and with even pressure, never using too much force.

Never keep the bed-clothes over the patient while giving a purgative enema. Cover him with an old blanket, slip a rubber sheet covered with one end of a muslin sheet (never a fresh one) under the thighs,
flex the knees, and bring the unused half of the sheet up over the legs, under the blanket. When possible, the patient should be turned on the left side with the knees well flexed, as, owing, to the formation of the intestines, the water will then have freer entrance. When necessary for the patient to remain in the dorsal position, the result will be better if the foot of the bed can be elevated.

A douche pan being larger than a bed-pan, there will be less danger of soiling the bed if the former is used. It should be brought to the bedside with the other requisites, before starting the enema, as it may be required suddenly.

Lubricate the tube well before insertion and insert it gently. If the rectum is found to be packed, the tube must be withdrawn and the faecal matter removed with the finger. To do this, either cover the finger with a rubber cot, or imbed the nail in soap. This is necessary not only to prevent faeces from getting under the nail, but also to prevent the nail from scratching the mucous membrane of the intestine.

Never use force in introducing the tube. Obstruction will probably be due to one of the three following causes:

1. A nervous contraction of the intestine, which will pass away in a few seconds. Wait until it does pass away, since the application of any force might injure the mucous membrane of the intestine.

2. Impaction higher than the finger can reach. To deal with this, let a little water run in, and push the tube in farther as the impaction, softened by the water, diminishes.

3. The clogging of the rectal tube by faeces. To
remedy this withdraw the tube and let the water run through it.

The tube can be inserted as far as it will go without force. Let the water run in slowly. If much pain ensues, shut the water off, occasionally, for a minute. When a sufficient quantity has been introduced, remove the tube quickly but gently, and press a folded towel to the anus, for a few minutes.

No alarm need be felt if the water is not expelled, as it is often absorbed, especially if the patient is thirsty. In such cases the enema should be repeated in about an hour. If the second injection is not expelled, siphon back the liquid in the following manner: Put the patient on the douche pan, insert the rectal tube with a funnel attached, fill the funnel with water, and, before it has all run through, lower and turn the funnel into the pan.

The result of the enema should always be charted or reported to the doctor.

Abdominal Flushing.—In cases of obstinate constipation, it is sometimes necessary to flush the colon more thoroughly than can be done with the patient in the usual positions. The knee–chest position is then adopted. The patient, as the name of the position implies, rests on the knees and chest, the head on one side, the arms at the sides—never under the chest. A nurse must support the patient and watch the pulse carefully, for the position is a trying one.

Medicated Purgative Enemata.—Various drugs with laxative properties, such as Rochelle Salts and Fel Bovis, are often used as enemata. The salts are generally given dissolved in a small amount of water (about six ounces) and should be retained. Fel
Bovis, as a rule, is added to the ordinary soapsuds enema.

Glycerin is often given, generally with oil, for the purpose of softening impacted faeces. The glycerin exerts, besides, a strong laxative action and possesses the property of extracting fluid from the tissue.

**Stimulating Enemata.**—Whisky or brandy and salt solution are the most common ingredients of stimulating enemata. After giving a stimulating enema, watch the pulse to see if it has produced the desired result.

**Sedative Enemata.**—Chloral and bromide are the drugs most commonly used for sedative enemata. Before administering a sedative enema, make the patient comfortable and give all impending treatment, that, after the enema, he may be left undisturbed.

In localities where the water supply is doubtful, the water for enemata should be boiled.

**Rectal Irrigation.**—Rectal irrigation is the introduction into the intestines of a large amount of fluid, the greater part of which is immediately expelled, although a considerable amount is absorbed, of course, when the irrigation is continued for some time. Rectal irrigation is used principally:

(1) As a substitute for purgative enemata, especially when no result can be obtained from the latter; (2) for general stimulation, to take the place of intravenous injection; (3) as a diuretic.

The irrigation is continued for from half an hour to several hours. Normal salt solution or plain hot water of a temperature varying from 105° to 115° are the liquids most commonly used.

About the same articles are required for a rectal
irrigation as for an enema. A long piece of tubing to carry off the return flow of the liquid, and a receptacle to catch it will also be needed.

Special tubes, such as the Dixon and Kemp, are frequently used instead of a rectal tube. They both consist of two cylinders, one inside the other, each of which has an opening and a pipe attached. In both varieties of tubes the straight attachment is the one through which the ingoing liquid flows. Therefore, attach the tubing connected with the irrigator to it and the tubing intended to carry off the return current to the curved pipe at the side. Put the other end of the latter into a receptacle on the floor. Lubricate the cylinder well before inserting it in the rectum. Two rectal tubes or catheters are very frequently used instead of the above tubes. In using them, always introduce the one attached to the tubing connected with the irrigator an inch farther into the intestine than the one intended for the return flow.

By all of these methods, the liquid is made to flow in and out evenly and uninterruptedly.

When the irrigation is to be continued for only a short time, a single rectal tube is sometimes used.
In this case, the return flow is obtained in the following manner: Insert the base of a T tube in the rectal tube. Attach the tubing connected with the irrigator to one arm of the T and the tubing intended for the return flow to the other arm. Put a stop-cock on each tubing and insert the rectal tube in the rectum. While the water is flowing in, keep the stop-cock on the tubing for the return-flow closed until about half a pint has entered. Then, open this stop-cock and close the other, that the water introduced may return. Repeat the process as often as required.

To estimate the quantity of liquid given at a time, it is necessary either to use a glass irrigator or to attach a funnel to the tubing and pour the fluid from a pitcher.

The position of the patient is the same for irrigation as for enemata.

When giving irrigation, always protect the bed with a rubber covered with a folded sheet, or, if the anus is relaxed (as is frequently the case with a patient who is very ill), substitute for the rubber a Kelly pad or douche pan. Elevate the foot of the bed, when possible. Place the irrigator three feet above the patient. There are large irrigators specially designed for rectal irrigation, but when these cannot be had the ordinary irrigator, douche can, or bag may be used and refilled as often as necessary. Never allow all the water to run out of the irrigator before refilling.

Care of Rectal Tube.—After using a rectal tube, cleanse it of faecal matter, allowing first cold\(^1\) water

\(^1\) As all discharges from the body contain albumin, if hot water is used first the albumin will be coagulated and harder to remove.
to run over and through it, then, hot water. Cleanse further with soap and hot water. Boil five minutes in a ½% solution of sodium chloride.¹

**Examination of Faeces**

The character of the faeces being an index of the condition of the whole lower portion of the alimentary tract, all evacuations of the bowels during illness should be inspected before being emptied.

Curds of milk in stools indicate imperfect fermentation in the stomach. Oil in the dejections is probably caused by defective action of the liver, pancreas, or intestinal glands, in consequence of which fatty substances in the food are not emulsified. Black, tarry stools may mean the presence of digested blood, or may be due to certain medicines such as iron and bismuth. Greyish dejections indicate an absence of bile. Greenish dejections indicate the presence of bile in undue proportion, and with children show an altogether defective digestion. Greenish-yellow liquid evacuations point to typhoid.

Mucus may indicate enteritis,² and pus, an opened abscess. Blood may proceed from hæmorrhoids, but may also be caused by ulceration of the intestines. Watery stools are associated with diarrhœa, but are also the natural result of hydragogue cathartics.

Hard lumpy stools indicate constipation.

When examining stools for worms,³ calculi, etc.,

¹ Salt in the water prevents the rubber becoming softened as it will otherwise become by being soiled.
² Worms are sometimes mistaken for shreds of mucus.
³ The worms most frequently found in the faeces are the "oxyuris vermicularis, the thread or seat-worm" (a fine white worm ½-⅝ of an inch in length) and the "cestodes or
tie thin muslin over a chamber, empty the bed-pan into this, and pour water over it slowly, breaking up all lumps of faeces with a stick. This should be done in a good light, since it is often difficult to detect the foreign matter.

**Odour of Faeces.**—The odour of faeces is also important. A very fetid odour, unless due to medication denotes extreme decomposition within the body. This decomposition is frequently due to lack of bile, the great natural disinfectant of the system.

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tapeworms” (long flat worms, pieces of which are often mistaken for shreds of mucus). When examining tapeworms always see if the head has been expelled, as, otherwise, the worm will grow again.
CHAPTER XIV

LAVAGE, ETC.


**L**IQUID is often introduced, by means of a tube, into the stomach, also, with a number of objects in view.

**Lavage**

Lavage is the washing out of the stomach. It is performed for the evacuation therefrom of poisons and of irritating matter which is causing nausea; and, in certain diseases of the stomach, for the cleansing of its lining.

The articles required will be:

1. The stomach tube, lengthened, if necessary, by rubber tubing:
2. A funnel.
3. A slop jar.
4. Two rubbers—one to protect the floor, the other to protect the patient.
5. A towel.
6. A kidney basin, in case the patient is nauseated.
7. Two pieces of gauze—one for the patient to use as a handkerchief, the other for wiping the tube.
8. Two pitchers of hot water—one 105° F., the other, 115° F.

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9. A basin containing ice, round which the stomach tube is rolled.¹

10. A cork with a hole through the centre through which the tube can be passed, or a spool or a piece of rolled bandage, to put between the teeth. This device is not necessary when the patient is accustomed to the passing of the tube, but otherwise it is a wise precaution, as he is liable to bite the tube.

Before starting the treatment, it is very important to reassure the patient and gain his confidence, for, with his assistance, it is a very easy matter, while without it, it is likely to be a very trying one.

To perform lavage: Attach the funnel to the tube. Insert the tube gently, since any force might result in the perforation of the mucous membrane of the oesophagus. Make the patient swallow, if possible, since swallowing will greatly facilitate the insertion. Avoid striking the back of the pharynx, as that will cause nausea. The length of tube to insert depends upon the size of the patient. Estimate the distance from the mouth to the stomach, and allow an extra couple of inches for the mouth. Fill the funnel with water and allow it to run through the tube until only half an ounce remains in the funnel. Repeat the procedure until a pint has been introduced into the stomach.² Then, lower the funnel into the slop jar and the fluid will siphon back. Introduce water and siphon it back several times. If there is any sign of blood in the ejected water, discontinue the

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¹ The cold hardens the rubber and this makes it easier to swallow.

² Never allow the funnel to become quite empty, as air would thereby be introduced causing unnecessary distress, and interfering with the siphonage.
treatment until the fact has been reported to the physician, for, if there is a possibility of haemorrhage due to a diseased condition of the stomach, lavage might be dangerous.

In charting the result of the lavage, state how much water was required before it returned clear, and whether mucous or other abnormal secretions were present in it.

**Gavage**

Gavage is the introduction of liquid food into the stomach through the stomach tube.

To perform gavage, introduce the tube as for lavage. Allow a few seconds to elapse after its insertion before pouring in the liquid. Muscular contractions are sometimes started in the stomach by the insertion of the tube and these may cause the immediate expulsion of the liquid if it is put in before they have quieted. Pour the liquid in slowly, and withdraw the tube quickly, but gently.

**Nasal Feeding.**—When the patient is in a state of coma, is unmanageable, or has had an operation in the throat or mouth, the liquid is often introduced through the nose by means of a rubber catheter.

The insertion of the tube is easier in this way than through the mouth, but there is considerable danger of getting it into the trachea. Watch the patient's colour, after inserting the tube, and, if he becomes cyanosed, withdraw the tube. If he does not, it is generally all right. To make sure, however, put the funnel to your ear, before pouring in the liquid, and listen a minute. If the tube is in the trachea, you will hear a whistling sound. This must not be

1 Direct the tube horizontally when inserting it.
confounded with the gurgling sounds that are heard when the tube is in the oesophagus. Another thing that may happen, and that must be guarded against is the curling up of the tube in the mouth, if it does not find its way into the oesophagus.

When there is any difficulty in inserting the tube in one nostril, remove it and try the other nostril. The septum in the majority of people is not perfectly straight; hence, one nostril is usually larger than the other.

To give any of these treatments to children, restraint is generally required. The best way to obtain this is to roll a blanket tightly around the body and arms in such a way as to keep the latter straight at the sides.

Feeding after Intubation.—When feeding a patient after intubation, raise the foot of the bed. It is easier to swallow, after this operation, if the head is lower than the body.

Test Meals

In diseases of the stomach, diagnosis is much facilitated by the giving of certain recognised "test meals," and then, at a specified time, withdrawing the contents of the stomach by siphonage and examining the same.

Thus, the motor function of the stomach can be ascertained by knowing how long it takes to completely empty itself after receiving certain food, and the reaction of the gastric juice can be determined by testing the result of the siphonage with litmus paper. The absorbing power of the stomach, likewise, is sometimes arrived at by giving the patient potassium iodide and then testing the saliva every
five minutes with starch-paper and acid. If absorption is normal, iodine will appear in the saliva within fifteen minutes (see Chapter XXIV).

Some hours before a test meal is taken lavage is generally performed and nothing is given by mouth afterward, except the special food, until after the siphonage.

The test meals in most common use are:

1. Two small slices of very dry toast (no butter), and six or eight ounces of weak tea (no milk or sugar). It is withdrawn by siphonage in one hour.
2. Boas' test breakfast, which consists of six ounces of strained oatmeal gruel. It is withdrawn by siphonage in one hour.
3. Ewald's test breakfast, which consists of a roll and eight ounces of water or weak tea without milk or sugar. Siphonage is performed in one hour.
4. The Leube-Riegel test dinner, which consists of soup, meat, and a potato or roll. Siphonage is performed in three and a half hours.
CHAPTER XV

ADMINISTRATION OF MEDICINES


Things a Nurse Should Know about Medicines and their Administration

A nurse should know the effect of the maximum and minimum medicinal doses, the signs of over-dosing, and the treatment for poisoning by all the drugs in common use. It is very necessary to be ever on the watch for signs of over-dosing, as certain people have an intolerance for certain drugs, and very small doses may bring on untoward symptoms. Some drugs have a cumulative action, that is, they are not readily excreted from the system, and these by accumulating in the body, may cause poisoning if the first symptoms of over-dosing are not promptly recognised. Even drugs which have not this action will, if taken too long, produce undesirable effects,
the primary symptoms of which must always be detected.

On the other hand, there are drugs to which the system becomes gradually accustomed, and which, to be of any benefit, must be given in increasingly large doses. If some of these drugs are continued for a long time, the patient may not only become accustomed to them, but crave them. Indeed, it is thus that the cocaine, morphine, and chloral habits are often formed. On this account, a nurse should make it a rule not to give an anodyne or narcotic under ordinary circumstances, without first doing all in her power to relieve pain or induce sleep, as the case requires (see Chapter VI).

A nurse should also be familiar with the symbols and abbreviations used in writing prescriptions, the standard weights and measures (both the apothecaries' and the metric systems), the manner of reckoning a child's dose, and the rules governing per cent. and fractions. The last-named must be employed in estimating percentage of solutions and in estimating a dose of a different fractional part of a grain from the drug on hand.

To Estimate Percentage of Solutions.—To estimate the percentage of solutions, reduce the amount of solution to minims, multiply by the rate per cent. and point off two places.

Example: it will take 19.2 grains to make one ounce of a 4% solution.

\[
\begin{array}{c}
60 \\
8 \\
\hline
480 \\
4 \\
\hline
1920
\end{array}
\]
To Estimate a Dose of a Different Fractional Part of a Grain from the Drug on Hand.—You are frequently ordered to give a dose of medicine of a different fractional part of a grain from the drug you have. Thus, you may be told to give gr. \( \frac{1}{2} \) of strychnine when the only solution on hand is mx. = gr. \( \frac{1}{3} \). To find out how much to give, multiply the denominator of the fraction of the solution on hand, by the number of minims containing it, and divide the result by the amount that you wish to give.

\[
\frac{30}{10} \div 25 = 12
\]

Give 12 minims.

To Reckon a Child's Dose.—Medicine is given to children in much smaller amounts than to adults, the dose varying according to the age of the child. To reckon the proper amount, make a fraction, by taking the child's age for the numerator and the child's age plus 12 for the denominator. This will be the fractional part of the adult dose which should be given. Thus, a child of eight should be given \( \frac{8}{18} \) or \( \frac{8}{9} \) of the adult dose.

Apothecaries' Weight.

20 grains = 1 scruple.
60 grains = 3 scruples or 1 drachm.
480 grains = 24 scruples, 8 drachms, or 1 ounce.

Apothecaries' Measure.

60 minims = 1 fluid drachm.
8 fluid drachms = 1 fluid ounce.
16 fluid ounces = 1 pint.
2 pints = 1 quart.
4 quarts = 1 gallon.
The Metric System.—The metric system of weights and measures, being more convenient and accurate than the apothecaries' system, is now gradually being adopted in this country as the standard in all scientific work.

It originated in France in 1790, and has been accepted in all European countries, except England where, as in this country, it is still optional.

The metre is the unit of length, the gramme of weight, and the litre of volume. The standards of capacity and weight are based on the standard of length. A gramme is the weight of a cube of water at four degrees centigrade, each side of which measures one centimetre or one one-hundredth of a metre. A litre is the volume of a cube of water at its greatest density—four degrees centigrade—each side of which measures one decimetre or one-tenth of a metre.

The prefixes, deca, hecto, kilo, derived from Greek numerals, are used to denote increase, and the prefixes, deci, centi, milli, derived from Latin numerals, to denote decrease.

\[
\begin{align*}
1000 & = 1 \text{ kilometre.} \\
100 & = 1 \text{ hectometre.} \\
10 & = 1 \text{ dekametre.} \\
1 & = 1 \text{ metre.} \\
.1 & = 1 \text{ decimetre.} \\
.01 & = 1 \text{ centimetre} \\
.001 & = 1 \text{ millimetre.}
\end{align*}
\]

The cube of a centimetre is called a cubic centimetre and is written Lcc. With the exception of the centimetre, the numerals denoting decrease are rarely used. Thus, instead of saying 1 decimetre, we say, 100 c. c. Also, in stating capacity, metre is often used instead of litre for the subdivisions.
Thus, we say 100 c.c. instead of 1 decilitre, and 10 c.c. instead of 1 centilitre.

Relation between the Apothecaries' and the Metric System.—The following table gives the approximate relation between the apothecaries' and the metric systems.

<table>
<thead>
<tr>
<th>Metric Unit</th>
<th>Equivalent in English Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 metre</td>
<td>39.39 inches</td>
</tr>
<tr>
<td>25 millimetres</td>
<td>1 inch</td>
</tr>
<tr>
<td>1 litre</td>
<td>33.81 fluid ounces or about 2 pints</td>
</tr>
<tr>
<td>1 gramme</td>
<td>15 1/2 grains</td>
</tr>
<tr>
<td>.065 &quot;</td>
<td>1 grain</td>
</tr>
<tr>
<td>29.37 c.c.</td>
<td>1 fluid drachm</td>
</tr>
<tr>
<td>4 c.c.</td>
<td>15 minims</td>
</tr>
</tbody>
</table>

Symbols and Abbreviations used in Writing Prescriptions.—The symbols and abbreviations most used in writing prescriptions are the following:

- aâ, ana, of each.
- Abstr. abstractum, abstract.
- Add., adde, add.
- Ad lib., ad libitum, as much as desired.
- Alt. hor., alternis horis, every other hour.
- Alt. noc., alterna nocte, every other night.
- Applic., applicatur, apply.
- Aq., aqua, water.
- Aq. dest., aqua destillata, distilled water.
- Aq. pur., aqua pura, pure water.
- B. i. d., bis in dies, twice a day.
- C., congius, a gallon.
- c., cum, with.
- c.c., cubic centimetre.
- Cap., capiat, let him take.
- Cen., centimetre.
- Comp., compositum, compound.
<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Latin Term</th>
<th>English Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conf.,</td>
<td>confectio</td>
<td>a confection</td>
</tr>
<tr>
<td>Contin.,</td>
<td>continuatur</td>
<td>let it be continued</td>
</tr>
<tr>
<td>Decub.,</td>
<td>decubitus</td>
<td>lying down</td>
</tr>
<tr>
<td>Det.,</td>
<td>detur</td>
<td>let it be given</td>
</tr>
<tr>
<td>Dil.,</td>
<td>dilutus</td>
<td>dilute</td>
</tr>
<tr>
<td>Dim.,</td>
<td>dimedius</td>
<td>one half</td>
</tr>
<tr>
<td>Div. in p.</td>
<td>dividatur in partes</td>
<td>divide into equal parts</td>
</tr>
<tr>
<td>æq.,</td>
<td>æquales</td>
<td>divide into equal parts</td>
</tr>
<tr>
<td>Emp.,</td>
<td>emplastrum</td>
<td>a plaster</td>
</tr>
<tr>
<td>F.,</td>
<td>fac</td>
<td>make</td>
</tr>
<tr>
<td>Fl. or f.</td>
<td>fluidus</td>
<td>fluid</td>
</tr>
<tr>
<td>Ft.</td>
<td>fiat</td>
<td>let there be made</td>
</tr>
<tr>
<td>Garg.,</td>
<td>gargarisma</td>
<td>a gargle</td>
</tr>
<tr>
<td>Gr.</td>
<td>granum or grana</td>
<td>a grain, or grains</td>
</tr>
<tr>
<td>Gtt.,</td>
<td>gutta or guttæ</td>
<td>a drop, or drops</td>
</tr>
<tr>
<td>Guttat.,</td>
<td>guttatim</td>
<td>by drops</td>
</tr>
<tr>
<td>Inf.,</td>
<td>infusum</td>
<td>an infusion</td>
</tr>
<tr>
<td>Inject.</td>
<td>injectio</td>
<td>an injection</td>
</tr>
<tr>
<td>Lb.,</td>
<td>libra</td>
<td>a pound</td>
</tr>
<tr>
<td>Liq.,</td>
<td>liquor</td>
<td>liquid</td>
</tr>
<tr>
<td>Lot.,</td>
<td>lotio</td>
<td>a lotion</td>
</tr>
<tr>
<td>M.,</td>
<td>misce</td>
<td>mix</td>
</tr>
<tr>
<td>Mist.,</td>
<td>mistura</td>
<td>a mixture</td>
</tr>
<tr>
<td>N.,</td>
<td>nocte</td>
<td>at night</td>
</tr>
<tr>
<td>No.,</td>
<td>numero</td>
<td>in number</td>
</tr>
<tr>
<td>O.,</td>
<td>octarius</td>
<td>a pint</td>
</tr>
<tr>
<td>Ol.,</td>
<td>oleum</td>
<td>oil</td>
</tr>
<tr>
<td>Ol. res.</td>
<td>oleoresina</td>
<td>oleoresin</td>
</tr>
<tr>
<td>Ol. oliv.,</td>
<td>oleum olivæ</td>
<td>olive oil</td>
</tr>
<tr>
<td>Ov.,</td>
<td>ovum</td>
<td>egg</td>
</tr>
<tr>
<td>Pil.,</td>
<td>pilula</td>
<td>a pill</td>
</tr>
<tr>
<td>P. r. n.,</td>
<td>pro re nata</td>
<td>as occasion arises</td>
</tr>
</tbody>
</table>
Pulv., pulvis, a powder.
q. s., quantum sufficit, as much as is sufficient.
R., recipe, take.
Rad., radix, root.
S. or sig. signa, write *i. e.*, give the following directions.

Sem. semen, seed.
S. O. S., sic opus sit, if necessary.
Sp. gr., specific gravity.
Sp. or spir., spiritus, spirit.
Ss. semissis, a half.
S. V. R., spiritus vini rectificus, alcohol.
S. V. G., spiritus vini gallici, brandy.
S. F., spiritus frumenti, whisky.
Syr., syrupus, syrup.
T. i. d., ter in die, three times a day.
Tr. or tinct., tinctura, tincture.
Troch., trochisci, lozenges.
Ung., unguentum, ointment.
M. minimum, minim.
3 drachma, drachm.
5 scrupulum, a scruple.

It is also necessary for a nurse to know the conventional abbreviations used in chemistry for the most common elements. These consist of the initial letter of the Latin name of the element, and sometimes also one of the other letters. When two or more elements have the same initial letter, the single letter symbol is reserved for the most common element.
### TABLE OF COMMON ELEMENTS AND THEIR SYMBOLS

<table>
<thead>
<tr>
<th>Element</th>
<th>Symbol</th>
<th>Element</th>
<th>Symbol</th>
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</thead>
<tbody>
<tr>
<td>Aluminum</td>
<td>Al</td>
<td>Iron (Ferrum)</td>
<td>Fe</td>
</tr>
<tr>
<td>Arsenic</td>
<td>As</td>
<td>Lead (Plumbum)</td>
<td>Pb</td>
</tr>
<tr>
<td>Calcium</td>
<td>Ca</td>
<td>Magnesium</td>
<td>Mg</td>
</tr>
<tr>
<td>Carbon</td>
<td>C</td>
<td>Manganese</td>
<td>Mn</td>
</tr>
<tr>
<td>Chlorine</td>
<td>Cl</td>
<td>Mercury (Hydrargyrum)</td>
<td>H</td>
</tr>
<tr>
<td>Gold (Aurum)</td>
<td>Au</td>
<td>Sodium</td>
<td>Na</td>
</tr>
<tr>
<td>Hydrogen</td>
<td>H</td>
<td>Nitrogen</td>
<td>N</td>
</tr>
<tr>
<td>Iodine</td>
<td>I</td>
<td>Oxygen</td>
<td>O</td>
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### TABLE OF COMMON SUBSTANCES AND THEIR SYMBOLS

<table>
<thead>
<tr>
<th>Substance</th>
<th>Symbol</th>
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</thead>
<tbody>
<tr>
<td>Acetic Acid</td>
<td>C₂H₄O₂</td>
</tr>
<tr>
<td>Alcohol</td>
<td>C₂H₅OH</td>
</tr>
<tr>
<td>Alcohol (Wood)</td>
<td>CH₃OH</td>
</tr>
<tr>
<td>Ammonium (Gas)</td>
<td>NH₃</td>
</tr>
<tr>
<td>Ammonium Hydrate (Aqua Ammonium)</td>
<td>NH₄OH</td>
</tr>
<tr>
<td>Aqua Calcis (Lime Water)</td>
<td>CaOH</td>
</tr>
<tr>
<td>Benzine</td>
<td>C₈H₁₈</td>
</tr>
<tr>
<td>Calcium Carbonate</td>
<td>CaCO₃</td>
</tr>
<tr>
<td>Calcium Hypochloride (Chloride of Lime)</td>
<td>CaClO₂</td>
</tr>
<tr>
<td>Carbon Dioxide</td>
<td>CO₂</td>
</tr>
<tr>
<td>Carbon Monoxide</td>
<td>CO</td>
</tr>
<tr>
<td>Caustic Soda</td>
<td>NaOH</td>
</tr>
<tr>
<td>Caustic Potash</td>
<td>KOH</td>
</tr>
<tr>
<td>Cellulose</td>
<td>C₆H₁₀O₅</td>
</tr>
<tr>
<td>Hydrochloric Acid</td>
<td>HCl</td>
</tr>
<tr>
<td>Potassium Chlorate</td>
<td>HC</td>
</tr>
<tr>
<td>Potassium Nitrate, (Saltpetre)</td>
<td>KNO₃</td>
</tr>
<tr>
<td>Potassium Tartrate (Cream of Tartar)</td>
<td>KC₄H₃O₆</td>
</tr>
<tr>
<td>Sodium Bicarbonate</td>
<td>NaHCO₃</td>
</tr>
</tbody>
</table>

¹Each letter represents but one atom of the corresponding element. When a substance contains more than one atom the number of atoms is written after or below the letter. Thus H indicates one atom of hydrogen while H₂O indicates two atoms of hydrogen and one of oxygen.
Sodium Carbonate (Washing Soda) . \( \text{Na}_2\text{CO}_3 + 10 \text{H}_2\text{O} \)
Sodium Chloride (Common Salt) . NaCl
Starch . . . . . \( \text{C}_6\text{H}_{10}\text{O}_5 \)
Sugar (Cane) . . . . \( \text{C}_{12}\text{H}_{22}\text{O}_{11} \)
" (Grape) . . . . \( \text{C}_6\text{H}_2\text{O}_{26} \)
" (Milk) . . . . \( \text{C}_{12}\text{H}_{22}\text{O}_{11} + \text{H}_2\text{O} \)
Tartaric Acid . . . . \( \text{C}_4\text{H}_6\text{O}_6 \)
Water . . . . . \( \text{H}_2\text{O} \)

**The Absorption of Medicine**

Medicine is introduced into the circulation through five channels: the stomach, the rectum, the cellular tissue (subcutaneously), the skin (inunction), and the lungs (inhalation).

The length of time required for the absorption of medicine depends upon the solubility of the remedies, the method of giving, and the state of the circulation.

Subcutaneous injections are absorbed, under ordinary circumstances, in five minutes, as they enter directly into the circulation. Owing to the large number of blood-vessels in the lungs, medication given by inhalation will also be absorbed speedily, that is, in five to ten minutes. The average time required for gastric absorption depends on the state of the stomach and the nature of the medicine. Medicine will be absorbed sooner when the stomach is empty than when it is full. Solutions are more readily taken up into the circulation than powders and pills, because the latter must first be dissolved; and solutions made with alcohol will probably be absorbed in quicker time than those made with water or other liquid. Rectal absorption is the slowest, requiring three-quarters of an hour.

**The Time to Give Medicine.**—The best time to give medicine depends on its nature and the effect
sought. If prompt action is desired, it is given when the stomach is empty. The majority of cough medicines, cardiac tonics, and diuretics come under this head, and are generally given between meals. Bitter tonics, being intended to act directly on the mucous membrane of the stomach, for the purpose of stimulating the secretion of the gastric juices, are given shortly before meals. Alkaline tonics are also given before meals, except when they are intended to neutralise hypersecretion of hydrochloric acid. In that case, they are given after eating. Saline cathartics and quickly acting purgatives are given before meals, preferably before breakfast, but laxatives are given at night. Acids and other irritating substances such as iron, etc., should be given after meals and well diluted. Remedies intended to effect intestinal, and not gastric digestion, are given when the contents of the stomach are about to pass into the intestines, viz.: between two and three hours after eating.

Give medicines to be taken before eating, half an hour before meal time, and those to be taken after eating, twenty minutes after the meal is finished.

**Important Rules for the Giving of Medicine.**—There are a number of very important rules to be observed in the administration of medicine.

1. While pouring out or administering a dose, never think of anything but the work in hand. Never speak to any one, nor allow any one to speak to you. Otherwise, you will surely make a mistake, and a mistake sometimes means the loss of a patient’s life.

2. Always give exactly what is ordered, not one drop more nor less.

3. Give medicines on time. If they are ordered
for twelve o'clock, for instance, they must have been given by that time.

4. Read the label on the bottle thrice, before taking the bottle from the shelf; also, before and after pouring out the medicine.

5. While pouring the medicine, hold the label on the upper side, to avoid defacing it, and, before replacing the bottle, wipe its rim with a piece of gauze kept for the purpose.

6. Use graduated glasses and pipettes, not spoons, for measuring.

7. While pouring, hold the glass with the mark of the quantity you require on a level with your eye. If held above the eye, you will give too little, if below, too much.

8. Give minims when minims are ordered, and drops when drops are ordered, for, in many medicines, there is a marked difference between the two.

9. Always shake the bottle before pouring out the medicine.

10. Always re-cork bottles immediately after use. Many medicines contain volatile substances and will become either stronger or weaker if left uncorked.

11. Never mix, nor give at the same time medicines which change colour or form a precipitate when put together.

12. Give acids and medicines containing iron through a glass tube or straw, as they discolour the teeth.

13. When giving medicine to an unconscious patient, drop it far back on the tongue, using a small spoon.

14. Never allow one patient to carry medicine
to another. Innumerable mistakes have thus been made.

15. Some medicines, notably several remedies for coughs, should be given undiluted, while others, on account of their irritating properties, should be very well diluted. Never dilute more than is necessary, however, since the addition of a large quantity of water renders a disagreeable dose still more unpleasant to take.

16. Always make a dose as palatable as possible. To this end, never use warm water to dilute medicine, but either hot or iced water. Holding a piece of ice in the mouth for a short time before taking medicine, or holding the nose while taking it will often render a disagreeable flavour less noticeable. Oleum ricini (castor-oil), to which lemon juice, a piece of ice small enough to swallow, and seltzer have been added is not at all unpalatable if it is immediately followed by a drink of seltzer. Other oils, with the exception of oleum tiglii (croton oil), can be given in the same way, or in milk, coffee, brandy, sherry, or other wine. Oleum tiglii is given on sugar. Powders with a disagreeable taste can be given in capsules or cachets. To use cachets, it is necessary to moisten their edges to make them stick together, but with capsules this is unnecessary, since their two parts slip into each other. When the powder is too large to be given in this way, it may be put into syrup, glycerine, jam, or honey. Powders with a disagreeable taste are placed far back on the tongue, and swallowed with a drink of water, but they should

1 Capsules or cachets are made of gelatine which melts at the body temperature, thus releasing the powder shortly after it reaches the stomach.
never be given in this way to an unconscious or a delirious patient, as particles of powder might get into the larynx.

17. When you are not certain that pills or triturates have been freshly made, pulverise them, as they soon become so dry and hard that they will not readily dissolve in the stomach, and may pass through the intestinal tract undigested.

18. Keep separate medicine glasses for oils and strong-smelling drugs.

Food and Drugs.—The influence of certain foods upon certain drugs must be taken into account. Starchy foods should be avoided when large doses of any iodine composition are being given, as starch will neutralise their effect. Milk and acids should never be given near together. Milk and albuminoids should not be given soon after, nor shortly before doses of mercury or calomel, since albuminate of mercury will thus be formed, and the medicine will be rendered ineffectual. Acids and salts or salty food must not be given near to a dose of calomel, for the calomel will be changed to corrosive sublimate by their action.

Hypodermic or Subcutaneous Injections.—When prompt action is required, and, sometimes, when the stomach is unable to retain medicine hypodermic injections are resorted to. The dose thus given is usually half to one quarter of that given by mouth.

Drugs intended for hypodermic use are generally specially prepared. They are put up in a concen-

1 This is particularly true of pills.

2 The word "hypodermic" is derived from two Greek words and means "under the skin." Subcutaneous also means "under the skin," but is of Latin derivation.
trated form, and great care is taken to have them pure and sterile. As a rule, it is only the active principle of drugs which is thus given, brandy, camphor, and ether being common exceptions. A drug not known to be perfectly fresh should never be employed hypodermatically, since an abscess may result.

Abscesses may also be caused by an unsterile needle or syringe. Therefore, these instruments must be carefully sterilised. The syringe is sterilised by alternately filling it with alcohol or carbolic 1–20 and emptying it. When carbolic is used, the syringe must be rinsed with sterile water, before being loaded with the drug. If the entire syringe is of glass and asbestos, it is often boiled. The needle is sterilised by being passed through an alcohol flame, by boiling for one minute,¹ by soaking in carbolic 1–20 and rinsing in sterile water before use, or by attaching the needle to the syringe, holding it in alcohol 95%, drawing the alcohol up into the syringe, and then expelling the alcohol. This last procedure should be repeated five or six times. If the instrument is cleansed in the same manner after use, is kept in a clean box, and is not used for septic or infectious cases, it demands no other treatment.

A tray, on which all the apparatus needed for subcutaneous injections is kept, should have a place in or near the medicine case. This tray should be supplied with three small,² covered glass jars (one for gauze sponges, another for alcohol, and another which should have absorbent or other soft cotton in the bottom, for the syringes and needles) and with

¹ Both of these methods soon blunt the needle.
² Three inches in diameter.
a small open glass dish in which to put the sponges after use. When about to give an injection, carry this tray to the bedside, having first filled the hypodermic at the medicine case and placed it on a sterile sponge in such a way that the needle cannot come in contact with anything which would render it unsterile. The method of filling the hypodermic depends on the kind of syringe used. If it is a glass syringe, attach the needle, remove the piston, and pour in the drug, holding the syringe slightly tilted while doing so. Pour in one or two drops more of the drug than are necessary, insert the piston, and push it gently down. When the piston reaches the solution, turn the syringe, pointing the needle upward, and gently press the piston until all bubbles of air disappear, and only the required amount of medicine remains in the syringe. While doing this, hold the mark of the required dose on a level with your eye. With the majority of metal syringes, the piston cannot be removed, and the fluid is drawn up through the needle. Otherwise, the method of procedure is the same as with the glass syringe.

Morphine and atropine are sometimes ordered to be given at the same time. When this is the case pour or draw the first drug in, expel the air, measure the second drug in a minim glass which has been washed with alcohol, and draw it in, being careful not to suck air with it by drawing it in further than the needle.

When doses of less than four minims are ordered dilute the drug with an equal amount of sterile distilled water, draw it into the syringe, and bring the piston to the level of twice the dose ordered. This is done because, with the majority of syringes, it is almost
impossible to measure less than four or five minims accurately. Digitalis is often diluted in this way, as it is thus rendered less irritating to the tissue.

The safest places for a hypodermic injection are the outer surfaces of the arms, legs, thighs, or abdomen. It should never be given over the course of a blood-vessel or bony prominence.

To give a hypodermic injection: Wash the part well with alcohol, using a gauzy sponge. Take up and hold firmly between the thumb and first finger of the left hand a cushion 1 of muscle, stretching the skin while doing so. Insert the needle quickly, in an almost vertical direction, deep into the tissue. Press the piston gently to inject the fluid. Remove the needle holding an unused end of the sponge against it and press the sponge quickly over the hole to prevent the escape of the fluid. Knead the spot gently for a few seconds to hasten absorption.

Before putting away the instrument, clean it in the same manner as you prepared it, with the addition of drying the needle by inserting and withdrawing a wire several times, wiping it before each reinsertion. When the needle is dry, leave the wire in it, or it will soon become clogged and unfit for use. Never allow the point of the needle to come in contact with anything hard, as it very easily becomes blunted.

**Methods of Giving Medicine by Inhalation.**—Certain drugs are administered by inhalation, both for systemic and local effects.

Ammonia, the anaesthetics—ether, chloroform, etc., —creosote and eucalyptus are given by sprinkling on a towel, cloth, or cone—made for the purpose,—which

1 Note that it is the muscle, not the mere skin that is to be grasped.
is held over the nostrils and mouth. Before giving chloroform, always rub vaseline or oil on the patient’s face, or an intense irritation may ensue.

**Dry Inhalation.**—To give a dry stramonium inhalation, put stramonium leaves into a bowl, fasten a cone of stiff paper over the bowl, set fire to the leaves, and have the patient inhale the smoke through the free end of the cone.

Oxygen may be given by dry inhalation. It is employed when, from any reason, the lungs are failing to take a sufficient amount from the air. Cyanosis is an indication that this is happening. The amount of oxygen being used may be estimated and, therefore, regulated, by making it pass through water, the quantity passing being indicated by the size of the bubbles produced. Enough oxygen to produce small bubbles suffices. The method of giving oxygen is as follows: Stand an oxygen tank on the floor by the bedside. Connect its faucet, by means of rubber tubing with an “oxygen bottle” half filled with water.\(^1\) Any bottle with a wide mouth and full rounded bottom will answer the purpose. Insert in the bottle a cork, preferably a rubber one, making two holes in it for the introduction of glass tubes. These tubes must be bent, and one should be longer than the other. Attach the tubing connected with the tank, to the longer one, and a second piece of rubber tubing long enough to reach the patient’s mouth, to the shorter one. Fit a funnel into the other

\(^1\) Certain drugs such as creosote, carbolic etc., are sometimes ordered to be added to the water. It is essential to remember the right connection of the tubes, since a mistake will lead to the cork and water being blown out of the bottle as soon as the oxygen is turned on.
end of this tubing. Hold the funnel either at the side of the face, slightly tilted forward, or at least twelve inches above the mouth. Never hold it directly over the mouth, or the exhaled breath will be thrown back, and the effect of the oxygen will be minimised.

Steam Inhalations.—Steam inhalations may be given in a number of ways:

1. Pour the drug prescribed into a "Maw's inhaler," a carafe, or a pitcher of boiling water. Wrap the receptacle in a bath towel or small blanket, leaving a small opening, if the carafe or pitcher is used, through which the vapour can be inhaled. The "Maw's inhaler" is fitted with a mouthpiece and, if this is used, only the mouthpiece is left uncovered.

2. If the inhalation is to be continued for some time, put the medicated water into a kettle, and keep it boiling over a gas or alcohol lamp. Attach either the small end of a cone made of stiff paper or a piece of rubber tubing to the spout of the kettle, and insert a funnel in the free end of the tubing. This will make it easier for the patient to get the full benefit of the steam.

3. A croup tent, so-called because of its frequent use in croup, may be used in giving steam inhalations. To make such a tent: Stretch two sheets, right sides together. If the steam is to be introduced at the back of the bed, pin them down the centre, putting the pins quite near each other, and fold each sheet over upon itself in order to form a seam. If the steam is to be introduced at the side, put the sheets wrong sides together, and do not pin. Some hospitals have hoops which fit into the tops of the beds, and others, various forms of frames which can be tied to the
bed and over which the sheets can be draped (see illustration). Lacking these, tie sticks or rods,¹ four to five feet in length, to each corner of the bed, tie a bandage from rod to rod, stretching it tightly, and drape the sheets over this bandage. To drape the sheets: Wind a bandage around the hoops or the top of the frame. Secure this in place. Put the doubled sheet over it, allowing it to hang about a foot in front, and at least to the line of the mattress in the back. Fold the excess width from the back around the sides, and pin to the bandage. Then, fold up the sides of the front, and pin them in place (as in the engraving). If the steam is to be introduced at the back, put the spout of the kettle through an aperture which can be made by removing a pin or two in the seam. The spout of the kettle must be at least two feet above the patient.

In an emergency, an umbrella can be tied to the head of the bed and a sheet thrown over it in such a manner that the sides and back of the bed will be walled in, and the steam can be made to enter at the back.

Inunction.—Medication is sometimes given by absorption through the skin (inunction). The process is described in Chapter X, under the head of "Local Applications."

Methods of Giving Medication by Rectum.—The two methods of giving medication by rectum are enemata and suppositories. The dose of medicine given by rectum is usually twice as large as that given by mouth, absorption in the large intestine being incomplete.

Enemata.—The giving of enemata is described in Chapter XIII.

¹ Umbrellas or canes will answer the purpose in the home.
Suppositories.—Suppositories are conical-shaped preparations of cocoa-butter, in which various drugs are incorporated. Though solid enough to retain their shape in the usual room temperature, the cocoa butter melts readily after it is introduced into the rectum, releasing the drug, which is then absorbed. To insert the suppository, oil both it and the index finger, and hold a folded towel to the anus till all desire to expel the suppository has passed.

Application of Medicine to the Eye.—To apply medicine to the eye, separate the lids with the thumb and first finger of the left hand, making pressure on the frontal and malar bones, and have the patient look up. When this is properly done, there is quite a trough between the eyeball and the lower lid, and it is into this that the application should be poured. If the application is intended for the cleansing of the eye, direct its current from the inner to the outer angle. Otherwise, the discharge may be washed into the lachrymal sac and a serious inflammation result. For this same reason, wipe from the inner to the outer angle of the eye when wiping out a discharge. On the other hand, when dropping into the eye medication intended to remain there, drop at the outer angle, since, if it is put in near the opening of the lachrymal sac, it will flow into the sac immediately and the eye will not be benefited. An ordinary medicine dropper can be used for any of these purposes, but for the cleansing application a soft rubber eye syringe or compress of absorbent cotton is better.

Whatever the implement used never let it touch the eye.

When the medication is intended for the lids, evert the lids well and drop the medication directly on
them. To evert the lower lid, place the thumb near its margin and press it downward, while the patient looks upward. To evert the upper lid, hold the lashes between the thumb and index finger of the right hand, draw the lid down, place a probe, thin pencil, toothpick or similar implement horizontally across it, and turn the lid back over the implement.

Medicines which dilate the pupil are called mydriatics, those which contract it myotics.

**Medicine Lists**

There are a variety of methods in hospitals, for keeping lists of medication, to insure its correct administration.

One of the best methods, which was devised in St. Luke's Hospital, New York, some years ago, consists of having tickets, two inches square, of coloured cardboard, a different colour or shape being employed for each time of administration. Thus: red signifies every four hours; red, with a corner off, every two hours; pink, every three hours; yellow, after meals; blue, before meals; white, every night; white, with a corner off, every morning, etc. On these tickets, are written the patient's name, the name and dose of the medicine, and the hour of giving. They are kept in the medicine case, each colour and shape together. As soon as the medicine is poured out, the ticket is placed on the medicine glass and must not be taken off, until the medicine is given to the patient. When giving out a number of medicines at the same time, read each ticket before taking it off the glass. New tickets are made out and old ones destroyed as soon as medication is ordered or changed, a check being made in the Doctor's Order Book to show that this
has been done. The tickets to be destroyed are doubled and left on the head nurse's table. They must not be thrown away, and new tickets must not be put into the medicine case until the nurse in charge of the ward has compared them with the order book.

Another method of administering medicine is to have the medicine tray marked in numbered squares. The beds in the wards are distinguished by corresponding numbers, and the medicine for each patient is placed in the square bearing the number of his bed. Lists of the medication, on which are inscribed the number of the bed, the patient's name, the name and dose of medicine, and the hour of giving are also kept.

A record of all medication given should be made on the patient's chart, as well as on the medicine list, and the result of the medicine should be watched for, and charted.

The Doctor's Order Book

It is a wise rule of many hospitals, that a "Doctor's Order Book" be kept in every ward, and that, except in emergency, no medicine be given, the order for which has not been first written in this book by the doctor. In these hospitals a nurse is sometimes allowed to write the orders, but, in that case, the doctor must read them and sign his name to them.

The Medicine Case

The ideal medicine case is of glass, with a painted iron or nickel frame. Provided that the case is always locked, and the key never left near it, there will be less danger that the patients will help themselves to its contents if it is kept in the ward, than
in an adjoining room. But whatever the style of the medicine case, it should be always scrupulously clean and neat. One great secret of keeping it so is to wipe the rims of the bottles carefully, before replacing them after use.

Bon Ami, or ordinary whiting is better than either soap or ammonia for cleansing glass, paint, and nickel. When washing the shelves of the case, never take down more bottles than can be quickly replaced if you are obliged to leave your work. Medicines must never be left out of the case, nor the case left unlocked.

So far as possible, keep the medicines in alphabetical order, but with bottles of the same size together. All the more powerful drugs should be kept in bottles with rough exteriors and of a different size from the others. They should be marked “poison” and placed together. Never have medicine in unlabelled bottles, nor leave a dose of medicine in an unmarked glass. Never order a large amount of medicine at one time. There are few medicines that will not deteriorate with age.

There should be two trays in or near the medicine case. On one, keep the medicine glasses, minim glasses, medicine dropper, water pitcher, glass rod—for stirring mixtures—drinking tubes, a towel to use when washing the glasses. The other tray is required to carry the medication to the patients.
CHAPTER XVI

EMERGENCIES

Surgical Emergencies: Burns and Scalds; Contusions; Dislocations; Foreign Bodies in Ears, Eyes, Nose, Trachea, and Tissues; Fractures; Haemorrhage; Shock; Sprains; Wounds. Medical Emergencies: Apoplexy; Asphyxia (Artificial Respiration); Collapse; Convulsions; Drowning; Epilepsy; Fainting; Hysteria; Intoxication; Poison; Sunstroke.

Outside the hospital, a nurse will often be obliged in emergencies to take the entire responsibility of a case, though she must remember that, except in very simple accidents, she is to do only that which is absolutely essential, and must get a doctor as soon as possible. In the hospital (barring extreme cases, such as haemorrhage) there is not much for the nurse to do in emergencies except to notify the doctor, get everything that he will require ready, and give him prompt and intelligent assistance in his work. Nevertheless, in the hospital, as well as outside of it, she must act quickly and keep cool.

Emergencies may be divided into two classes, surgical and medical.
Burns and Scalds.—A scald is an injury to the tissues caused by moist heat, while a burn is a like injury produced by dry heat. The treatment in both cases is practically the same.

Burns are classified according to the depth of the injury, as being of three degrees: First, redness of the skin; second, vesication; third, charring of the skin and deeper tissues.

Burns of the third degree will of course do serious damage to the tissue and function of the affected part; but, so far as the danger resulting from shock and systemic after-effects are concerned, it is not the degree of the burn, but the extent of the skin surface destroyed, that is of importance.

Shock is always to be expected, and treatment must be applied after a burn of any extent. It must be remembered that the patient need not necessarily be unconscious or in a state of coma to be suffering from shock. Patients who have never been unconscious have died from heart failure, resulting from shock.

Other causes of death following burns are: pneumonia, resulting from the irritation of the bronchi and lungs, due to the inhaled smoke; hæmorrhage, from the sloughing of the blood-vessels; sepsis, from the absorption of the purulent discharges; and inflammation of the internal organs, from the absorption of septic material and, in the case of the kidneys and intestines, of the extra work thrown upon them by the failure of the skin to perform its part in the elimination of waste matter from the body. Death from the last two causes may not take place for several weeks, but a fatal issue is likely to follow.
burns, if more than one-third of the body is involved, and will almost certainly occur, if two-thirds of the skin surface has been destroyed.

Burns are produced by the action of fire, strong acids, and alkalies.

Fire.—If your own clothes should catch fire, lie down on the floor and press the burning portion to the ground. Keep your mouth shut, to avoid the inhalation of smoke. If another person is the sufferer, wrap him quickly and tightly from head to foot in a blanket, rug, or other heavy woollen article, beginning at the head, and roll him on the floor. Before removing the blanket, be sure that the flames have been smothered.

Treatment.—Shock is the first thing to be considered in the treatment of burns. Loosen all clothing, keep the patient quiet and in the recumbent position, apply heat, give plenty of fresh air, and, if the pulse is weak, stimulation. Whisky is the stimulant to be preferred when necessary to give one without a doctor's order. Formerly the air was always immediately excluded from the wounds by means of a dressing. Gauze, clean, soft linen or cotton, wet in a saturated solution of bicarbonate of soda or carron oil¹ is the dressing most frequently used. The bicarbonate of soda has the advantage of being odourless and cleanly, and is generally easily obtained. Its use is continued for only two or three days and is followed by a dressing of sterile boric acid, zinc oxide, or other ointment (see Chapter XV). In many hospitals the “open treatment” is now used; the patient is kept in a warm room and the wounds dusted with stearate of zinc and exposed to

¹ Carron oil is a mixture of equal parts of olive oil and lime water.
the air. In caring for severe burns, the danger of deformity, caused by the contraction of the skin and underlying muscles must be remembered, and any suspicion of this condition reported. This danger can be somewhat obviated if treatment by the application of splints, or Buck’s extension is started in time, and massage, begun at an early date, is invaluable. Burns are sometimes treated with continuous warm baths (see Chapter IX).

**Acids and Alkalis.**—Burns produced by an acid other than carbolic acid, are best dressed in the beginning with dry bicarbonate of soda. For carbolic acid burns, use alcohol. When burns are caused by an alkali, neutralise the effect by washing with diluted vinegar or lemon juice, and afterwards apply an ointment dressing.

For burns of the eye resulting from the introduction of strong alkalies, irrigate freely with warm water or boric acid solution. For acids, apply a few drops of pure albolene or white vaseline.

**Contusions.**—Contusions are injuries in which extravasation of blood into the cellular tissue takes place, due to the rupture of the superficial capillaries. The result is oedema and discolouration of the skin.

**Treatment.**—The objects aimed at in the treatment of contusions are: The prevention of the further escape of blood into the tissues; the counteracting of any tendency to inflammation; the relieving of pain, and, in cases where the tissue is crushed, the restoration of vitality of the part. Either very cold or very hot applications are, therefore, the general remedy, the former being usually preferred in slight contusions, and the latter, when the vitality of the tissue has to be considered.
Dislocations.—A dislocation is the displacement of any of the articular bones. It is associated with more or less injury of the ligaments. Its symptoms are: loss of function, deformity, and pain.

Treatment.—An improperly reduced dislocation will result in permanent deformity. Therefore, if any of the large joints are affected, a nurse should not do more than apply cold to keep down the swelling, and see that the extremity is properly supported, till a surgeon’s services can be obtained. Dislocation of the fingers can sometimes be easily reduced by pulling them gently. A dislocated jaw can also, at times, be easily brought into place in the following manner: Protect the thumbs well, and place them on the back teeth, at the same time holding the fingers under the jaw. Forcibly depress the angle, of the jaw, lifting the chin at the same time, and remove your thumb quickly, for the jaw will slip into place with a snap.

Foreign Bodies in the Ears, Nose, Trachea, and Tissues.—Never poke at anything in the ear. If there is an insect in the ear, lay the patient down on the side opposite to the affected ear, pull the tip of the ear upward and backward, and syringe gently with warm water. Be careful not to close the orifice with the end of the syringe. For hard substances, except such as will swell with moisture, syringe the ear with warm water. If the substance cannot be removed by syringing, medical aid had better be sought.

To remove lime or other soluble substance from the eye, bathe the eye with warm water. Insoluble substances, such as dust or cinders, can often be removed by drawing the upper lid down over the eye,
and blowing the nose forcibly at the same time. If the particle is caught under the upper lid, instruct the patient to look down, turn the lid back over a small pencil or knitting needle, being careful not to make pressure on the eyeball, and then, with the corner of a handkerchief, wipe off the offending object. If the particle is under the lower lid, draw the lid down against the cheek-bone and instruct the patient to look up. If it seems to be imbedded in the eyeball, do not interfere with it, but have the eye seen by an oculist at once, or permanent injury may result.

When any foreign substance gets into the nostril have the patient take a deep breath, close the mouth, and press the other nostril. The air is forced out, and the object may then dislodge. If it does not, make compression on the nostril above the object, and try to draw it out with a hair-pin or bent wire.

An obstruction in the throat, trachea, or oesophagus may sometimes be removed by striking the patient forcibly on the back, between the shoulders. Sometimes it is expedient to invert him while doing so. A child can be held up by the legs; but an adult should be placed across a bed, couch, or chair, with his head and chest hanging well over the edge. If the object is in the oesophagus, it can often be washed down by a drink of water, or forced down by eating bread or other solid substance. To prevent excoriation of the alimentary canal, after the swallowing of any sharp substance, have the patient eat plentifully of bread, potatoes, or mush, but do not give a purgative.

To extract a barbed instrument, such as a fish-
hook, from the flesh, push it sufficiently through to break off the head before drawing it back.

Fractures.—A fracture is a dissolution of continuity of the osseous tissue. The symptoms are: loss of function, abnormal mobility, crepitus, pain, swelling, and discolouration, the last-named being due to extravasation of blood and serum at the point of fracture.¹

A fracture may be simple, compound, complicated, comminuted, impacted, multiple, or greenstick.

In a simple fracture, the bone is severed, but there is no wound in the tissue at the seat of fracture, exposing it to the outer air. A compound fracture is one in which the air communicates with the ends of the broken bone. A fracture is said to be complicated, when wounds are present, but not at the seat of fracture, and when a joint is involved. In an impacted fracture, the broken ends of the bone have been forcibly driven into and fixed against each other. In a comminuted fracture, the bone is broken, or crushed, into many pieces, and the breaks communicate. A multiple fracture differs from a comminuted fracture in that, though there are many breaks, they do not communicate with each other. A greenstick fracture is an incomplete fracture. It occurs most frequently in children, because, owing to the gelatinous nature of their bones, the bone is not easily completely severed.

Fracture of the lower end of the fibula, complicated with dislocation of the ankle joint and fracture of the inner malleolus, is called Pott’s fracture.

¹ Scudder, in his *Treatment of Fractures*, uses the more definite terms “closed” and “open” wounds instead of those so long in use “simple” and “compound.”
ture of the lower end of the radius is known as Colles's fracture.

According to the direction of the break, fractures are said to be longitudinal, oblique, or transverse.

_Treatment._—It is a mistake to imagine that a fracture must be reduced immediately. Far more harm is done by unskilful setting than by allowing the patient to wait some hours, or even two or three days, until the swelling has disappeared and proper aid can be secured. In the meantime, handle the fracture as little as possible and apply temporary splints to keep the broken bones in apposition and to prevent pain from the spasmodic twitching of the muscles. These splints can be made by binding pieces of board, shingles, strong pasteboard, a pillow, a couple of umbrellas or walking canes, on either side of the extremity.

Apply cold, such as ice-caps, or compresses wrung out in an iced solution, such as lead and opium, to control the swelling, which, if it becomes severe, will make the fracture harder to reduce.

In a case of fractured thigh, extend the leg and bind to it a splint long enough to reach from the axilla to the heel. When the fracture is of the leg, the splint need only extend from the heel to above the knee. When the patella is fractured the leg should be elevated and the bones kept in apposition by the application of a long splint at its back. For a fracture of the forearm, bind a well-padded splint on each side of the arm, keeping the thumb up and leaving the fingers above the knuckles free, and place the arm in a sling (see Chapter XVII). For a fractured clavicle, have the patient lie on his back, without a pillow, and bind the arm on the injured side across
his chest. For fractured ribs, keep the patient quiet, pin a broad binder tightly across his chest, and watch for any bloody expectoration—puncture of the lung by the broken bone being a common complication. For a fractured pelvis or spine, keep the patient on his back, and very quiet, and put a fracture-board under the mattress.

For a fracture of the skull: Keep the patient quiet and the head of the bed slightly elevated. Watch for twitching, convulsions, or paralysis of any part of the body, and report any such symptoms immediately, as they denote pressure upon some part of the brain. Blood oozing from the ears, mouth, or nose, or ecchymosis around the eyes usually means that the fracture is at the base of the skull—a very serious condition. Keep the blood washed away, as it is a good culture media for germs. Apply ice-caps to the head.

Great care must be taken in handling fractures. A simple fracture may be made compound by careless handling. When lifting, apply support under the point of fracture, and under the joints both above and below it. The wound in a compound fracture must be carefully cleansed and dressed with the usual antiseptic precautions.

The repair or knitting of a bone is due to a substance known as callus, which nature, soon after the occurrence of the accident, throws out around the ends of the broken part. This callus is soft at first, but gradually hardens and glues the bones together. The callus which forms around the outer edges of the bones is called provisional callus, and this is in time reabsorbed, being only intended by nature to aid in keeping the bones in apposition. The bone should be fairly strong at the end of six weeks, but it will
take from six months to a year for the affected part to be as firm as it was before the accident.

Hæmorrhage.—Hæmorrhage is the escape of blood from its containing vessels. When caused by a wound, it is called traumatic, but when it is due to a diseased condition of the blood-vessels, it is said to be spontaneous. According to the vessel from which the blood escapes, the hæmorrhage is known as arterial, venous, or capillary. The variety will be recognised by the manner in which the blood comes from the wound. In arterial hæmorrhage it will, owing to the contractive power of the arteries be thrown out in jets or spurts corresponding to the heart-beats, and will be a bright red colour. In venous hæmorrhage, it will be darker in colour and will flow from the wound in a steady stream. In capillary hæmorrhage the blood will ooze from the general surface of the wound, and not from any one point.

Hæmorrhage occurring immediately after a wound or operation is known as primary, while that which comes on some hours or days afterwards is known as secondary. Secondary hæmorrhage is generally caused either by the slipping of a ligature or by the sloughing of the tissues and blood-vessels.

In cases of internal hæmorrhage, the escaping blood does not always come away immediately, and constitutional symptoms only will indicate that a hæmorrhage is taking place. The symptoms are: a growing pallor; weak, shallow, sighing respiration; thirst; restlessness; a longing for fresh air; vertigo; a weakening of the pulse beats which also become rapid and irregular; a falling temperature.

When the hæmorrhage is from one of the larger arteries, death may ensue in less than five minutes.
Treatment.—The first two things to consider in endeavouring to control a haemorrhage are position and pressure.

Position.—When the haemorrhage is from an extremity, elevate or flex the limb; when from the head, elevate the head of the bed; when from the abdomen, elevate the foot of the bed.

Pressure.—Pressure may be direct or indirect, and provisional or permanent.

Direct pressure is made directly over the bleeding point. This is done by bandaging tightly rolled compresses of gauze firmly over the wound, or, if the wound is deep, by packing it tightly with gauze before applying the compresses. This method, if the haemorrhage is from the larger arteries or veins, might not be sufficient; or it might be inadvisable to use it either because of the nature of the wound, or the danger of infection. In these contingencies indirect provisional pressure must be made.

Indirect pressure is made over the large artery or vein which supplies the part. Pressure for arterial haemorrhage must be made between the heart and the bleeding point; for venous it is first made between the periphery and the wound, and then above the wound to prevent the engorgement of the veins, or the entrance of air into them. This mode of pressure is called provisional, because it must not be continued for any length of time or gangrene will result. It can be safely continued for only one hour. It is made either by pressing the thumb or the fingers directly over the course of the artery or by applying a tourniquet or Esmark bandage.

A tourniquet can be made of a handkerchief or a bandage of any kind. To prepare and use a tourni-
quet: Place some hard substance in the centre of the bandage or make a large firm knot in it, and put this over the course of the artery. Tie the bandage tightly. Introduce a stick, pair of scissors, or any similar object under the bandage, then turn, twisting the bandage until the bleeding ceases. When possible put a piece of cardboard or like substance under the bandage at this point, to avoid catching in the skin while twisting the bandage.

The Esmark bandage is made of rubber. In applying it, make a few spiral turns around the extremity, pulling the bandage to its full extent. Leave a portion of the bandage rolled and slip the roll in under the last turn of the bandage, placing the roll over the artery. An ordinary piece of rubber-tubing applied tightly and tied in a surgeon’s knot will form an effective substitute.

To be able to make pressure without loss of time it is necessary to know the course of all the large arteries. Nurses should therefore give this study careful attention and should practise stopping the arteries on each other. To do this make pressure on the large arteries which supply the extremities with blood and then feel at the points below where the pulse can usually be felt; if there is no pulsation in these arteries the pressure is effectual.

To control hæmorrhage of the scalp by indirect pressure, make the pressure on the temporal arteries; of the face, on the facial arteries either at the lower jaw just below the angle of the mouth or before the ears above the angle of the jaw. For hæmorrhage of the axilla or of the shoulder make pressure on the subclavian artery by pressing the fingers in behind the clavicle near its centre. For hæmorrhage of the
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arm or hand make pressure on the brachial artery; this can be best reached between the biceps and triceps muscles, or the inner surface of the arm, at the end of the upper third of the length from the shoulder to the elbow. Hæmorrhage, on the hand, can also be controlled at the wrist; pressure there must be applied on both the radial and ulnar arteries. Hæmorrhage of the thigh can be arrested by pressure on the femoral artery, either where it passes over the rim of the pelvis—viz.: at about two-thirds of the distance from the hip bone to the middle line of the body—or at Scarpa's triangle. For bleeding of the leg below the knee pressure is made on the popliteal artery, behind the knee, and on the anterior and posterior tibial arteries for hæmorrhage in the foot.

After the amputation of a leg, as there is even more than the average danger of hæmorrhage, either an Esmark bandage or tubing should be kept near the patient's bedside for at least ten days.

Other Methods of Arresting Hæmorrhage.—Other methods of arresting hæmorrhage are:

1. The application of heat and cold. Heat coagulates the albumin of the blood and thus favours the formation of clots, it also contracts the arteries. Examples of its use are: the hot douche (120° to 124°F.) in uterine hæmorrhage, hot irrigations and the use of the actual cautery during operations. Cold contracts the arteries but interferes with the clotting of the blood. It is generally applied in the shape of ice or ice-water, either in ice-caps, ice-poultices, or ice-coils.

2. The use of astringents, such as acetic acid, adrenalin, and ergot. The acetic acid is added to hot douches, the ergot is given internally, and the
adrenalin is employed both internally and externally.

3. The use of styptics, such as alum, gallic acid, and lunar caustic. Styptics are rarely employed now, because, although they are often efficacious in arresting hæmorrhage, their action is deleterious to the tissue. Iron is sometimes used to arrest bleeding after extracting teeth and slight operations such as tonsillotomy.

4. Ligation. The bleeding vessel is held by a pair of forceps while a ligature is tied around it.

5. Torsion. The artery is seized by the forceps and twisted. The twisting renders the use of a ligature unnecessary.

To check epistaxis (nose-bleed), elevate the arms and head, and apply cold to the back of the neck, forehead, and bridge of the nose. It is also useful to make pressure against the base of the nostrils by placing two fingers beneath the upper lip and pressing upward. When these methods fail, astringent sprays, such as adrenalin 10,000, can be used, or the anterior nares can be plugged by packing them tightly with absorbent gauze. Formerly, in cases of severe epistaxis, the posterior nares were plugged by attaching a tampon by a string to a rubber catheter, inserting the catheter in the nostril, passing it through the mouth and drawing it out, thus pulling the tampon into place. This is very rarely done now, the simpler method being usually quite as effectual, as the majority of hæmorrhages take place from the anterior nares.

In cases of internal hæmorrhage (as from the lungs, intestines, etc.), keep the patient quiet in a recumbent position, and, if the hæmorrhage is severe, shut off the return circulation from the extremities
by the application of tight bandages. In applying these bandages, begin at the shoulders and the thighs. By thus giving the heart less fluid to pump, its contractions are weakened and the blood, being sent with less force to the bleeding point, has a chance to clot at the ends of the vessels. One limb is always left unbandaged, the bandages being changed alternately, so that the circulation is not shut off from any one extremity longer than three-quarters of an hour.

After the hæmorrhage has been controlled the bandages are often applied in the opposite manner, that is, the extremities are raised and the bandages applied beginning at the periphery. This is done in this manner to keep the blood from the legs and arms and thus give the heart a larger supply.

The vomiting of blood is called hæmatemesis. The blood may come from all parts of the alimentary canal, or from the respiratory organs. When it comes from the stomach, it is dark coloured, and sometimes has a coffee-ground appearance. Hæmorrhage from the stomach is generally due to either ulcer or carcinoma of the stomach. In addition to the treatment already described, the patient must not be given food till ordered by the doctor. Crushed ice is often given.

Hæmorrhage from the lungs is called hæmoptysis. It is easily recognised, as the blood is frothy by reason of the admixture of air.

Blood in the urine is called hæmaturia. The blood may come from the kidneys, bladder, or urethra. When it comes from the kidneys, it is dark and clotted; when from the bladder, it is generally clearer.

Hæmorrhage from the intestines is known as
enterorrhagia. As in hæmatemesis, food must be discontinued until ordered by the doctor.

In cases of uterine hæmorrhage, hot douches (120°–124°F.) are generally given, acetic acid being frequently added to the douche. Ergot is also generally given, either through the mouth or hypodermatically, for its contractive effect upon the arteries. It is often necessary to pack the uterus. This is done by inserting either long strips of gauze, leaving the ends free, or tampons. The packing must be very tight, or it will be worse than useless. Only in an extreme emergency, when other means had failed, would a nurse be justified in doing this. Everything used must be sterile.

Hæmorrhage following child-birth is called post-partum hæmorrhage.

Hæmorrhage from the umbilicus in new-born infants is generally best controlled by the use of styptics. Alum and powdered perchloride or iron are most frequently used.

Hæmophilia (hereditary hæmorrhagic diathesis) is a hereditary predisposition to hæmorrhage, transmitted along the female line of descent. It is due both to the incapacity of the blood to coagulate properly, and to thinness of the walls of the blood-vessels. In persons thus afflicted the slightest wound may result fatally.

Shock.—All accidents of any severity are likely to be followed by shock, and it is often necessary to treat patients for this before even carrying out the specific treatment. Shock is a partial or complete prostration of the vital forces. Its symptoms are: a weak and irregular pulse, irregular, sighing respiration, mental and muscular weakness, pallor, and a
cold exterior. The temperature is subnormal at first, but pyrexia is apt to follow. The patient may or may not be unconscious. Complete unconsciousness is an unfavourable symptom. Vomiting, on the other hand, is a favourable one, since it shows that the nerve centres are not completely prostrated.

_Treatment._—To treat shock, loosen all clothing, elevate the foot of the bed, apply heat and give plenty of fresh air. Stimulation is given if there is no hæmorrhage. If there is hæmorrhage this must be checked first, and stimulation given, if at all, with caution. It must never be forgotten that the symptoms of shock are not always obvious immediately after an accident. The excitement caused by the event often acts as a strong stimulant for the time being. Therefore, after any severe accident keep the patient quiet and warm, or a sudden collapse may follow.

_Sprains._—A sprain is a wrenching or twisting of a joint, accompanied by a stretching of the ligaments and tendons. A sprained limb should be elevated and supported, and treated with either very cold or very hot applications. The two are sometimes alternated. In this case, the injured member is first treated either with a bath of hot water or applications of hot cloths and then with iced compresses or an ice-cap. Light massage is given after a few hours. The limb should be firmly strapped or bandaged, and should be permitted moderate use, unless there is some further complication. A nurse, being unable to differentiate between a sprain, dislocation, or break, should do nothing further than employ the hot and cold treatment until the patient has been seen by a doctor.

_Wounds._—Wounds have been described as "breaks
in the continuity of the soft tissues.” According to their nature, they are known as:

1. Contused wounds. These are made by a blunt instrument, and are accompanied by more or less crushing of the surrounding tissue. The external hæmorrhage from them is apt to be slight, but there may be considerable bleeding into the tissues.

2. Incised wounds. These are made by sharp instruments such as knives, glass, etc.

3. Lacerated wounds. These are accompanied by tearing of the tissue.

4. Punctured wounds. These are produced by pointed instruments or bullets.

_Treatment._—If there is hæmorrhage, control it (see page 222). When an incised wound has been made by a sterile object, the ends should be immediately brought into apposition. If it is of any extent, a surgeon should be notified, as unless the wound is sutured, an unsightly scar will result. Furthermore, if the wound is of any depth, some of the tendons or ligaments may have been severed and unless they are properly connected, loss of function will follow. If the wound is slight, wash the surrounding skin with soap and water, alcohol, or other disinfectant, and put on a sterile dressing.

When the instrument or object causing the wound is unsterile, or the wounded part is dirty, syringe the wound with an antiseptic solution and scrub the surrounding parts well with soap and water and a disinfectant. If there is any hair about the part, remove it by shaving. Always examine such a wound for foreign particles and wash out from it all blood clots. Never close it entirely. As a rule, it is advisable to insert a small strip of gauze, catgut or
rubber tissue in its lower angle for drainage. To provide emergency sterile dressing, cut clean soft muslin or gauze the required size, and boil or otherwise sterilise it (see Chapter XIX).

Before handling wounds, scrub and disinfect your hands. Be careful not to let anything unsterile come in contact with the wound.

The Healing of Wounds.—When tissue is cut or otherwise injured, nature sends out cells, similar in composition to those of the tissue, which gradually assume in all ways the form of this tissue and which, by their growth, bring the walls of the incised flesh into complete apposition. In an uninfected wound, the edges of which have been brought into apposition soon after the accident, recovery takes place in a very short time and there will be but little inflammation around the incision. This is called "healing by first intention," or "primary union." Wounds are said to heal by second intention when, owing to infection or failure to bring the edges of the wound into direct apposition, a greater amount of new tissue is required in the process of repair. In such wounds, red elevations, called granulations, appear on the surface of the forming tissue. These start from the sides and bottom and gradually fill up the wound. Sometimes, granulations grow too quickly or too large, and, in that case, an astringent, such as nitrate of silver, is applied to check their growth. When they are soft, or are not growing sufficiently, balsam of Peru is often applied to stimulate their growth.

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Apoplexy.—Apoplexy is generally due to pressure
on some part of the brain caused by haemorrhage from one or more of the cerebral blood-vessels. There is a sudden loss of consciousness, the face is usually flushed, and the pupils of the eye are fixed, one or both of them being dilated. The pulse, as in the majority of cases where there is brain pressure, is full and slow. The respirations are slow, laboured, and stertorous. There will be paralysis, usually hemiplegia. Convulsions and vomiting also may occur.

_Treatment._—To give first treatment to a victim of apoplexy, loosen his clothes, elevate his head and chest, and apply ice to his head, and warmth to his extremities. Do not give stimulants.

_Aspyxia._—Asphyxia is caused by a great diminution of oxygen in the blood, due to the impurity of the air, or to an obstruction of the passage of air to the lungs.

_Treatment._—If the asphyxia is due to the latter cause, remove the obstruction if possible. In all cases, give plenty of fresh air, loosen the clothing, and dash cold water over the face and chest unless the body is cold, when hot applications should be used. If necessary, perform artificial respiration and treat for shock. Cessation of breath for longer than two minutes is usually fatal.

_Artificial Respiration._ There are two methods of giving artificial respiration in common use, namely, Sylvester’s and Marshall Hall’s. To employ either method, the tongue must be first drawn forward and held so. If there is no assistant to hold the tongue out, tie a handkerchief or string around it, cross the ends, pass them round to the back of the neck, and tie them there.

If you use Sylvester’s method, lay the patient on
his back with his head and shoulders slightly elevated. Then, standing behind him, grasp his arms above the elbows and draw them slowly outward and upward till they meet over his head. Hold them in this position for two seconds and then flex them slowly but forcibly against the sides of the chest. The first motion causes inspiration, the second, expiration. The combined movements should be repeated sixteen times in a minute until respiration takes place naturally, or until all hope of resuscitating the patient has been abandoned. Resuscitation should not be considered hopeless until artificial respiration has been practised at least two hours.

When Marshall Hall’s method is used, the patient is placed upon his face, and pressure is made upon his back. He is then turned upon his side. After a few seconds, he is turned upon his face again, and pressure is reapplied upon his back. These movements are repeated sixteen times in the minute.

Collapse.—Collapse is an almost complete failure of the vital powers. The symptoms are the symptoms of shock intensified. The treatment is the same as for shock but with more stimulation.

Convulsions.—Convulsions in adults are generally due to epilepsy, hysteria, uremia, poisoning from drugs, or bacteria. They also sometimes complicate pregnancy. They are then called eclampsia.

Treatment.—To deal with a victim of convulsions: Keep him from hurting himself, but, beyond this, do not try to restrain his movements. Put something between the teeth to prevent him from biting his tongue. Loosen his clothing. Maintain him in a recumbent position, with the head slightly elevated. Give plenty of fresh air, but not stimulants. The
further treatment depends upon the cause of the convulsion.

Convulsions in children are more common than in adults, and may mean little or much. They are often due to difficult dentition, excitement, indigestion, or worms. They also frequently usher in many serious diseases, particularly the exanthemata. Put the child in a hot bath 112–118° F. (see Chapter IX). Give an enema and, if possible, a dose of castor-oil.

Drowning.—When you have to deal with a person who has been rescued from the water in an unconscious condition, you must resort to artificial respiration, but, before starting this, loosen his clothing, turn him face downward, raise his body at the waist line, to favour the emptying out of water from the trachea, and, then, clean out any accumulation of mucous from the back of his throat. As soon as possible, remove his wet clothes, put him between warm blankets, and, otherwise, treat for shock.

Epilepsy.—Attacks of epilepsy (see convulsions) are generally succeeded by warning sensations known as the "aura," the nature of which varies in different individuals. Attacks of epilepsy only last a few seconds. The mental condition of the confirmed epileptics becomes much impaired and insanity often results.

Fainting.—Fainting or syncope is a state of unconsciousness caused by a sudden enfeeblement of the action of the heart. This may be due:

1. To some form of heart disease.
2. To temporary weakness of the heart by exhaustion, as in extreme hunger, prolonged, excessive exertion, or even a slight amount of exertion if the person is in a weak condition.
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3. To anything strongly influencing the nervous system. The action of the heart, being to a great extent under the control of the nervous system, anything tending to affect strongly the latter (pain, fright, or excessive emotion, for example) may bring on an attack of syncope.

As the brain becomes anæmic in syncope, one of the first things to do is to lower the head. In fact, if a person threatened with syncope bends forward, when he first feels dizzy, so that his head will be lower than his knees, or lies down, keeping his head low, the attack will often be averted. Fresh air should be supplied in abundance and all clothing should be loosened. Cold water, thrown over face and chest, will, by causing enforced inspiration, often shorten the attack. Smelling salts or ammonia may be given by inhalation, but care must be taken in using the latter, not to let any drop into the eyes, and not to hold it too near the nose or mouth, as an intense irritation of the air passages may result.

After a patient has recovered from an attack of syncope, keep him quiet until the proper action of the heart and circulation is re-established.

Symptoms of Syncope.—In syncope, the face is pale, the pulse weak and somewhat accelerated, and the respiration shallow. The attack is generally of short duration.

Hysteria.—One of the common forms of hysteria is a simulation of syncope. In the former, the patient is not unconscious, he will resist any attempt made to raise the eyelid, and there will be little, if any change in his colour, or in the rate and quality of his pulse beat. The same facts are true of hysterical convulsions, and in these, the patient seldom hurts
himself. Hysterical patients should be watched but, as a rule, the best treatment is to leave them alone.

**INTOXICATION.**—The stupor of intoxication is often confounded with apoplexy, and, worse still, vice versa. In the former, the patient's pupils are generally evenly dilated, he can usually be partially aroused, and his breath smells of alcohol. He should be kept quiet and warm, and an emetic may be given.

Poisons.—According to their action, poisons are classified as:

1. Corrosives, which corrode and burn the tissues.
2. Irritants, which irritate the tissues.
3. Neurotics, which affect the nervous system.

**Treatment.**—The treatment for poisons has three objects in view: to remove the injurious substance; to neutralise its further action; and to remedy the ill effects already produced. The first object is attained by the giving of an emetic or lavage. The second object is attained by giving a chemical antidote, which must be a substance that will not, by acting chemically upon the poison produce a compound which is either insoluble or comparatively harmless. The treatment resorted to for the attainment of the third object is known as the physiologic treatment. It consists in the giving of demulcent drinks, to counteract the irritation caused by the poison on the mucous membrane, and of such medication as will neutralise the effect of the poison upon the system.

Emetics are seldom given after corrosive poisons, as the tissues would be still further corroded during emesis. Lavage is given when there is not too much
Emergencies

abrasion of the tissue to prevent the passing of the tube.

The emetics most commonly used are:

Sodium chloride (salt)—two teaspoonsfuls in a glass of water, repeating the dose several times, if necessary.

Mustard—two or three teaspoonsfuls in a glass of water.

Apopomorphine—gr. one-tenth to one-eighth given hypodermatically.

Ipecac—mxxx of the fluid extract.

Sulphate of zinc—grs. xx to xxx.

These are all adult doses. For a child’s dose, see Chapter XV.

If no emetic is at hand, tickle the back of the throat with the finger. This will often produce emesis.

In all cases except those mentioned above, give an emetic, and, if possible, lavage. If the stomach has not been well emptied of the poison, repeat the emetic or lavage, after giving the antidote, and follow by a second dose of the antidote.

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**SYMPTOMS AND SPECIFIC TREATMENT AFTER THE MOST COMMON POISONINGS**

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<thead>
<tr>
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<tbody>
<tr>
<td>Corrosive Acids:</td>
<td>Corrosion of the mucous membrane, intense abdominal pain, livid, cold skin, small, irregular pulse, stupor, collapse. There may be convulsions. As above.</td>
<td>Alkalies, soda, magnesia, chalk, lime-water.</td>
<td>Demulcent drinks, as oil, milk, and albumin stimulants, opium, external heat.</td>
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<tr>
<td>Acetic.</td>
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<tr>
<td>Citric.</td>
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<tr>
<td>Hydrochloric.</td>
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<td>Nitric.</td>
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<tr>
<td>Sulphuric.</td>
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<tr>
<td>Oxalic.</td>
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<table>
<thead>
<tr>
<th>Poison</th>
<th>Symptoms of Poisoning</th>
<th>Chemical Antidote Treatment.</th>
<th>Physiologic Treatment.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbolic</td>
<td>As above. Also odour of carbolic in breath, vomitus, and urine. Strangury and sometimes, retention. Smoky urine.</td>
<td>Sulphate of magnesia, sulphate of soda, lime-water, syrup of lime.</td>
<td>As above, but give no oil since oil hastens absorption. Catheterise.</td>
</tr>
<tr>
<td>Hydrocyanic Acid</td>
<td>Almost immediate loss of consciousness, eyes protruding and showing pupils dilated, pulse imperceptible, respiration very slow, odour of acid on the breath.</td>
<td>Acts too quickly for any antidote to be of use. Give emetics and lavage.</td>
<td>Artificial respiration, cold water to head and spine, stimulants, external heat.</td>
</tr>
<tr>
<td>Corrosive Alkalies: Ammonia, Caustic Potash or Soda, Potassium Nitrate, Calcium.</td>
<td>Excoration of tissue, violent abdominal pain, vomiting and purging of bloody matter. Usual symptoms of collapse.</td>
<td>Mild acids—vinegar or lemon juice, sour cider.</td>
<td>Heat, stimulants, milk, oil, white of eggs for ammonia. Cold air, artificial respiration.</td>
</tr>
<tr>
<td>Antimony</td>
<td>Epigastric pain, shrunken features, cramps of lower extremities, convulsive spasms, collapse.</td>
<td>Tannic acid, strong tea.</td>
<td>Demulcent drinks, heat.</td>
</tr>
<tr>
<td>Arsenic</td>
<td>Puffiness and itching about the eyelids, intense abdominal pain, violent vomiting, hiccough, intense thirst, straining, stools, bloody and offensive, collapse, sometimes convulsions.</td>
<td>Hydrated sesquioxide of iron to prepare, mix oz. viii of sol. mag. sulph. and oz. iiiv of iron. Let remain in stomach 15 minutes, wash out, repeat two or three times.</td>
<td>Demulcent drinks, heat, stimulants if necessary, catheterise.</td>
</tr>
<tr>
<td>Bichloride of Mercury, Calomel, Blue Mass.</td>
<td>Salivation, metallic taste, mucous membrane sometimes glazed and white, vomiting of blood and mucus, tenesmus, dysenteric purging, diminishing urine. Collapse after a short time and convulsions.</td>
<td>White of egg in water. One egg to every four grains of mercury, milk and flour paste.</td>
<td>Copious mucilaginous drinks, heat, stimulants if necessary.</td>
</tr>
<tr>
<td>Iodine</td>
<td>Pain and burning of alimentary canal, vomiting, purging, yellow stain about mouth.</td>
<td>A paste of starch or flour and water.</td>
<td>As for bichloride of mercury.</td>
</tr>
<tr>
<td>Lead</td>
<td>Slate coloured lines on the gums along margin of incisor teeth, colic, and other symptoms of irritant poisons, paralysis of extensor muscles of forearms.</td>
<td>Sulphate of sodium or magnesium, white of eggs and milk.</td>
<td>As above.</td>
</tr>
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</table>
## Emergencies

<table>
<thead>
<tr>
<th>Poison</th>
<th>Symptoms of Poisoning</th>
<th>Chemical Antidote Treatment</th>
<th>Physiologic Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phosphorus</td>
<td>Odour of garlic in breath, &quot;coffee ground&quot; vomitus, jaundice and usual symptoms of irritant poisons.</td>
<td>Crude French acid turpentine, in 3 ss doses every 15 minutes. Use sulphate of copper as emetic. Give purgatives. Never give oils, since they hasten absorption.</td>
<td>As above.</td>
</tr>
<tr>
<td>Gases</td>
<td>Embarrassed respiration, frequent, weak, irregular pulse, cyanosis, dilated pupils, loss of sensibility in the conjunctiva.</td>
<td></td>
<td>Loosen all bands, lower head, heat, stimulants, fresh air, artificial respiration. Keep tongue forward. After illuminating gas, phlebotomy is often performed. Atropine, digitalis, heat, keep head low, artificial respiration.</td>
</tr>
<tr>
<td>Neurotics:</td>
<td>Characteristic tingling, pulse irregular, intermittent, and slow, respirations shallow, weak, sighing, and slow, anaesthesia of the surface, anxious expression, eyes glaring, dilated, and protruding. The mind is usually clear, but there are often convulsions.</td>
<td></td>
<td>Heat to extremities, cold applications to head, inhalations of ammonia.</td>
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<tr>
<td>Aconite</td>
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<tr>
<td>Alcohol</td>
<td>(Acute poisoning.) A short period of excitement followed by coma, respirations irregular and stertorous, pupils either dilated or contracted, face flushed, pulse frequent and hard.</td>
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<tr>
<td>Belladonna</td>
<td>General rash resembling that of scarlet fever, pupils bright and staring, headache, vertigo, restlessness, and noisy delirium.</td>
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<tr>
<td>Digitalis</td>
<td>Pulse irregular, slow, weak, face pale, eyes staring and prominent. Sclerotics blue, vomiting, great prostration, rapid respiration, convulsions.</td>
<td>Tannin.</td>
<td>Strychnine, keep patient quiet and in horizontal position.</td>
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</tbody>
</table>
### Symptoms of Poisoning

<table>
<thead>
<tr>
<th>Poison</th>
<th>Symptom Descriptions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chloral</td>
<td>Respiration slow, irregular and shallow, pulse first weak and slow, then rapid, irregular and thready, coma, almost complete relaxation of the muscles, pupils contracted and then dilated.</td>
</tr>
<tr>
<td>Hyoscyamus</td>
<td>Either deep sleep and unconsciousness, or noisy delirium followed by coma, intense thirst, dilated pupils.</td>
</tr>
<tr>
<td>Nux Vomica</td>
<td>Tonic convulsions, face livid, mouth contracted. &quot;Risus sardonicus,&quot;—eyes open and staring. Death is usually the result of paralysis of the respiratory muscles.</td>
</tr>
<tr>
<td>Opium</td>
<td>Intense desire for sleep, respiration slow and stertorous, contracted pupils, face first flushed, then pale, pulse at first full, slow, and strong, but gradually becoming rapid and weak, profuse perspiration. Retention of urine is frequent.</td>
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### Chemical Antidote Treatment

<table>
<thead>
<tr>
<th>Poison</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chloral</td>
<td>Alcoholic stimulants, strong coffee, mustard pastes, hot footbaths, electricity, heat.</td>
</tr>
<tr>
<td>Hyoscyamus</td>
<td>Same as belladonna.</td>
</tr>
<tr>
<td>Nux Vomica</td>
<td>Tannic acid or tincture of iodine. Follow immediately by emetics, as compounds thus formed are not permanent.</td>
</tr>
<tr>
<td>Opium</td>
<td>Potassium permanganate.</td>
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### Physiologic Treatment

<table>
<thead>
<tr>
<th>Poison</th>
<th>Treatment</th>
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</thead>
<tbody>
<tr>
<td>Chloral</td>
<td>Keep patient awake, artificial respiration, atropine if necessary, strong black coffee by rectum and mouth.</td>
</tr>
<tr>
<td>Hyoscyamus</td>
<td>Same as belladonna.</td>
</tr>
<tr>
<td>Nux Vomica</td>
<td>Keep patient awake, artificial respiration, atropine if necessary, strong black coffee by rectum and mouth.</td>
</tr>
<tr>
<td>Opium</td>
<td>Same as belladonna.</td>
</tr>
</tbody>
</table>

### Local Poisoning from Poison Ivy.

In a case of ivy-poisoning, envelop the poisoned part in clean white cloths wet with a solution of bicarbonate of sodium.

### Poison from Bites or Stings of Snakes, etc.

In a case of poisoning from the bite or sting of a snake or other venomous creature, ligate the wounded part above the point of injury, apply cupping glasses, cauterise the wound, and give stimulants to the verge of intoxication.

### Sunstroke.

Sunstroke, called also insolation, is marked by unconsciousness, as a rule, by congestion
of the face, stertorous breathing, a weak and fluttering pulse, and extreme hyperpyrexia—the temperature frequently rising to 115° F. and over.

Treatment.—To treat a sunstroke, apply ice to the head and give ice-cold baths with constant friction till the temperature drops. As death may occur any moment from heart failure, watch the pulse carefully, and take the temperature every five minutes. When it drops, remove the patient from the bath, apply heat to the extremities and give stimulants when necessary. Renew the cold applications, if the temperature rises.

Heat prostration is a mild form of sunstroke. To treat it, apply ice to the head, give cold baths, if necessary rubbing constantly, and keep the patient quiet.

Sunstroke and heat prostration can be caused by intense heat of any kind. Exposure to the direct rays of the sun is not essential. Fatigue, foul air, and alcoholism will aggravate the danger.
CHAPTER XVII

BANDAGES, STRAPPING, AND SPLINTS


Bandages

Bandages are used to keep applications and surgical dressings in place, to make compression, to control the circulation, to reduce swelling, to limit motion, and to afford support.

They are most commonly made of either gauze, crinoline, muslin, flannel, Canton flannel, or rubber. Gauze is usually preferred for keeping dressings in place, because it is lighter, cooler, and more easily adjusted than the other materials. Crinoline, which is generally stiffened with plaster of Paris, is used to give support and prevent motion. Flannel and Canton
flannel are sometimes used under plaster bandages and splints to protect the skin. Flannel bandages are also used to reduce swelling and oedema, and when used for this purpose they are cut on the bias. Rubber bandages are used to afford support, as in weak ankles and varicose veins, and to control hæmorrhage. Muslin\textsuperscript{1} is used to keep splints in position and as a substitute for other material.

The average width and length of bandages are: 1 inch wide, 3 yards long for finger; 2 to 2½ inches wide, 6 yards long for head and extremities; 4 to 6 inches wide, 8 yards long for the trunk.

The different parts of the bandage are known as the roll, the initial and the terminal end, the outer surface and the inner surface.

When each end is wound towards the middle, forming two rolls, the bandage is called a double roller.

**Making Bandages.**—Bandages must be smoothly and tightly rolled and all ravellings removed. There are various machines for rolling bandages. On some, the whole width of the material is rolled at once, the bandages being cut the required width afterward. On others, the material is cut or torn into the required width before rolling. But whatever the machine used, never fail to hold the free end of the material firmly in order that the bandage may be rolled tightly and without wrinkles.

**To Make a Bandage by Hand.**—Tear or cut the material the required width, remove the selvage and ravellings. Fold one end of the strip several times upon itself. Then hold the free end of the strip very

\textsuperscript{1} Choose muslin without dressing and that which is not too heavy.
tightly between the index and middle fingers of the left hand and roll with the right.

To make plaster of Paris bandages: Choose fresh plaster of good quality and without lumps. Cut fine crinoline into strips the required length and width and spread and rub the plaster, unless there is a regular machine for applying it, evenly into the meshes of the crinoline with a knife, spatula, or tightly-rolled bandage. Roll the strip loosely as each portion is finished. Store in an air-tight tin box. Wide plaster bandages should be rolled on sticks, since this prevents them from doubling when wet.

Points to Remember in Bandaging.—Bandages must be put on tightly enough to insure their remaining in place. As a rule, except when there is inflammation, they should make a certain amount of pressure also. But they must never be tight enough to cause pain by impeding the circulation, and the pressure must be even. That it may be so, no one turn of the bandage must be tighter than another and each turn must overlap the other an equal distance. In bandaging an extremity, the toes or fingers are usually left uncovered, as it can thus easily be seen whether the bandage is too tight. If they become cyanosed, the bandage should be removed. Before bandaging a joint, always place the extremity involved in the position in which it will remain afterward. When bandaging the leg, always support it. For this purpose, a sand-bag is a good substitute for the regular heel rest. When putting on a spica of the groin, place a pillow, or two or three sand-bags, under the upper portion of the back so that the part under which the bandage has to pass back and forth will be raised from the bed. Hold the bandage roll side upperward,
and bandage from the extremity toward the trunk, and from right to left. Always pin or tie the bandage so that the knot or pin will not come in contact with any part of the patient's body, or be where he will lie on it. Always use safety-pins for pinning. To tie, tear a few inches of the bandage, twist the two ends around each other, and pass one end in one direction around the extremity and the other in the other direction and tie over the twist.

To Apply Plaster Bandages.—The requisites for applying plaster bandages will be:

1. Two large rubber sheets one to protect the floor and the other, the bed.
2. A doctor's apron.
3. Two or three sand-bags.
4. Sheet cotton; muslin, soft flannel, or thin Canton flannel bandage.
5. Two strips of Canton flannel three inches wide, cut on the bias, long enough to go around the leg at both ends of the cast. These are called "cuffs."
6. Plaster bandages.
7. A basin containing sufficient warm water to cover three or four bandages at a time. Salt, $\frac{3}{4}$ to 1 quart, is generally added to the water, as it hastens the drying of the plaster.

To prepare the extremity, shave it, wash it with soap and water, dry it well, and powder it.

A few minutes before the doctor is ready for the
plaster bandages put two or three of them in the water. When the bubbles cease to rise, they are thoroughly soaked and ready for use. Put more in, as required. One should always be ready when needed. Squeeze the bandage gently to remove the surplus water, and pull off any ravellings, before handing the bandage to the doctor.

When required to hold a leg during the application of a cast, keep it in the exact position in which it is placed.

Either a soft flannel or thin Canton flannel bandage, or a layer of sheet cotton is put on under the plaster bandage, to protect the skin from the rough plaster, and a "cuff" of Canton flannel is secured at either end of the cast. These "cuffs" are put around the leg and held in place by the first layer of plaster bandage. Three or four layers of plaster bandage are applied, according to the desired strength of the cast, and the upper edge of the "cuff" is turned over and secured in place by the last layer. After the bandage is completed, some of the plaster in the bottom of the basin is rubbed over the surface of the cast.¹

Leave the protecting rubber sheet on the bed until the cast is dry. Place sand-bags on either side of the extremity to keep it from moving and so breaking the cast. Leave the cast uncovered until it is dry. Never empty the plaster remaining in the basin into the hopper or closet, since it will harden and block the pipes.

To Remove a Plaster Bandage.—To remove a plaster bandage, moisten it in a straight line down the front (or wherever the opening is desired) with either

¹ Plaster bandages are never put on as tightly as other bandages.
bichloride or dilute hydrochloric acid, and then cut it with a plaster knife or a strong pair of scissors.

The Fundamental Bandages.—The fundamental bandages, on which the construction of the greater number of the special bandages are based, are the circular, the spiral, the spiral reversed, the figure-eight, and the recurrent.

The Circular Bandage.—The circular bandage consists of two or three circular turns, each turn covering the preceding one.

The Spiral Bandage.—The spiral bandage can be applied only to parts of uniform circumference. It consists of circular oblique turns, each one made higher than the preceding one, but overlapping it one-half its width.

The Spiral Reverse.—The spiral reverse bandage consists of an ordinary spiral bandage with reverses. To make the reverse, place the thumb of the left hand at the point where the reverse is to be made, pronate
the right hand, in which the roll is held, thus doubling the bandage upon itself (see engraving), and make traction on the bandage with the right hand to draw it well into place. Make each reverse directly above the preceding one. By thus reversing the bandage, the turns can be adjusted to the contours of the body.

The reverse is principally used for the legs and arms.

*Spiral Reverse.*

The reverse is principally used for the legs and arms.

*Figure-Eight Bandage.*

**The Figure-Eight Bandage.—**The figure-eight
bandage consists of a series of oblique turns alternately ascending and descending and crossing each other in such a manner that they form the figure-eight. The figure-eight is sometimes used instead of the reverse for the extremities; it is often used for the hands and feet; it is the foundation of the spicas and many other special bandages; and it is particularly valuable to retain dressing in place and to give support to the elbow and knee joints.

The Recurrent Bandage.—The recurrent bandage consists of a series of turns passed back and forth across the part to be bandaged, each turn overlapping the other one-half its width. The ends are secured by a circular turn around them. The recurrent bandage is principally used to retain dressings in place on the ends of the fingers, toes, stumps, and the head.

The Recurrent Bandage of the Head.—To apply a recurrent bandage to the head: Fix the bandage by making two horizontal turns around the head. When the second turn comes to the centre of the forehead have the patient or an assistant hold it in place. Reverse the bandage and carry it across the head, reverse, hold it in place with the thumb of the left hand, carry the roll across the head, overlapping the first row two-thirds its width and converging toward the centre, near the forehead. Repeat this turn on the opposite side of the first turn across the head. Repeat, carrying the bandage back and forth,
first on one side and then on the other until the head is covered. Finish with a couple of circular turns around the head.

*The Capeline or Recurrent Bandage of the Head with Double Roller.*—For a capeline bandage, use a double roller. To apply it: Place the centre of the bandage in the centre of the forehead, carry both cylinders to the occiput, reverse one end of the bandage turning it over the other which continue horizontally around the head to the forehead, bring the reversed end obliquely around the head, cross it with the horizontal end, reverse it over this, and carry it around the other side of the head. Repeat these turns, making every turn of the oblique bandage higher than the other, but over-lapping it two-thirds its width. Make each horizontal turn exactly cover the preceding one.

*Bandage for Front of Scalp.*—To apply a bandage to the front of the scalp: Place the initial extremity of the bandage on one temple and fix
Bandages, Strapping, and Splints

it by two circular turns. Carry the bandage downward, around the occiput, and upward, over the brow, covering the circular turn one-half its width. Continue obliquely downward around the nape of the neck, then up, crossing just above the ears over the front of the head, and down again on the left side.

Bandage for the Side of the Head.—To apply a bandage to the side of the head: Fix the bandage with a couple of circular turns. On reaching the forehead the second time secure the bandage with a small pin. Reverse, carrying the bandage around the head to the nape of the neck, overlapping the circular turn half its width. Reverse, hold the bandage in place, and carry it back to the forehead still higher up on the side. Repeat the turns and complete with a circular turn.

The Monocle Bandage for One Eye.—To bandage the left eye: Place the initial end of the bandage on the left temple. Take a circular turn around the head from left to right and on to above the right ear. Then, carry the bandage down back of the head, up under the left ear over the cheek prominence and the eye,
lower edge of the bandage crossing the root of the nose. Pass the bandage over the right side of the head to the back and up the left side of the face, as before, covering one-half the width of the preceding and making the turn higher on the cheek and lower on the right side of the head. Make a third turn still higher on the cheek and lower on the head. Secure in place with a circular turn.

In bandaging the right eye, place the initial extremity of the bandage on the right temple and carry the bandage from right to left.

*Binocle or Bandage for Both Eyes.*—To apply a bandage to both eyes: Bandage the left eye in the manner already described. Carry the finishing circular turn to the back of the head and pin. Then, bring the roller upward over the left side of the head down over the root of the nose and the right eye. Cover this in the same manner as the left eye with the exception of reversing the turns and bringing the bandage downward from the scalp over the eye, instead of carrying it up from the face over the scalp.

*Barton’s Bandage for the Jaw.*—To apply a Barton
bandage to the jaw: Place the initial end behind the ear of the sound side, hold it in place with the thumb of the left hand, carry the roll across the nape of the neck under the occipital protuberance, up behind the other ear, over the skull, down the sound side of the face in front of the ear, under the chin, and backward up the opposite side of the face. Cross the previous turn in the median line, and continue down behind the ear of the sound side around the neck over the chin, and back to the occiput. Repeat these turns two or three times, covering each one exactly. Finish with the turn which crosses under the chin. Pin on the top of the head.

Suspensory Bandage for the Breast.—To apply a suspensory bandage to the breast: Place the initial extremity of the bandage on the left side of the chest, carrying it from left to right. Make two circular turns. On reaching the breast, incline the bandage upward across the breast, over the opposite
shoulder, down the back, around the body, and up again over the breast and shoulder, as in the first turn, overlapping it one-half its width. Repeat as often as necessary. The turns should overlap each other, forming the figure 8, under the most pendent part of the breast.

**Suspensory Bandage for Both Breasts.**—To apply a suspensory bandage to both breasts: Fix the initial end of the bandage on the right side of the chest by two circular turns. On reaching the right breast for the second time carry the bandage over the opposite shoulder, down the back. Bring it forward to the right breast across the front of the chest, under the left breast covering in one-half the circular turn. Carry it obliquely across the back, over the opposite shoulder, down under the left breast, transversely around the back, across the right breast, and over the opposite shoulder. Then carry it again down the back, around the front of the chest, and over the left shoulder, crossing the breast as
before. Repeat these turns until the breasts are covered.

*Velpeau's Bandage.*—Before starting to apply Velpeau's bandage, place the hand of the injured side upon the sound shoulder, bringing the elbow opposite the point of the sternum, powder the skin between the arm and body, apply a thin layer of cotton, and place a pad in the axilla, and one over the seat of fracture. To apply Velpeau's bandage:

Put the initial end of the bandage in the axilla of the uninjured side. Carry the roll up behind the back, over the injured shoulder, and down across the middle of the arm, then beneath the arm and across the chest to the sound axilla. Repeat the turn, covering the first. When reaching the arm of the affected side for the second time, pass the bandage around the body carrying it over the point of the elbow and then upward again to the sound axilla, across the back, over the affected shoulder, down in front of the arm, and then beneath it as before. Repeat these alternate vertical and
transverse turns, until the vertical turns reach the point of the elbow. Complete by successive turns around the chest, until the forearm of the affected side is covered up to the wrist. Cover each of the vertical turns two-thirds their width, and the transverse turns one-third their width.

_Spica of the Shoulder._—To apply a spica of the shoulder: Fix the initial extremity by a couple of circular turns around the middle of the arm. Make spiral reverse turns until reaching the axillary folds. Then pass the bandage across the chest, through the opposite axilla, across the back, over and around the arm, crossing the reverse turn on its outer edge. Repeat these turns across the back, under the axilla, across the chest, and around the arm, until the shoulder is covered. Cover each preceding turn on the arm and shoulder one-half its width, but converge the bandage, as it reaches the axilla on the second side of the body.

Spicas in all parts of the body are done in the same manner.

_Bandage for the Hand and Forearm._—To apply a bandage to the hand and forearm when it is necessary
Bandages, Strapping, and Splints

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to cover each finger separately: Begin at the tip of the first finger. Cover it, either by a succession of circular turns or figures of 8, to its base. Then, take a turn around the wrist to keep these from slipping and return to the root of the second finger. Lead the bandage by one or two spiral turns to the tip, then proceed down it, as on the first finger, and conclude with another turn around the wrist. Cover each finger successively in the same way. Then take a wider bandage and make two circular turns around the base of the fingers. On reaching the centre of the back of the hand for the second time, pass the bandage obliquely across it, around the wrist, up across the back of the hand, crossing the other oblique turn in the median line, around the palm and down again across the back of the hand, making the turn lower on the hand but overlapping the former one-half its width. Repeat these turns till the hand is covered. Finish with a circular turn, or proceed up the forearm using either reverse or figure 8 turns.

When it is not expedient to cover each finger separately: Put gauze or cotton between and over the tops of the fingers. Place the initial end of the bandage well down on the palm of the hand. Take recurrent turns back and forth across the tops of the fingers, covering each preceding turn one-half its width. Hold these turns in place with the thumb and first finger of the left hand, secure them with a couple of
circular turns around the hand, and then proceed up the hand as already directed. If it is necessary to cover the thumb, do it first. Then, take a circular turn around the hand, hold the bandage in place with the left hand and start the recurrent turns over the fingers.

*Elbow Bandage.*—Large joints such as the elbow and knee should not be involved in the bandaging of the extremities unless it is necessary. When it is necessary to cover the elbow and upper arm, proceed as follows: Continue the reverses until within two inches of the elbow. Flex the forearm. Carry up the bandage directly over the elbow, having the point of the olecranon in the middle of the bandage. Bring the bandage down inside the joint to the forearm, keeping the upper edge of the bandage just below the point of the olecranon. Cross it on the inside of the
Joint and carry it above and around the elbow, having the upper edge of the bandage just above the point of the olecranon. Repeat the turns, making those on the forearm lower and those on the arm higher than the first ones and covering them one-half their width. Make one circular around the arm and proceed up it with either the reverse, spiral, or figure 8.

The knee is bandaged in the same manner as the elbow.

*Bandage for the Foot.*—To apply a bandage to the foot: Take two circular turns around the roots of the toes, cross the arch of the foot, and encircle the ankle above the heel. Cross the arch of the foot, pass over and around the toes. Take alternate turns around the foot and ankle, making each one around the ankle lower on the heel and each one on the foot nearer the leg. Finish with a circular turn about the leg, or, if it is necessary to bandage the leg, take a circular turn around it and then proceed with either reverse or figure 8 turns.

If the foot is long take two or three reverse or figure 8 turns before carrying the bandage around the ankle.

If it is necessary to cover the toes, use the recurrent turns, as when covering the fingers.
Bandage for the Heel.—To apply a bandage to the heel: Take two turns around the heel. Carry the bandage over the arch of the foot and around the heel, having the upper edge of the bandage cross the lower edge of the heel. Proceed up over the arch of the foot and around the leg with the lower edge of the bandage overlapping the first turn half its width. Repeat. Finish with a circular turn around the ankle.

Tailed Bandages and Slings.—Tailed bandages are very convenient for keeping poultices and other applications in place.

The Four-Tailed Bandage of the Head.—To apply a four-tailed bandage to the head: Take a piece of muslin eight inches wide and long enough to go over the scalp and tie under the
Bandages, Strapping, and Splints

chin. Cut it in the middle from each extremity to within four or five inches of the centre. Place the body of the bandage on the top of the head and tie

*Four-Tailed Bandages.*

the two posterior tails under the chin and the two anterior tails at the back of the neck.

If it is desired to cover the back of the head, place the body of the bandage there and fasten the two posterior tails around the forehead and the two anterior tails under the jaw.

When the forehead is to be covered, place the body of the bandage there and fasten the two anterior tails at the back of the head and the two posterior tails under the chin.

*Tail Bandage for Chin.*

*Tail Bandage of the Chin.*—To apply a tail bandage to the chin: Take a piece of muslin four inches wide
and about thirty-six inches long and cut it in the middle to within three inches of the centre. Place the body of the bandage on the chin. Tie the upper tails at the back of the neck and the lower tails on top of the head. Then tie the four tails together on the top of the head.

The Four-Tailed Bandages of the Knee.—To apply a four-tailed bandage to the knee: Take a piece of muslin one and one-quarter yards long, and one-quarter of a yard wide and split it in the middle to within three inches of the centre. Place the body of the bandage over the knee. Carry the tails under the knee, cross them so that the upper ones will come below the joint and the lower ones above, bring them around and tie them in front.

A Scultetus or Many-Tailed Binder for the Abdomen.—A scultetus or many-tailed binder is used on the abdomen to obtain pressure or to keep applications and surgical dressings in place. To make it, take four or five strips of muslin three inches wide and a yard and a quarter to a yard and a half long, place them each
one overlapping the other half its width and sew the edges down in the centre for a quarter of a yard. To apply, pass half the bandage under the patient, in such a way that the sewed part will come under the back, and fold the strips alternately obliquely over the abdomen, crossing them in the centre.

When this bandage is applied to keep a surgical dressing in place, the dressing should be further secured by a strip or two of adhesive plaster, and the bandage should be drawn as tightly as possible without causing pain, in order that the sides of the wound may be held firmly together.

To prevent the binder from slipping up, two tails
(see engraving) are sometimes sewed or pinned to the lower edge of the binder. These tails are brought up between the legs and pinned in front.

T-BANDAGES.—T-bandages, as the name implies, are cut in the shape of the letter T. They are generally made of unbleached muslin. If the muslin is doubled and stitched around the edges the bandage can be laundered and used for a long time.

*T-Bandage of the Perineum.* — To make a T-bandage: Cut the tails about four inches wide and a yard to a yard and a third long. The perpendicular tail is sometimes slit up the centre to within three inches of the top, making what is called a double T-binder. To apply, fasten the horizontal arm around the waist, bring the tail or tails up over or on either side of the perineum and fasten in place.

*Double T-Bandage of the Chest.*—To make a double T-binder for the chest: Take a piece of material
about eight inches wide and long enough to go around the chest, and sew to its upper edge, near the centre, about six inches apart two strips, two inches wide and fourteen long. To apply, pin the binder in the front, bring the straps over the shoulder and pin them in front. If necessary, pin a dart in under both breasts.

Y-BINDER FOR THE BREASTS. — For a binder in the shape of a Y for the breasts, the tail should be eight inches wide, and long enough to reach across the back and meet the two arms which cross the chest, and the arms should be four inches wide. Put one of these arms under, and
the other above, the breasts and pin them to the tail. Shoulder straps can be added if necessary.

**Straight Binders.**—Are generally made of a double fold of unbleached muslin stitched together round the edges.

**Straight Binder for the Abdomen.**—Straight binders for the abdomen are often used in obstetrical cases, after confinement. They should be about twelve to fourteen inches wide and long enough to go around the body.

To apply, pin down the centre with small safety-pins, and pin darts on both sides, above and below the hip prominence. The lower darts are loosened when it is necessary for the patient to use the bed-pan.

**Straight Binder for the Chest.**—To make a straight binder for the chest, cut from a straight piece of muslin a section long enough to go around the body and wide enough to extend from the neck to the waist and shape
it to fit under the arms and around the neck. To apply, pin it tightly down the front and over the shoulders, with small safety pins, and adjust it to the body by pinning darts under both breasts. These binders are used to make pressure on the breasts, and to keep poultices and other applications in place. When using for the former purpose, pad the axilla between and around the breasts with non-absorbent cotton and fasten the binder as tightly as possible. When using for the latter purpose, it need not be put on as tightly and the darts are unnecessary.

Slings.—To make a sling cut a square yard of muslin across diagonally. This will make two slings. When the forearm is injured, its whole extent should be supported squarely, and the sling is used for this purpose. To apply: Put the forearm in the centre of the sling. Carry the outer end of the sling over the arm and tie it, at the back of the neck or on the shoulder to the inner end, after drawing this up between the arm and the chest. Bring the third point around the elbow and fasten in front.

When the upper arm is injured the wrist only should
be supported. In this case, to apply the sling, proceed as follows: Turn the hand, palm upward. Fold the sling. Place the wrist in the center of the folded sling, cross and knot or pin its ends a few inches above the wrist and then tie them around the neck.

**Handkerchief Bandages.** *Handkerchief Bandage for the Head.*—To apply a handker-

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**Handkerchief Bandage for the Head.**—To apply a handkerchief bandage to the head: Place the base of the triangle on the nape of the neck and the apex over the forehead allowing it to hang down in front (as in engraving). Knot the other two ends in front, turn the apex up over the knot and pin.

**Handkerchief Bandage for the Hand.**—To apply a handkerchief bandage to hand: Place the base of the triangle at the front of the wrist, carry the apex up over the fingers, and fold the two extremities, one on
either side, around the hand. Cross the ends, bring them around the wrist and tie. Pin the apex in place, if it does not come far enough up on the wrist to be secured by the points.

Handkerchief Bandage.—To apply a handkerchief bandage to the foot: Place the base of the triangle above the heel and bring the apex up over the toes to the front of the ankle joint. Fold the two extremities down one on either side, over the instep, around under the sole of the foot and back again to the instep.

Handkerchief Bandage for the Foot.

Handkerchief Bandage of the Heel.—To apply a hand-
kerchief bandage to the heel: Place the base of the triangle on the sole of the foot beneath the instep and the apex at the back of the leg. Bring the two extremities up over the instep and round to the back of the leg. Cross and bring them once more round the leg and tie in front.

Handkerchief Bandage for the Heel.

Strapping

Adhesive strapping is largely employed to insure the immobilisation of parts (as in strapping of the chest for fractured ribs and pleurisy) and to give support and uniform pressure (as in injury to or disease of the knee, ankle, or other joints). Before strapping wash and shave the part which is to be strapped.

Strapping the Chest.—The chest is strapped for fracture of the ribs in order that the bones by being kept immobile may have a better chance to unite. It is strapped in pleurisy also to give relief from pain by restricting the depth of the respirations.

To strap the chest: Take either a piece of adhesive plaster long enough to extend from the far side of the spine to the sternum and wide enough to cover from just below the axilla to below the margin of the ribs, or, several pieces of adhesive plaster about two inches wide stuck together overlapping each other half their width. Prepare the chest by shaving and
Bandages, Strapping, and Splints

powdering. Place one end of the strapping on the spine. Make the patient take a deep breath and then "let out his breath," and, while the lungs are thus comparatively empty, quickly stretch the plaster and fix its free end over the far end of the sternum. Mould it to the body with the palm of the hand until all wrinkles are removed. To prevent the ends of the plaster from curling, put a narrow strip of adhesive plaster down both the back and the front.

Another way of strapping is to use the narrow strips of plaster, two inches wide, applying each one separately. To do this: Cut a sufficient number of strips of plaster the correct size and make the patient "let out his breath" before the application of each strap. Overlap each strip half its width.

To Strap the Wrist.—To strap the wrist: Cover it with one-inch strips of adhesive plaster, applying them
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tightly and letting each one cover the other half its width and extend about two-thirds around the wrist. Finish on either side with a narrow strip. Never put adhesive strappings entirely around an extremity.

Strapping of the Knee.

To Strap the Knee.—To strap the knee: Cut four pieces of one-inch adhesive plaster long enough to reach, when tightly stretched, from the middle of the leg just above and below the patella to the side of the latter. Cut twelve more strips, four of which are half an inch, four, an inch, and four, an inch and a half longer than the first ones. Surround the kneecap with the first four, stretching them very tightly and crossing them in the centre both above and below the patella and at the sides, thus forming the figure 8.
Apply the next size in the same manner, overlapping the first half their width, and so on. The strapping must be very tightly applied, without wrinkles, and close to the patella. Cover with a tight figure 8 bandage.

To Strap the Ankle.—To strap the ankle: Place the patient’s heel on a stool, put a bandage back of his toes and have him hold the ends, so that his foot will be drawn forward. Stretch a piece of adhesive plaster down one side of the leg from about three inches above the ankle, crossing the point of injury. Pass it under the sole of the foot well toward the front and up the other side of the leg the same distance.¹

Stretch a piece of one-inch plaster down one side of the leg (beginning three inches above the ankle), under the heel and up the other side an equal distance. Place a strip at the back of the heel, bring one end around to just about the little toe and the other above the big toe. Put on alternate strips in this manner till the point of injury is well covered and finish with

¹ This strip is to help hold the foot in position. It is under the rest of the strapping and does not show in the engraving.
a narrow strip down either side, to prevent the ends curling. Never completely encircle the foot.

Splints

Temporary splints can be made of any material sufficiently stiff not to bend: umbrellas, canes, firewood, wooden slats, several thicknesses of cardboard, etc. If nothing stiff can be obtained, bandage the fractured leg to the sound one. Permanent splints are generally made of wood, tin, iron, or plaster. Basswood spints are pliable and can be fitted to an extremity, but they break very easily. Hence they can only be used in connection with other splints or where there will not be much pressure. Splints of pine, about a quarter of an inch thick, are the wooden splints most frequently used.

A coaptation splint is one made by fitting small strips of wood together upon cloth which adapts itself to the part.

Splints must usually be long enough to extend beyond the joints above and below the seat of fracture. The side intended to be next the body must be very carefully padded, especially at the ends, otherwise pressure sores may result, to permit which is an unpardonable crime. Splints are best padded with cotton wadding or non-absorbent cotton which is generally held in place by bandaging.

When a splint is to be applied have ready for the doctor some extra cotton for padding, adhesive plaster (strips of which are used to secure the splint in place), and bandages.

There are two forms of angular splints, known as posterior and anterior respectively, both of which are
Bandages, Strapping, and Splints

frequently used for fractures of the elbow. The posterior splint is applied to the outer surface of the arm, and the anterior to the inner surface. The Volkman splint is much employed for fracture of the leg.

These splints are padded and put on like the others. Plaster splints have already been described under bandages.

There are a great many special splints and braces used both for fractures and in orthopedic work. Whatever the splint used the following rules must be observed:

Keep the skin healthy by bathing with soap, water, and alcohol as often as possible. Powder it well to prevent chafing. Protect it from breaks or abrasions by proper padding. Make the splints or brace sufficiently tight to remain in place, but never tight enough to interfere with the circulation.

Extensions

In fracture of the femur, it is generally necessary to make traction on the leg in order to overcome the contraction of the muscles, which tends to displace the ends of the fractured bone.

Buck's Extension.—Buck's extension or one of its modifications is very frequently used in such cases. The necessary articles to prepare when Buck's extension is resorted to are:

A pulley.
A screw to attach the pulley to the bed.
A rope and weights (the Volkman or other slide).
Blocks to elevate the foot of the bed.
A fracture board, if one is not already under the mattress.
Bed cradle.
A splint, or splints, the kind to be specified by the doctor.
Adhesive plaster.
Bandages. Gauze bandages are generally used to

fix the moleskin, and unbleached muslin ones, unless a plaster cast is put on, to secure the splint.

Non-absorbent cotton, for padding.

A spreader, made from a piece of wood about one inch wide and three inches long, on which a strip of
one-inch webbing, long enough to extend about six inches on either side of the wood is tacked. There must be a hole in the centre of the wood through which the rope holding the weights can be passed and knotted.

Matches, and an alcohol lamp, the latter to heat the moleskin.

Two pieces of moleskin with suspender-buckles attached. The moleskin should be long enough to extend, when folded over the buckle from the side of the foot to the upper margin of the lower third of the thigh.

To prepare the moleskin for use: Cut its end. Slip on the buckle, having the clasp on the non-adhesive side. Take off about four inches of the gauze protecting the adhesive surface, turn back the lower flap of moleskin over the bar of the buckle and stitch it around the sides and top of the flap, the moleskin not being sufficiently adhesive in itself to stand the strain of the weights.

Do not remove the protecting gauze from the upper part of the moleskin until the doctor is ready to use it. After removing the gauze, heat the moleskin, holding the non-adhesive side facing the flame. Prepare the leg by washing and shaving it.

To apply the moleskin: Fasten it to the sides of the leg having the buckles just escaping the side of the patient’s foot, and as it does not always stick very firmly at first, secure it generally, by a gauze bandage. Put on a splint or heavy bandage, fastening the ends of the webbing on the wooden cross-bar into the buckles. Put one end of the rope through the hole in the bar and knot it firmly, and pass the other end over the pulley and the weights attached to it.

Raise the foot of the bed on shock blocks.
bed cradle over the bed to keep off the bed-clothes. While changing the bed, or performing any other duty that involves much moving, rest the weights on the foot of the bed to relieve the traction.

The Inclined Plane.—Another device for procure-\(\text{ing}\) extension is the inclined plane. It consists of three pieces of wood, the under piece having bars across one end, to allow the adjusting of the upper plane, and small poles on either side, to keep the same from slipping out of position. The upper pieces of the plane are joined by a hinge and there is a foot piece on the lower one of these.

Except that no weights, pulley, rope, or slide will be needed, the articles to prepare, when an inclined plane is to be used, are the same as for a Buck’s extension. The webbing is fastened in the buckles and tied on the lower pole of the plane.

Vertical Extension.—Vertical extension is often used for fractures of the femur in young children.

The articles required are, with a few exceptions, the same as for the Buck’s extension. A bar to go over the bed replaces the weights, and, as both the injured and uninjured leg are suspended, there must be two wooden cross-bars with webbing attached, two pieces of rope, and four pieces of moleskin and buckles.

The pulleys are attached to the bar above the bed.
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One end of each piece of rope is put through the wood and knotted, as in the Buck's extension, and the other end is passed over the pulley and tied to the foot of the bed.

To cover the child's legs, pin a folded sheet neatly around them and also to the rope, to hold the sheet in place.

To protect the chest, put a folded sheet or a doubled blanket folded in a sheet across it, and tuck the ends in under the mattress.

The Bradford Frame.—The Bradford frame is an appliance much used for restraining children and, in cases of fracture, for providing a surface which will not sag as a mattress does. It consists of a frame of gas piping, which should be a few inches longer than the patient and wide enough to prevent his shoulders from resting on the frame. A strong piece of canvas is stretched very tightly around either end of the frame. Between these strips of canvas there is an aperture where the buttocks will rest. This space is left to allow the child to use the bed-pan without removing the frame.

To immobilise the body: Put on a restraining jacket¹ and pin it at the side under the rim of the frame. Pin the shoulder straps over the top of the frame. Pass bandages through the "buttonholes" in the lower edge of the binder and tie them to the bottom rim of the frame, to prevent the binder from slipping up. The binder must not be tight enough across the chest to restrict the breathing, but it can, except in abdominal and hip cases, be made more

¹ This consists of a straight binder with armholes and shoulder straps. The body of the binder should extend from the neck to below the hips.
secure around the hips. A straight binder can be pinned across the legs, if necessary.

When there is danger of bed sores at the end of the spine, pressure on it can be relieved by raising the frame a few inches from the bed, and tying it to the bed-posts.
CHAPTER XVIII

PREPARATION FOR GYNÆCOLOGICAL TREATMENTS

Gynæcological Positions. How to Prepare the Patient for Examination. How to Hold the Sims Speculum.

The delicate nature of the diseases peculiar to women renders it highly desirable that the nurse should display consummate tact in gynæcological cases. Otherwise she may alarm the modesty or wound the sensibilities of a patient. Now the surest foundation for such tact is a knowledge of the principles of gynæcology¹ and deftness. Hence the nurse should spare no pains to acquire both. It is especially important that she should familiarise herself with the position in which a patient is placed for gynæcological examination, operation, and treatments.

Gynæcological Positions

The following are the most common gynæcological positions:

1. **Dorsal Recumbent Position.**—In the dorsal recumbent position the patient lies flat on her back, with her knees flexed and separated.

2. **Dorsal Lithotomy Position.**—The dorsal lithotomy position is the same as the dorsal recumbent,

¹ Gynæcology is the science that treats of the diseases of the uterus and its appendages.
except that the buttocks and hips are elevated and
the thighs flexed on the abdomen and held in position
by a crutch or a folded sheet passed under the knees
and fastened, either around one shoulder, or the back
of the neck.

3. **Horizontal or Supine Position.**—In the hori-
izontal position, the patient lies flat on her back, with
her legs either extended or slightly drawn up to relax
the abdominal muscles.

4. **Knee-chest Position.**—In the knee-chest po-
sition, the patient rests on her knees and chest, with
her knees slightly separated, her thighs perpendicular,
her legs extended, her head on one side and the arms
free at either side—*never under the chest*. She must
be supported while in this position.

5. **Left Lateral or Sims Position.**—In the left
lateral position, the patient lies on her left side. The
body is extended diagonally from right to left. The
thighs are flexed at about right angles with the pelvis,
the right one being drawn up more against the abdo-
men than the left. The left arm is thrown across the
back and the right arm is loose at the side. The chest
is rotated forward so that it comes in contact with the
table, the spine being fully extended and the head
resting on the left parietal bone.

6. **Standing or Erect Position.**—In the standing
position, the patient stands with her knees separated
about ten inches, one foot on a low stool and one hand
on a table or other support.

7. **Trendelenberg Position.**—In the Trendelen-
berg position, the patient lies on her back, her thighs
elevated against an inclined plane and her legs, from
the knees, hanging down on its other side, and tied.

In the hospital, there is a specific table adjustment
for this position. In a private house, an inverted chair fastened to the end of a narrow table, is a good substitute.

**Preparing the Patient for Examination**

Before placing the patient in position, loosen her clothing, cover her with a sheet, tuck her clothing up out of the way and see that the genitals are scrupulously clean. In the hospital, a douche is very frequently given before examinations, and, if the bowels have not moved within the last twelve hours, an enema.

When the patient is in the dorsal position, drape the sheet in either of the two following ways:

1. Gather the lower edge up in the centre, so that the vulva, but the vulva only, will be exposed, and twist the ends around the feet to secure them in place.

2. Proceed as above, but allow the ends of the sheet to hang loosely over the legs and feet, securing them in position by tucking the upper corners under the buttocks.

For both of these methods, fasten a towel under the sheet, allowing one end of it to fall over the vulva.

When the patient is in the Sims position, cover her body with a sheet, secure it in place by tucking one end under her legs, gather it up in the centre so as to expose the vulva, and put a towel under the sheet (as in the dorsal position), allowing it to fall over the vulva.

When the patient is in the knee–chest position, cover

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1 A douche is seldom given before the first examination. The majority of physicians wishing to see the character of the discharge, if any, and the general condition of the vaginal walls before any changes have been made by a douche.
her back with the centre of the sheet and her legs with the ends, pin these ends to secure them in place, gather the sheet away from the vulva and cover the vulva with a towel.

To drape a patient in the erect position, pin a sheet around the waist, allowing it to fall around the legs like a skirt with the opening at one side.

**Holding the Speculum**

The bivalve speculum is generally used when the patient is in the dorsal position, and the Sims, when she is in the Sims position. To hold the Sims speculum: Stand on the left side of the patient resting your left arm lightly on her hip. Separate the buttocks near the vaginal opening with the left hand. Take the speculum in the right hand, grasping it firmly by the handle with the hand proper on the outer side and the thumb and fingers on the inner side—next the patient. Hold it firmly, making even traction.

**Objects, Required for Gynaecological Examinations**

A rubber glove and emulsion of white soap or other lubricant is sometimes all that is required for gynaecological examinations. At other times a speculum, either bivalve or Sims, and a uterine sound will also be needed. When any application is to be made, the usual requisites, in addition to the objects already named, are uterine and dressing forceps, an applicator, a sponge holder, scissors, sponges, tampons or gauze packing, and the specific disinfectant or lotion.

In the hospitals there are special tables for gynaecological work. When such a table is not to be had, any strong narrow table can be used or the patient can
be placed crosswise on a couch or bed. In the latter case, the buttocks should be at the edge of the bed, and the feet, if the position is the dorsal one, should rest on chairs. The chairs must be so placed that they will be out of the physician's way.

**Making of Tampons**

For the method of making tampons see Chapter XXII.

**Removing Uterine Supports**

There are several forms of uterine supports. Of these, the Hodge pessary (or one of its variations) is perhaps the most common. It frequently happens that a pessary must be removed by a nurse. To remove a pessary introduce the index and middle fingers into the vagina, bend the index finger over the anterior bar of the pessary, give it a slight turn, and pull it gently down.
The Sterilisation and Cleansing of Instruments and Utensils for Surgical Dressings. The Preparation for, and Dressing of Wounds.

As has been already stated (see Chapter II), the introduction of germs into a wound may not only interfere with its healing, but may even cause the death of the patient. Therefore, it is necessary that everything which will come in contact with a wound be made sterile, and also everything which, though not coming in contact with the wound itself, may touch something that will.

**Sterilisation and Cleansing of Instruments**

The following are some of the rules to be observed in sterilising and cleansing instruments, utensils, etc., to be used for surgical dressings:

**Sterilisation.**—Boil blunt instruments for five minutes and sharp ones for thirty seconds in a 1% solution of sodium carbonate.

Never put instruments into the steriliser until the water is boiling.

Always put them in blunt end foremost.

Always open or unclasp scissors and other hinged instruments before putting them in the steriliser.
Surgical Dressings

Wind cotton or gauze around the blades of scalpels and bistouries.

Remove the wires from needles and run wires and needles into gauze. Protect the points carefully. Wipe the wires on sterile gauze, if the needles are not to be used immediately, and put them back in the needles to prevent rusting.

Cleansing.—Wash from the instruments with cold water all blood and discharge. Sterilise them. Scrub them on a board kept for the purpose, with a nail brush, using pearline, Bon Ami, or whiting, and hot water. Dry them thoroughly with soft gauze, when they are perfectly clean. Dry the inside of needles by alternately inserting and removing the wire, drying it each time before reinserting. Always put needles away with wires in them. As they can easily be gathered up with the towels and soiled dressings, and thus lost, always count instruments before starting to clean them, and again before putting them away.

The proper cleaning of instruments after use is very essential, both to preserve them and to insure their proper sterilisation when required for use.

Sterilisation and Cleansing of Syringes and Exhaust Pumps.—The method of sterilising a syringe depends upon the material of which the syringe is made. When made purely of glass it can be boiled. Put it into the steriliser while the water is cold, other-

1 Nearly all the fluids of, and discharges from, the body contain albumin. Heat coagulates albumin and makes it hard to remove.

2 There are some rubber packings which are ruined by boiling. Syringes with asbestos packings can always be boiled. Leather washers cannot be boiled.
wise the glass may be broken. Boil five minutes. After boiling, test it to see that it is in working order. If boiling would spoil the syringe, disinfect it by alternately drawing in and expelling alcohol or ether several times, and washing the outside with alcohol.

To clean syringes, wash them inside and outside with first, cold water, then, hot water and soapsuds. After washing sterilise or disinfect and dry. There are some syringes which are ruined by being taken apart. Dry such by drawing ether into the barrel and then expelling it, and, afterwards, moving the piston up and down gently until the glass is dry and polished.

Exhaust pumps, such as are used to exhaust the air in the bottle for aspirations, must not be confounded with syringes. Drawing fluid into or boiling these invariably ruins them.\(^1\)

Wash off the outside of an exhaust pump, both before and after use, with (i) green soap and water, and (2) with alcohol, and then roll in gauze wet in carbolic 1-40 and leave until wanted.

**Sterilisation and Cleansing of Solution Basins, Lotion Glasses, and Kidney Basins.**—Sterilise a solution basin, lotion glass or kidney basin either by boiling, exposure to steam pressure under, or by soaking in a disinfectant the length of time required to render it sterile. To clean, wash (i) with cold water and (2) with hot water and Bon Ami. A kidney basin which has been used as a receptacle for soiled dressings, or to catch the discharge from wounds, must be either sterilised or disinfected after use, as well as before.

\(^1\) It must be remembered that this pump is not really sterile, and precautions must be taken accordingly when using it.
Sterilisation and Cleansing of Rubber Tubing.—To sterilise rubber tubing, boil for five minutes in a one-half % solution of sodium chloride. As rubber tubing will float, it is well, when sterilising long pieces, to tie them in gauze.

To clean rubber tubing, insert a funnel in one end and let a plentiful supply of (1) cold water and (2) hot water run through it. Dry by stretching through the fingers until no water appears at the outlet, and then allow it to hang for some time before putting it away. When necessary to put the tubing away sterile, keep it in a sterile towel while stretching and stretch for a longer time, but do not hang it up.

To Cleanse and Disinfect Dressing Rubbers.—Dressing rubbers are not, as a rule, disinfected before use. After use, wash off all blood or discharge with cold water, soak them in a disinfectant the required length of time then, scrub with Bon Ami and hot water, using a brush. Disinfect and cleanse.

To Sterilise and Cleanse Rubber Gloves.—To sterilise rubber gloves which are wanted for immediate use, boil for five minutes. After use, wash them with (1) cold water and (2) with hot water and soap and dry and powder with talcum both inside and out. If they are to be put away sterile, use a sterile towel and powder, wrap them in a cover of sterile unbleached muslin and sterilise for ten minutes at fifteen pounds pressure, temperature of 250° F.

Preparation and Sterilisation of Gauze Used for Surgical Dressings.—To avoid handling dressings after they have been sterilised, those for each patient, with the necessary sponges, should be done up in a separate bundle and rolled in a cover of unbleached muslin (for method of sterilisation, see Chap-
The bundle should not be opened until the dresser requires its contents.

All gauze and sponges not used for a dressing should be kept and resterilised.

An extra supply of sterile dressings and of separate packages of gauze, sponges, and absorbent cotton, should be kept in each ward ready for each person.

Care of the Hands.—For care of the hands, see Chapter I.

Disinfection of the Hands.—In the glands of the skin and underneath the nails, millions of bacteria are lodged. As the hands cannot be subjected to a sufficiently high temperature or immersed in solution long enough to kill these germs, they are never really sterile. Therefore, rubber gloves are now nearly always worn during operations, and very frequently during the preparation and application of dressings. When gloves are used the following régime is generally considered a sufficient preparation for dressings:

Scrub the hands for three minutes with soap and hot water changing the water and using a sterile nail brush.¹ Clean the finger nails with a blunt-pointed sterile orange stick. Scrub the hands again for two minutes with bichloride of mercury solution 1:1000, or 70% sublimate-alcohol 1 in 100. Rub dry and polish with a sterile cloth.

When the gloves are not worn, twice the time must be spent in scrubbing the skin.

General Suggestions

Not only must everything used for surgical dressings

¹ Nail brushes when new are bleached in oxalic acid by soaking for twelve hours. They are boiled daily for ten minutes and kept in a solution of carbolic 1–20.
be made sterile, but the dressings themselves must be kept sterile, and it requires constant watchfulness and thought to keep them so. Some of the common careless blunders in asepsis are: pouring out solutions and lotions without washing off the rims of the bottles with a disinfectant; placing stoppers and covers inner side down on an unsterile table; and touching an unsterile object with the hands after disinfection.

If a sterile object comes in contact with anything unsterile, it must be resterilised before being used.

In some hospitals, everything required for all the dressings is placed on a dressing carriage, which, when there is no dressing-room, is wheeled from bed to bed. This saves time, but the asepsis can hardly be as strictly maintained as when individual dressings are prepared. When the individual dressing method is employed, put everything for a patient's dressing, on trays, or, if the bedside tables have glass or metal tops, on a table, after having washed either tray or table top with (1) green soap and water, (2) a disinfectant—bichloride 1–1000 or formaldehyde 1–500 are most frequently used—and covered it with a sterile towel. Place on this sterile towel all sterile requisites for the dressing, i.e., the package containing dressing and sponges; the instruments—probe, scissors, and forceps are the ones most frequently used—a syringe or irrigator, if the wound needs irrigation; solution basins containing necessary solutions—two ounce glasses are employed for such solutions as peroxide where only a small amount of solution is used; a kidney basin\(^1\); and rubber tubing or rubber tissue, if

\(^1\) The kidney basin should be put under the towel covering
required. Then cover these objects with another sterile towel.

Use this second towel during the dressing to cover the bed-clothes or the dressing rubber, next the wound, placing the side that has been touching the sterile objects uppermost.

The unsterile requisites most commonly used are a dressing rubber or a Kelly pad or, if there is much irrigation, both; a paper bag for soiled dressing; adhesive plaster; and a binder or bandage. Place these on a lower shelf of the table.

The unsterile articles should be arranged either before or after the sterile ones. Preferably before, especially if the "dressing jars" are to be filled. Glass jars\(^1\) with wide ground-glass rims which keep cover and jar tightly together, thus rendering them comparatively air-tight are the best things in which to keep sterile dressings, etc. These jars should be emptied daily and the contents sent to be resterilised. They should be well washed and disinfected before being refilled. If not practicable to disinfect the jars thoroughly, the gauze, absorbent cotton, etc., should be left in the coverings in which they were sterilized.

When several dressings are to be done at a time, there ought, if possible, to be two nurses present,—one, to assist the dresser, and the other, to prepare in advance the patient next to be dressed, to put on the bandage or binder of the patient just dressed, and to resterilise the instruments.

\(^1\) When glass jars cannot be afforded, tin boxes, stone, or other jars which can be thoroughly cleansed, are used.
When assisting with a dressing, a nurse should watch the surgeon closely and anticipate his wants. A good nurse has seldom to be asked for anything.

When removing a dressing from a wound, never pull it off forcibly. If it adheres to the wound, wet it with solution. In lifting it, pull from both sides toward the centre to avoid separating the edges of the wound. If the wound is sutured, be very careful not to pull the stitches.

When doing a dressing, be thorough, but gentle in your work. It is false kindness to half-do it for fear of hurting. When using nitrate of silver, or other caustic, to burn off granulations, be careful to touch the granulation only, and not the edges of the wound or skin. Wash all blood and other discharges off the skin before putting on the dressing. If these are dry, or not easily removed, use alcohol or ether. Wash from the wound, to avoid getting anything into it; but hold its edges in apposition while doing so, to prevent breaking up the new tender tissue growth and thus retarding the healing process. Apply the bandage or binder as tightly as possible without interfering with the circulation, that the edges of the wound may be held firmly together, and that the dressings be held strictly in place.

Cleanse and disinfect the hands before beginning, and between dressings, in the same manner as before preparing them.

Always dress clean, before suppurating, wounds.

Always reinforce a dressing, as soon as discharge comes through it. Not only does the soiled dressing look untidy, but the gauze is no longer impervious to germs.
CHAPTER XX

TREATMENT REQUIRING ASEPTIC PRECAUTIONS


In preparing for aspiration of the abdomen, thorax, and pericardium, exploration of the thorax and other cavities, intubation, throat cultures, lumbar puncture, hypodermoclysis, infusion, intravenous injection, and injection of antitoxine, etc., the same aseptic precautions must be taken as in preparing surgical dressings. When all these precautions have been taken, place all sterile articles on a disinfected tray, covered with a sterile towel. Cover them with a second sterile towel. When the doctor is ready to begin the operation, this second towel is placed sterile side—the side which has been next the sterile objects—uppermost, over the bedclothes near the point of puncture. The doctor does this unless the nurse’s hands are sterile.

Aspiration

Aspiration is the withdrawing of liquid from the closed cavity.
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**Abdominal Aspiration.**—Abdominal aspiration, or withdrawing of liquid from the abdominal cavity, is generally called paracentesis. Cirrhosis of the liver is the disease most commonly complicated by an excessive collection of fluid in the abdomen, and ascites is the name given to this collection.

The instruments 1 required for abdominal aspiration are:

1. Canula and trocar.
2. Scalpel.
3. Probe.
4. Scissors, forceps, two needles.

There will also be needed:

1. Twelve sterile sponges.
2. A dressing, consisting of two pieces of sterile gauze and one large piece of absorbent cotton.
3. Silk.
4. Two sterile towels.
5. Adhesive plaster.
6. A binder—preferably, a scultetus.
7. A sterile funnel with long rubber tubing connected. 2 This is intended to convey the fluid from the canula to a jar standing on the floor.
8. A slop jar to catch the liquid.
9. Two rubber sheets 3 one to protect the floor, and the other, the bed-clothes.
10. Sterile glasses containing the disinfectants

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1 For the sterilisation and cleansing of instruments, see Chapter XIX.
2 There are some canulas to which the tubing can be attached. A funnel is not then necessary.
3 Table oil-cloth, heavy paper, or several thicknesses of newspaper can be used in private and district nursing, instead of rubber sheets.
usually used for the preparation of the skin for minor operations (see Chapter XXII).

11. Stimulants (as ordered). Stimulation should always be at hand during the performing of any of these operations, as it is often required unexpectedly.

12. Hypodermic syringe ready for use and loaded with cocaine.

13. Laparotomy stockings and slippers.


15. Two bandages.

16. Two blankets. Only one will be required if the patient does not sit up.

Preparation of the Patient.—To prepare the patient for abdominal aspiration, shave his abdomen, scrub it with green soap, and, after he is in position, with the disinfectants usually used in the preparation for minor operations. In some hospitals, this final scrubbing is done by the doctor. The hands of the person doing it must be sterile. Many doctors require women patients to be catheterised before paracentesis.

Freer drainage can generally be obtained if the patient is able to sit up in bed with his legs over its edge. When such is the case: Have him sit near the head of the bed. Wrap one blanket round his shoulders, and the other round his legs—having first put stockings and slippers on him. Place a sufficient number of pillows at his back to form a comfortable support. Pass bandages around them at both ends, and tie them firmly, first, at the edge of the pillows and then to the side of the bed on which he is sitting. If the bed is so high that his feet cannot rest on the floor, make loops of the free ends of the bandages, and tie them to the bed so that they will form stirrups.

If he is unable to sit up, draw him well over to the
side of the bed, protect his shoulders and back with a blanket, and fold the bed-clothes down below the abdomen, covering them with one of the rubbers.

Aspiration of the Thorax.—An accumulation of excess of liquid in the thoracic cavity complicates several diseases. The most common are: pleurisy, various forms of heart disease, and pneumonia. In pleurisy, this excessive liquid is due to increased exudation or secretion by the cells of the pleura. In heart disease, it is generally due to transudation of serum, etc., through the blood-vessels, this transudation having been rendered possible, either by the diseased condition of the blood-vessels, or by stasis in the same, due to poverty of circulation. This latter condition is known as hydrothorax.

The sterile requisites for aspiration of the thorax are:

1. The aspirating apparatus. This consists of a graduated glass bottle with a rubber stopper, in which there is a hollow metallic tube with two branches at the top; two rubber tubes with metallic ends which fit the branches of the metallic tube in the stopper; an exhaust pump; a needle, or canula and trocar, the former being now most frequently used.

2. A hypodermic syringe loaded with cocaine, 2%.
3. Glasses containing the usual disinfectants employed for disinfecting the skin for minor operations.
4. Twelve gauze sponges.
5. Two towels.
6. Collodion and brush, if the puncture is to be protected with collodion after the operation; otherwise, gauze dressing and adhesive plaster.

1 See Chapter XIX.
7. A solution basin containing sterile water for the testing of the apparatus.

The unsterile requisites are:

1. Stimulants.
2. A dressing rubber.
3. A kidney basin.
4. A tray.
5. A small blanket, or nightingale, to protect that point of the chest not to be exposed.

After collecting all the requisites and sterilising those required to be sterile, disinfect your hands, put the cork in the bottle, attach the two pieces of rubber tubing to the metal tubes in the cork and test the apparatus to make sure that it is in working order. The majority of exhaust pumps used for the purpose of exhausting the air in the bottle have two projections. On each of these points there is an arrow and each arrow points in an opposite direction. Insert the projection on which the arrow points upward into one of the pieces of tubing and then proceed as follows: Open the stop-cock in the metal tubing, on the side to which the pump has been attached, and close the one on the opposite end. Exhaust the air in the bottle by pumping until the pump grows hard to work.\(^1\) Put the end of the other tubing (in which the needle is to be inserted, when ready for use) into the sterile water and reverse the order of the stop-cocks. If the apparatus is in working order, the water will immediately start to flow through the tubing into the bottle. Do not attach the needle until the doctor is ready to

\(^1\) It must be remembered that the air pumped out will not be sterile. The pump must, therefore, be pointed away from the table.
use it. The preparation of the skin is the same as in paracentesis.

**Aspiration of the Pericardium.**—In certain forms of heart disease, liquid sometimes collects under the pericardium. An exploring syringe is frequently used for removing this fluid, in preference to the regular aspirating apparatus. The exploring syringe resembles a very large hypodermic syringe.

The sterile requisites, when the exploring syringe is used are:

1. The syringe and needles, or small trocar and canula.
2. Twelve gauze sponges.
3. Two towels.
4. The usual disinfectants, for cleansing the point of puncture.
5. A hypodermic syringe, loaded with cocaine.
6. Collodion and brush.

A test-tube or glass to receive the fluid drawn from the cavity.

The unsterile requisites are the same as for an aspiration.

It is not, as a rule, necessary to shave the point of puncture. Otherwise the local preparation is the same as for paracentesis.

**Exploration.**—The exploring needle is often inserted to ascertain if liquid is present, before resorting to aspiration. The requisites will be the same as for aspiration of the pericardium.

**Lumbar Puncture.**—Lumbar puncture is performed to relieve pressure on the spinal cord, by removing an excess of liquid collected in the spinal canal. Such an excess is the result of some cerebral disturbance, particularly meningitis. The requisites for
this operation are the same as for aspiration of the pericardium, except that a syringe is seldom required.

Phlebotomy.—Phlebotomy, or venesection, is the taking of blood from a vein. It is performed either to relieve arterial or venous engorgement, or to remove toxic blood from the body—as in gas and uræmic poisoning. In the latter case, the phlebotomy is generally followed by an intravenous infusion.

The instruments required for phlebotomy are:

- Aneurism needle, i.
- Artery clamps, 2.
- Forceps, ii.
- Probe, i.
- Scissors, i.
- Scalpel, i.
- Needles, ii.
- Sterile sponges, ii.
- Sterile towels, ii.
- Catgut.
- Black silk.
- Kidney basin, i.
- Dressing rubber, i.
- Usual solutions for disinfection of skin.
- 8 oz. sterile graduate glass for reception of blood.
- Solution basin of sterile salt solution.

Hypodermoclysis and Intravenous Infusions

It has been proven by experiments on animals, and by clinical experience, that normal salt solution is quite as efficacious as blood in supplying volume to, and restoring a failing circulation. It is therefore injected after a hæmorrhage to replace the lost blood, and, in cases of cardiac insufficiency, to stimulate the
heart's action. This stimulation is not due to any strengthening virtue on the part of the salt solution, but to a purely mechanical stimulus caused by the presence of the extra liquid necessitating stronger contraction on the part of the heart. Normal salt solution\(^1\) is used instead of another solution only because it can easily be rendered sterile, and is of the same alkalinity as the blood. Infusions are also given to wash from the body impurities circulating in the blood and to flush the kidneys. Hypodermoclysis is given in preference to the intravenous infusions when an instantaneous effect is not required. It is an easier and less dangerous operation, and is not liable to be followed by the reactionary chill, which is often the result of the intravenous infusion.

**Hypodermoclysis.**—In hypodermoclysis, the solution is introduced into the cellular tissue. The usual situations for the injection are just below the breasts, the anterior and lateral portions of the abdomen, and the external surfaces of the thighs.

As a rule, a double current is obtained by inserting two needles one on each side the body. In this case, the necessary requisites are:

Two aspirating needles with wires, or, if it is desired to have the fluid enter the tissue slowly, hypodermic needles.

One piece of rubber tubing forty inches long and two pieces twelve inches long.\(^2\)

One tube carrier.\(^3\)

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1 See Chapter II.
2 When only one needle is to be used the T-connecting tube and pieces of rubber tubing will not be needed, the needle being inserted in the main tubing.
3 A hollow semicircle of steel which fits over the flask. Its
One glass connecting tube. This is inserted in the end of the tubing which is put into the bottle to weight it.

One glass T-shaped connecting tube to join the three pieces of tubing.

Two flasks of hot salt solution 115:120, and one flask of cold salt solution.¹

One glass thermometer.

One glass syringe.

Twelve gauze sponges.

Eleven sterile towels.

Usual disinfectants for cleansing the patient’s skin.

One hypodermic syringe loaded with cocaine.

One kidney basin.

For hypodermoclysis, prepare the point of puncture in the usual way, shaving if necessary.

Preparation of apparatus: Insert the stem of the T tube in the long piece of rubber tubing and each arm in a short piece. Fit the glass tube intended to act as a weight in the free end of the long tube, and a needle in each of the short pieces. Slip the end of the tubing which is to go into the flask into the carrier at the point where it will go over the rim of the flask, arranging it so the tip just escapes its bottom. Do not put the tubing into the flask until the doctor is ready to use it; he then generally does so himself, and purpose is to prevent the tubing from slipping or becoming flexed on the edge of the flask. The carrier is indispensable if the solution is to be siphoned from the flask. In an emergency, a piece of tin or other metal can easily be bent to the required shape.

¹ An irrigator or douche bag can be used instead of the above apparatus; but the latter is to be preferred, as the solution is siphoned directly from the vessel in which it was sterilised, thus with it, lessening the danger of infection.
starts the liquid flowing, either by expressing the air
by drawing the tubing between his fingers, or by suc-
tion obtained by disconnecting the main tubing from
the T, inserting the nozzle of the syringe in it and
slowly drawing up the piston, when the flow is started.
Then reconnect the tubing and allow the fluid to flow
through the needles to expel all air, after which he
inserts them in the tissue.

Intravenous Infusion.—The requisites for in-
travenous infusion are:

Aneurism needle, 1.
Artery clamps, 11.
Canulas with wires (different sizes), 2.
Rubber tubing, 1.
Tube carrier, 1.
Forceps (mouse tooth), 1.
Forceps (thumb), 1.
Glass thermometer, 1.
Probe, 1.
Glass syringe, 1.
Scissors, 1.
Scalpel, 1.
Needles (surgeon’s), 11.
Towels, 12.
Catgut.
Black silk.
Bandages.
Sterile gauze compress, 1.
Sterile sponges, 12.
The usual requisites for cleansing the patient’s skin.
Kidney basin.
Dressing rubber.
Hypodermic syringe loaded with cocaine, 2%.
Two flasks of hot salt solution, 120° F.
One flask of cold salt solution.

In intravenous infusion, as the name implies, the solution is injected into a vein, one of those at the elbow being most frequently chosen. A bandage is tied tightly around the upper part of the arm, before the beginning of the operation, to further the engorgement of the vein. This is cut after the canula has been inserted in the vein.

As the entrance of any air into the vein might kill the patient, it is imperative to watch that the tubing does not float above the solution and that it is clamped before the solution becomes too low in the flask.

**Injection of Antitoxine and Vaccination**

Very few discoveries in medicine have been of more benefit to the human race than that of antitoxine. Since vaccination was taught by Jenner, in 1796, small-pox has never again been the scourge it was previously, when whole villages were swept away by its visitation. The use of diphtheria-antitoxine has lessened the mortality from that disease more than 60%. Better still, it renders those exposed immune, so that even children who have been in direct contact with a patient will, if given antitoxine promptly, be free from danger.

Antitoxine is not, as is often supposed, a culture of the diphtheria germs themselves, but a chemical product developed in the blood of an animal by the action of such cultures.

Thus, diphtheria antitoxine is obtained by inoculating a young horse with media in which a culture taken from the throat of a patient suffering with diphtheria has been planted. The horse will have all the
constitutional symptoms of diphtheria. Upon his recovery, he is once more inoculated. This process is continued for nearly a year, at the end of which time about 6000 cubic centimetres of blood are drawn from the external jugular vein. This is allowed to clot, and the resulting serum is the antitoxine.

Erysipelas and streptococci serum are prepared in much the same way as the serum of diphtheria; also vaccine, except that for the latter, calves are inoculated instead of horses. The greatest asepsis is practised in the preparation of the antitoxines, and must be continued in their inoculation.

The antitoxines, with the exception of vaccine, are injected hypodermatically. The syringes used are like the ordinary hypodermic syringe, but larger. The syringes and their needles should be sterilised either by boiling, or by washing thoroughly with alcohol 80%. The patient's skin should be prepared by washing with green soap and a disinfectant, and the point of inoculation should be protected with a collodion or other sterile dressing.

The method of applying vaccine depends upon the preparation used. Usually, the skin is scarified with a sterile sewing-needle, and the vaccine rubbed in. Everything used for the operation must be sterile, and the patient's skin must be cleansed and disinfected in the usual manner. Septic arms always come either from some break in asepsis or impure vaccine.

**Intubation**

Except when the trouble is so deeply seated that the intubation tube will not avail, intubation has almost entirely superseded tracheotomy. It is per-
formed when there is danger of asphyxia from inflammatory affections of the larynx or trachea, or from stenosis of the larynx. The instruments rendering this procedure possible were invented by the late Dr. O'Dwyer of New York.

As it is sometimes necessary, in the absence of the doctor, for the nurse to perform the intubation, and as her knowing how to help the doctor is of much importance, the procedure will be explained here.

The instruments required are:
A mouth gag to keep the patient's jaws apart during the operation.
The introducer.
The extractor.
The tubes.

All intubation sets contain several tubes of graded size. Those for children are numbered, and the number chosen should be the one agreeing approximately with the child's age. A loop, some eight inches long, of heavy silk thread, is tied through the perforation in the neck of the tube. Inside the tube is a piece of metal called the obturator, and, to this, the introducer is attached while inserting the tube.

The usual office of the nurse is to hold the patient, keeping him perfectly quiet, and in such a position that the mouth and trachea will be perfectly straight. Failure to do this results in loss of time, and in such cases there is seldom a second to lose. If the patient is a child, you will do best, as a rule, to hold him sitting in your lap. Secure his extremities by rolling him in a blanket, grasp his arms through the blanket, just above the elbow, rest his head against your shoulder, and sit so that the light will fall directly upon his mouth, keeping it open with the mouth gag. If the
doctor is able to have a second assistant, it is generally this second assistant who holds the mouth gag and steadies the child's head. In inserting the tube, the operator sits facing the patient. He introduces the index finger of his left hand—protected with adhesive plaster, or a metal cot—into the mouth, holding down the tongue with it and lifting up the epiglottis. After seeing that the silk loop is free, he passes the introducer, connected with the obturator in the tube, into the mouth alongside his finger, slips the tube into the trachea, and presses it into position with the index finger of his left hand. He then immediately removes the obturator. If the tube is in the trachea, the breathing will be much improved, as soon as the first gush of mucous discharge—caused by the violent respiratory effort that takes place upon the introduction of the tube—is over. If it has been put into the oesophagus, no improvement will take place. It is partly to avoid accidents from this mistake that the silk thread is attached to the tube, as it can thus be easily pulled out. This thread is sometimes left attached to the tube, as long as the latter remains in the pharynx; but, as a rule, it is pulled out as soon as the tube is securely in place, the tube being removed, when required, with the extractor. The chief objection to leaving the thread is that the patient, unless his hands are continually tied, is likely to pull the tube out at any time by pulling the thread. Before removing the thread, cut off the knot, otherwise, if the wrong end is drawn through the tube, the knot coming to the hole will displace the tube. When the thread is left on, fasten it over the ear, and secure it further by putting a strip of adhesive plaster over it, across the cheek.
Practical Nursing

Taking Throat Cultures

To take a throat culture: Place the patient in a good light. Rub any exudation or patch with a sterile cotton swab taken from a sterile tube. Remove the cotton plug from the culture tube, being careful that it never comes in contact with anything unsterile, since the culture would be rendered valueless by the introduction of outside germs. Insert the swab, rub it gently but freely over the surface of the media therein and reinsert the cotton plug. Replace the swab in its own tube and plug it carefully. It must not come in contact with anything but the patient’s throat. If it does so before touching his throat, the culture will not be pure, and if it does so afterward, and the patient has diphtheria, whatever it touches will be infected.

The Blood

The blood is a body fluid which circulates through the arteries, capillaries, and veins of the blood supplying food and oxygen to the tissues and carrying from them carbon dioxide and other waste products to the excretory organs. It is composed of cells which float in a fluid medium, the plasma. The weight of the blood is about one-thirteenth of the weight of the body.

The plasma is an almost colourless fluid composed of about 90% of water and 10% of organic compounds and salts. The organic compounds are both nutritious and excrementitious; the former being chiefly proteids with a small amount of fats and glucose, the latter being products which are the result of tissue activity, such as urea, the urates, etc.
An important proteid of the plasma is fibrinogen, a substance which becomes fibrin when blood is shed. Fibrin exists as a fine mesh-work which catches and holds the blood cells, forming the clot. The fluid part of the plasma which remains after fibrin has formed is known as the blood serum. It has no power to clot. Serum, therefore, is plasma minus fibrinogen and blood cells.

The blood cells, or corpuscles, are of two kinds: the white blood cells, or leucocytes, and the red blood cells.

The white blood cells are colourless, have a nucleus, and are about one to two times larger than the red blood cells. They are formed in the lymph nodes and bone marrow, and their functions are to remove foreign material such as bacteria, and to assist in the repair of tissue, as in the formation of scars. Their number varies between 3000 and 10,000 to the cubic millimetre of blood.

There are various types of white blood cells differentiated by staining them with dyes in smears made on glass slides. Each type has a structure different from the others and a different reaction to the dye.

The chief types of these in diagnostic value are the lymphocytes (22–25% of the white cells), the polynuclear leucocytes (65 to 75%), the eosinophiles (2–4%), and the myelocytes. The latter are not found in normal blood, but are present in myelogenous leukæmia and in some forms of severe anaemia.

The red blood cells number about 5,000,000 to the cubic millimetre of blood. They are smaller than the white blood cells and have no nucleus. They contain the colouring matter of the blood, haemoglobin. This substance is a proteid containing iron and has the property of combining with oxygen from the air taken
into the lungs, and carrying it to the tissues where it is given up to them. Haemoglobin is measured by "per cent.,” 100% being taken as the average amount in a normal healthy individual. The red cells are derived from the bone marrow, liver and spleen. Their function is to carry oxygen to the tissues.

The Blood in Disease

It has been found that the composition of the blood is altered in disease, and these changes have been made use of for diagnostic purposes. The changes may be (1) in the number of white cells, (2) in the relative proportion of the various types of white cells to each other, (3) in the number of red cells, or (4) in the amount of haemoglobin.

(1) The white blood cells, or leucocytes, may be either decreased or increased in number. (The cubic millimetre of blood is the unit in which blood cells are numbered.) A decrease in leucocytes is known as leukopenia. It occurs sometimes in typhoid fever, malaria, and in some forms of anaemia.

An increase in the leucocytes over the normal limit of 10,000 to the cubic millimetre is known as leucocytosis. Leucocytosis occurs in many of the infectious diseases, chiefly: scarlet fever, diphtheria, pneumonia, rheumatic fever, erysipelas, and suppurative conditions generally such as appendicitis, peritonitis, abscesses, etc. In typhoid fever, tuberculosis, measles, malaria, and mumps there is no leucocytosis. Leucocytosis also follows the administration of chloroform, ether, the injection of tuberculin, saline infusions, cold baths, and the inhalation of illuminating gas.

(2) Changes in the relative proportion of the different types of white cells to each other are estimated by
counting several hundred cells in stained smears and noting the number of cells of each type as the count is made. This is known as a differential count.

The polynuclear leucocytes are found to be most commonly relatively increased in those diseases and conditions causing leucocytosis, and it is the increase in this type that causes the leucocytosis.

An increase in the lymphocytes is known as lymphocytosis, and is seen only in leukæmia. This increase may be great enough to make the total count of white cells reach 100,000 to 200,000 to the cubic millimetre of blood. A slight relative increase in lymphocytes sometimes occurs in typhoid fever.

The eosinophiles are found to be relatively increased in bronchial asthma, when intestinal parasites are present, and most markedly in trichinosis where they may reach 60% of the white blood cells.

(3) and (4). Changes in the number of red cells and in the amount of hæmoglobin occur together, because the hæmoglobin is contained in the red cells, but the change in one element may be greater than the change in the other. Increase in these elements is not common but occurs in chronic cyanosis. Decrease is much more common and the condition produced is known as anæmia.

The Estimation of Hæmoglobin

The percentage of hæmoglobin in the blood may be estimated by a number of methods. The one generally used in hospital wards is known as the Tallquist method. It is a rough but fairly accurate test and consists in the comparison of a piece of blood-stained filter-paper with a lithographic plate representing
the colours of ten solutions of haemoglobin ranging from ten to one hundred per cent.

This scale and sheets of good quality filter-paper are put up in book forms. A small piece of the filter-paper is touched to a drop of blood and as soon as this diffuses through the paper, the stain is compared with the scale.

The estimation of haemoglobin is made also with various instruments, viz., the haemoglobinometers of Gower, Fleischl, Dare, etc.

**Blood Smears**

"Smears" for the microscopical examination of blood cells are made on glass slides or cover-glasses, which before using must be thoroughly cleansed.

If slides are used a drop of blood taken from the lobe of the ear or the finger tip with the usual aseptic precautions is lightly scraped off with the smooth end of a slide and pressed gently upon the flat surface of another slide, which is laid upon a table or other firm support. When the blood has spread along the edge the first slide should be held firmly, but with light pressure, at an angle of about 30°, and drawn slowly along the receiving slide, thus spreading the blood evenly over the surface.

If the cover-glass method is used, a cover-glass is touched to the drop of blood and applied to a second cover-glass with the corners projecting. The blood will spread between the two surfaces and then the cover-glasses should be gently drawn apart. Forceps should be used in handling the glasses to prevent moisture of the fingers from affecting the smear.

Smears should be well dried in the air and fixed by
passing through the flame of a Bunsen burner. As a rule they are then stained, after which they are ready for examination under the microscope.

**Blood Cultures**

These are made for the purpose of demonstrating bacteria which may be present in the blood. They are of value in determining for diagnostic purposes the specific organism which is the exciting cause of an infectious disease, or for the purpose of preparing vaccines or antitoxines from that organism for the treatment of that disease.

Bacteria are found in the blood in some cases of typhoid fever, pneumonia, malignant endocarditis, and septicaemia. The culturing of the bacteria in these cases, the preparation of vaccines, etc., are the work of the bacteriologist and cannot be considered here.

About 10 c.c. of blood is the quantity required, and it is obtained in the following manner: the blood is usually taken from one of the prominent veins of the forearm. A ligature is applied to the upper arm tight enough to prevent the return flow of venous blood, but not to interfere with the flow of blood through the artery, that is, tight enough to cause cyanosis of the hand without obliterating the radial pulse. This will distend the vein. The skin over it is then thoroughly cleaned with green soap, alcohol, ether, and bichloride in succession. A hollow needle is connected to one end of a glass tube, and the needle is plunged through the skin into the lumen of the vein. If the vein is well distended, the pressure in it is great enough to force the required amount of blood through the needle.
into the tube. The blood obtained is then distributed through a series of tubes containing the culture media and these are sent to the bacteriologist.

The whole procedure must be done under thoroughly aseptic conditions, the operator preparing his hands as for a surgical operation. The tube and needle are previously sterilised by dry heat. If the patient is delirious or very nervous, it may be of assistance to bind the arm to a basswood splint of sufficient length to extend under the body, before beginning the procedure.
CHAPTER XXI

CARE OF PATIENT BEFORE AND AFTER OPERATION

Preparation of Patient for Operation. Care after Operation.

Preparation of Patient for Operation

Bath.—To avoid tiring the patient on the day of operation, the bath is generally given the preceding day. It must be very thorough and should include the washing of the hair, unless this has been done very recently or the patient is too weak to stand it.

Bladder.—Always see that the patient voids urine shortly before operation. The sphincter muscles relax under the influence of anaesthetics and any urine left in the bladder is likely to be voided during the operation. Before abdominal section, many surgeons require the patient to be catheterised, as there is danger of cutting into the bladder, if it is in the slightest degree distended.

Catharsis.—The bowels should be very thoroughly emptied before operation. If they are distended all the faecal matter they contain is likely to be evacuated, when the sphincter muscle is relaxed and there is also danger of an accidental incision. Furthermore, the chances of nausea are much less, if the system is well cleaned out before the anaesthetic is taken.
A strong cathartic is usually given the morning or afternoon of the day before the operation, and a second one, if there is no result before night. An enema is given about six hours before the operation and is repeated if the intestine does not seem well emptied.

**Diet.**—To lessen the danger of nausea and the presence of much residue in the intestine, only light, easily digested food is given the day before operation, and no solids after the evening meal. Liquids, without milk, are generally allowed until six hours before operation. From then on, unless the patient’s condition requires it, nothing but water is given, and only a small quantity of that.

**Local Preparation.**—To prepare the field of operation, shave it and the surrounding skin and scrub for five minutes with green soap, using sterile water and sterile cotton ball. The rest of the preparation varies greatly in different hospitals. In some, nothing more is done until the patient is on the operating table. In others, the preparation begins about four hours before the time of operation and the scrubbing with soap is followed by a scrubbing with Harrington’s solution\(^1\) or other disinfectant and the application of a green soap poultice\(^2\) 20%. This poultice is covered with rubber tissue and held in place with a gauze binder and is left on until the patient is on the operating table. Another method is to make this or

\[
\text{Harrington’s solution} \begin{cases} 
\text{Alcohol} & 640 \text{ c.c.} \\
\text{Muriatic acid} & 60 \text{ "} \\
\text{Corrosive sublimate} & 8 \text{ gm.} \\
\text{Water} & 300 \text{ c.c.} \\
\text{Carmine} & 2 \text{ gr.} 
\end{cases}
\]

\(^1\)A dressing towel or gauze compress saturated with soap solution.
some like preparation the afternoon of the day previous to the operation, and, when the green soap poultice has been on for four hours, to replace it with a gauze pad wet in bichloride or other disinfectant. This method was formerly a very common one; but, as it causes the patient considerable discomfort and is frequently followed by an eczema of the skin, it is becoming much less so, especially as the results attending the shorter preparations have been quite as satisfactory.

In all cases, the scrubbing is repeated when the patient is on the operating table. Alcohol, benzoin, and Harrington's solution are the disinfectants then most commonly used, as they all have cleansing as well as disinfectant properties.

**Vaginal Operations.**—A green soap douche is generally given some hours before a vaginal operation, and this douche is followed by one or more douches containing such disinfectants as lysol $\frac{1}{4}\%$ or solution of carbolic $1:120$. After the douche the vulva should be covered with a sterile pad held in place by a T binder.

The local cleansing for vaginal operations is seldom done until the patient is on the operating table and under the influence of the anaesthetic.

A common formula is: Wash—using a sterile gauze sponge, on a sterile clamp— with (1) green soap, (2) sterile water, (3) bichloride of mercury $1-1000$, (4) sterile water.

**Final General Preparation.**—Shortly before the patient leaves the ward, make sure that he has no false teeth, put on him a clean nightgown and laparotomy stockings, and, in the case of a woman, braid the hair in two braids and tie it securely under a cap of muslin or gauze.
Preparation for Minor Operations.—For minor operations, when no ether is given, local preparation is, as a rule, all that is necessary. The common methods are:

1. Wash with (a) green soap, (b) sterile water, (c) ether, (d) alcohol (e) bichloride of mercury 1-1000.

2. Wash with (a) green soap, (b) Harrington’s solution, (c) sterile water.

3. Wash with (a) green soap, (b) alcohol 80%.

Before starting the local preparations, the nurse should wash and disinfect her own hands. Everything used in the process should be sterile.

Care of Patient after Operation

After an operation of any extent, there is more or less shock. Therefore the bed and blankets must be warmed (see Chapter V). The hot-water bags are seldom left in the bed, however, unless the patient is in bad condition, since burns easily occur, owing to the depressing effects of the anaesthetic, and the consequent sluggishness of the superficial circulation. When it is necessary to have heaters or hot-water bags in the bed, they must be very carefully covered, and watched, and the nurse in charge of the case must not go off duty without informing her successor of their presence.

A patient should never be left alone while coming out of ether. There is always danger of his becoming restless, of the tongue falling back over the trachea, or of vomitus getting into the trachea. While he is vomiting, keep his head turned on one side, with your fingers behind the angle of his jaw, throwing it forward, and pressed against the root of his tongue to prevent the tongue from falling backward.
After abdominal section, to avoid strain on the stitches, place your hands on either side of the wound while the patient is vomiting.

No matter how slight the operation, be on the watch for symptoms of haemorrhage (see Chapter VII). Do everything possible to make an operative case comfortable, so that the patient will remain quiet, for restlessness increases the strain on the sutures and the danger of haemorrhage.

Owing to the drying up of the mucous membrane by the anaesthetic, patients generally suffer intensely from thirst for some hours after an operation. It is impossible to give much to drink, as it would cause nausea, but much relief can be given by washing the mouth frequently with some lubricating mouth wash, such as 3 i of albolene and lemon juice, to oz. 1 boric acid solution 2%. When water is allowed, give it, at first, in drachm doses and either hot or very cold. Tepid water will increase nausea.

When crushed ice is ordered for nausea, crush it very fine so that it can be swallowed as ice immediately. To prevent the ice from melting quickly, drain off the water by tying a piece of gauze over the mouth of a tumbler, placing the ice on the gauze.

As anaesthetics frequently affect the kidneys, the urine should be measured and its quality noted, until it is normal in every respect. If the patient does not void urine within twelve hours after operation, the fact should be reported.

1Abdominal section is also known as "laparotomy" or "celiotomy." These terms include all operations in which incision is made into the peritoneum.
CHAPTER XXII

OPERATING-ROOM TECHNIQUE, ETC.


In newly severed tissue, there is the greatest possible danger of infection; therefore, the strictest asepsis must be maintained, not only during the time of operation, but in the minutest detail of the preparation of everything that may come directly or indirectly in contact with the wound.

Care of the Operating Room

Not only must all dust be removed from every part of the operating room, but, as far as possible, it must be prevented from entering.  All windows that open connecting directly, or indirectly, with the operating room, must be screened with fine wire, and the screens covered with two thicknesses of gauze, which should be frequently changed.  Ventilators intended for the admission of air should be likewise covered.  The floors and walls of the operating room are usually of a substance which can be washed.  The floor should be scrubbed daily or flushed down with a hose, and the walls, at least to the height of seven feet, should be
washed weekly. This method of removing dust replaces sweeping, which only distributes the dust through the air whence it may fall on sterile articles and into the wound.

Between operations, the floor should be mopped with a disinfectant. The mop used must be kept exclusively for this purpose, and, when not in use, should stand in a disinfectant.¹

The furniture and utensils of the operating room are chiefly of iron, glass, and agate. They are necessarily very expensive, and the utmost care must be exercised in handling them. They must not only be thoroughly scoured, but all stains caused by disinfectants, etc., removed. Everything should look not only clean, but "shining."

There must be an exact place for everything. Everything must always be returned to its proper place and every one connected with the operating-room work should know where that place is.

**Temperature of the Operating Room**

During operations, the temperature of the operating room should be kept between 74° and 80° F. Pneumonia is a frequent sequel of operations. In the majority of such pneumonia cases, the irritating effect of the ether is considered the predisposing cause, but it is frequently attributed to the chilling of the body while under the influence of the anaesthetic. Cold is very easily taken at such times, the skin circulation being poor, and the vitality low. Another reason for a hot room is that the patient is less liable to suffer from shock when kept in warm surroundings.

¹A weak solution of chloride of lime is a good disinfectant to use for this purpose.
Care of the Patient During Operation

Before administering an anaesthetic, make sure that the patient has no false teeth, and see that the neck of the nightgown is unbuttoned. Four points to be remembered in connection with the placing of the patient on the table are:

1. That there should be no exposure while getting him in position.
2. That his body should be well wrapped in blankets.
3. That hot-water bags should be well secured in heavy covers, if he is in such bad condition that hot-water bags are necessary.
4. That his arms should be so placed that they will not hang over the edge of the table. To this end in all operations except those on the chest, turn the tail of the nightgown up over the arms, cover arms and chest with a blanket and tuck it firmly in so that it will hold the arms in place. In chest operations, extend the arms above the head and see that they are well covered.

When the patient has thus been properly placed upon the table, cover the blankets in which he is wrapped with a rubber and this, after the field of operation has been scrubbed, with a sterile fenestrated sheet, the opening of which must include the seat of operation. Place sterile towels around this opening, changing them or covering them with fresh towels as they become stained during the operation. Sufficient towels should be used to keep everything sterile, but there must be no unnecessary extravagance. As stimulation may be needed at any moment stimulants, a sterile hypodermic syringe, and appa-
ratus for giving rectal stimulation must be near at hand.

The nurse in charge of the operating-room is responsible for the conduct of all operations. She must account for everything given to the sponge nurse—sponges, pads, packing, etc. She must be watchful that no one makes a break in aseptic technique; that hand and sponge solutions are changed when necessary; and that cautery, irrigations, dressings, etc., are at hand when needed.

The sponge nurse is not only responsible for handling sponges quickly and deftly, but she must also keep track of the sponges, pads, etc., given into her charge. She should know their exact whereabouts, and, at any moment, be able to account for every one of them. Many a wound has had to be opened because a sponge or a pad was left in the cavity.

The quicker the operation is performed, the better the patient's condition is likely to be afterward. Sometimes, it is of vital importance that the patient be kept under the influence of the anaesthetic but a very short time. Therefore, nurses should do everything in their power to expedite matters. When preparing for an operation, do not forget anything likely to be required. During an operation observe what is required, without having to be asked for it, and work quickly, but without any appearance of excitement or rush. It is fatal for a nurse to lose her head in emergency.

The head nurse, in addition to her work during the operation, has the charge and supervision of preparing most of the materials employed. She must know the special requirements of each surgeon with whom she works, as well as the instruments required for each
operation. The methods of preparing the requisites for operation which are given below vary in different hospitals, but the formulas given here are very common ones. A most important point to remember in their preparation is that, before touching anything sterile, the hands must be as carefully disinfected as before operation.

**Disinfection of the Hands**

To prepare the hands for disinfection: Scrub the hands and arms for three minutes with hot water and green soap,\(^1\) using a sterile nail-brush.\(^2\) Clean finger nails with a sterile orange stick. Scrub again for three minutes. Then, rinse with sterile water and disinfect. During the scrubbing process the water should be frequently changed.

The following are some of the most common methods of disinfecting the hands:

1. Wash for three minutes with a lather made of equal parts of chloride of lime and carbonate of soda, rinse in sterile water and immerse in bichloride of mercury \(1:100\) for three minutes.

2. Immerse the hands and arms in a solution of permanganate of potash (two ounces to four quarts of water), then in a solution of oxalic (eight ounces to four quarts of water) and, finally, in bichloride of mercury \(1:1000\).

3. Immerse the hands and arms in alcohol \(50\%\), and then in permanganate and oxalic as above.

\(^1\) Sterile sand is used in addition to the soap in many hospitals.

\(^2\) Bleach new nail-brushes by soaking them in a saturated solution of oxalic acid for twelve hours. Boil them in water for ten minutes and keep them in carbolic solution \(1:40\). Boil for ten minutes between operations.
4. Soak the hands in alcohol\(^1\) 50\% for two minutes, and in bichloride of mercury for three minutes.

5. Rub with methylated spirit for three minutes and scrub for two minutes with a 70\% sublimate alcohol (1 in 1000).

Gloves are now nearly always worn during operations, and frequently, while preparing for them. Fine thread ones are sometimes used. These are sterilised in the same manner as the dressings. For the cleansing and sterilisation of rubber gloves see Chapter XIX.

**Preparation of Dressings, Ligatures, etc.**

**Dressings.**—In preparing dressings, sterilise the gauze and absorbent cotton required for each dressing in individual packages, and do not open these packages until required for use (see Chapter XIX).

**Instruments.**—For the sterilisation of instruments see Chapter XIX.

**Adhesive Iodoform Gauze.**—To prepare adhesive iodoform gauze, sterilise gauze, cut the required size and saturate immediately before using with the following solution:

- Iodoform powder, 22 grammes.
- Resin, 10 "
- Glycerine, 5 c.c.
- Alcohol, 26 "

**Iodoform Gauze.**—To prepare iodoform gauze: Cut fine absorbent gauze one yard square, fold it and sterilise for one hour. Wring the gauze through iodoform solution until it is all taken up. Then, fold and put in sterilised glass tubes. While making this gauze

\(^1\) Alcohol is becoming a very common disinfectant for the hands, as in addition to its antiseptic qualities it cleanses and hardens the skin.
wear sterile rubber gloves. Scrub and disinfect the hands and arms before putting them on and have everything used in the process absolutely sterile.

For every yard of gauze, mix:

- 60 c.c. salt solution.
- 15 grams of iodoform powder.
- 8 c.c. 95% carbolic acid.
- 5 " liquid green soap.
- Sufficient clean castile soap to make a good lather.

Catgut Ligatures — Catgut ligatures are purchased in bundles of six to ten strands each two and one-half yards long. To prepare the gut for use: Wind on clean glass reels, half a strand on each reel. Place reels in an air-tight glass jar, cover them with ether and soak for twenty-four hours shaking the jar every four hours during this time. Pour off the ether and immerse the reels in a 1:500 alcoholic solution of bichloride of mercury, made with 95% alcohol letting it stand, for one hour. Pour this off, cover the reels with 95% alcohol, and place the jar in a bath, allowing the alcohol to boil for ten minutes. The gut will then be ready for storage. Before use, boil again for ten minutes in the same manner.

Chromicised Catgut Ligatures. — To prepare chromicised catgut ligatures; Wind the gut on reels. Place it in 95% alcohol for twenty-four hours and allow it to dry by spreading between sterile towels. Place it in chromic solution¹ and leave it for twenty-four hours to three days. At the end of this time,

¹ Chromicising solution:
- Bicarbonate of Potassium, gr. lxxv.
- 5% sol. carbolic, pts. v.
remove it,\(^1\) and dry slightly. Then, let it stand six days in a 1:5000 alcoholic solution of bichloride of mercury made with 70% alcohol. Keep it in sterile jars containing 70% alcohol and boil it in a water bath for ten minutes before using.

**Horsehair Ligatures.**—To prepare horsehair ligatures, put twelve strands of horsehair in each glass tube, plug the tube with cotton, and sterilise with live steam fifteen pounds pressure for one hour on two successive days.

**Silk-Worm Gut Ligatures.**—Silk-worm gut ligatures are prepared in the same manner as horsehair ligatures.

**Surgeons' Silk Ligatures.**—Surgeons' silk comes in four sizes—fine, intermediate, heavy, and very heavy. To prepare ligatures therefrom, wind strands each one yard long on glass reels, place the reels in glass tubes, plug the tubes with cotton and sterilise with live steam at fifteen pounds pressure on two successive days.

**Gauze Pads.**—Gauze pads for abdominal section are generally made of two thicknesses of gauze and in three sizes:

- Largest, 12 x 15 inches.
- Medium, 12 x 5 inches.
- Small, 12 x 3 inches.

To make the pads: Turn in all the raw edges of the gauze and sew. To facilitate keeping track of these pads, in order that none be left in the wound, it is well to do them up in packages of six (or other standard number). Both the head nurse and the nurse who does up the package should count them.

\(^1\) Keep Nos. 1 and 2 in the solution for twenty-four hours; three and four, three days.
Rubber Tissue.—To prepare rubber tissue for use in operations, scrub it with green soap—using a sterile brush—wash with cold, sterile water and soak in bichloride of mercury 1:1000 for twenty-four hours. Keep in sterile normal salt solution.

Rubber Tubing for Drainage.—To prepare rubber drainage tubing for use in operations, scrub it with liquid green soap. Boil it for fifteen minutes before using.

Gauze Sponges.—To make gauze sponges, fold nine-inch squares of gauze, so that all the raw edges will be securely held inside.

Cotton Sponges for Washing Instruments.—To make a cotton sponge tie a small piece of absorbent cotton in a nine-inch square of gauze.

Reef Sponges.—The average cost of reef sponges, unprepared, is two and one-half cents a piece. To prepare a reef sponge: Wash through two waters. Bleach in a saturated solution of permanganate of potash, followed by a saturated solution of oxalic acid. Wash through two waters. Soak for twelve hours in a solution of muriatic acid, 15 c.c. to 1 litre. Wash in water until free from sand, using ten to twenty waters. Soak for twenty-four hours in a solution of bichloride of mercury 1:1000. Keep in a solution of carbolic 2½% until ready for use.

Do not keep sponges on hand longer than two weeks. Burn them after use.

Tampons.—Tampons are used both as a substitute for pessaries and as a medium for applying local applications to the uterus or surrounding parts. They are generally made either of absorbent cotton or lamb's wool.
To make absorbent cotton tampons: Cut strips of cotton one inch thick, three inches wide, and six inches long. Double these strips and tie them with strong linen thread, leaving the ends of the thread about six inches long. Knot these at the ends.

To make lamb's wool tampons: Twist a piece of wool ten inches long and two inches wide around the fingers, forming a loop with both ends at the bottom. Tie the loop through the top with linen thread, leaving strings six inches long. Knot these at the end.

Utensils.—For the preparation of utensils, see Chapter XIX.

Preparation for Operation in a Private House

In the choice of a room for operation in a private house: A good light is the first consideration, since this is a positive necessity. It is important also that the operating room should be convenient to the patient's bedroom. To prepare the room, remove all rugs, carpets, draperies, curtains, knick-knacks, and unnecessary furniture.

The day before operation,¹ dust down the walls of the room with a hair-brush covered with a duster,² paying special attention to all cornices and moldings. See that the floor is scrubbed or, at least, wiped with a damp cloth. The floor should also be dusted

¹ When unable to start preparations the day before operation, it is better not to disturb the pictures, etc., and not to dust down the walls, as by doing so the dust is disturbed, and all that is left behind, not having had time to "settle," will be in the air and ready to fall on sterile objects, or into the wound.

² When moisture will not injure the paper, this cloth should be slightly dampened.
with a damp cloth a couple of hours before the time
to prepare for operation.

There will be needed: a narrow kitchen table, for
the operating table (if it is not sufficiently long, place
two tables together and tie their legs firmly to keep
them from slipping apart), three small tables, and a
chair. Choose old furniture. Protect the floor under
and around the operating table with rubber, or sev-
eral thicknesses of paper, and cover the rubber with
a sheet, securing the sheet at the corners with thumb
tacks. Protect the table intended to hold the solu-
tions, instruments, dressings, etc., with rubber or
paper, cover with large towels, which, pin to the
legs of the table. Cover these later with sterile
towels.

Cover the operating table with a couple of folded
blankets, protect them with rubber, and pin or tie the
latter under the table.

If a Kelly pad is required, one can be
improvised by rolling a small blanket
tightly over a stout two-inch bandage;
the roll should be about one yard in
length and nine inches in circumfer-
ce; the bandage should be long
enough to extend half a yard beyond
the roll at either end. Roll the
blanket in one end of a rubber
sheet. This rubber sheet should be the
width of the roll and sufficiently long
for its free end to reach into a pail
standing on the floor. Tie the ends
of the bandage together so that the
roll will form an almost complete circle, pin the edges
of the free end of the rubber together to form a
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drain. Oilcloth such as is used for covering shelves, etc., can be used instead of rubber sheeting.

Operating gowns can be improvised with sterile sheets. Three common ways of doing so are:

1. Pin, with safety-pins, two small sheets together at the sides to within about seven inches of the top, pin the top edges together, leaving sufficient space in the centre to pass the head through. The spaces at the top of each side are to put the arms through. Pin the ends of the sheet, which fall over the shoulders, around the arms three or four inches above the elbows. Do the pinning on one side before sterilising the sheets. An assistant should pin the other side with sterile pins after the sheets are in place, being careful not to touch the front surface.

2. Place a sterile sheet across the front of the body directly under the arm-pits, be careful while unfolding and placing it in position not to let it touch anything unsterile, and only handle it with sterile hands, at the extreme edges. Bring the two ends over the shoulders and upper part of the arms, pin the upper edge of these ends together to the front of the sheet, carry the points under the arms and pin them so that they will form a short sleeve, pin the back edges of the sheet together at the back about the waist line.

3. Put a sheet around the body under the arm-pits. Pin the two ends together at the side, and the upper edges over the shoulder and upper part of the arm. If the sheets are too long they can be turned under at the top.

A stretcher can be improvised by tying the legs of two strong straight-legged chairs together, and then tying pillows or a blanket across their backs. Place a sheet folded in four where the buttocks will rest.
This will facilitate the lifting of the patient from the stretcher to the table or bed. When a heavy patient is to be lifted, one person lifts the head and shoulders, a second the feet, a third stands on the far side of the bed and grasps one end of the folded sheet, and a fourth stands at the side of the stretcher and grasps the other end of the sheet. All lift in unison.

If the light is glaring, or if people can see in from outside, either rub whiting or sapolio over the window or tack a piece of gauze across it.

Have on hand a plentiful supply of cold sterile water, boiling water, and sterile towels. For methods of sterilising towels, see Chapter II. Reliable sterile dressings can now be purchased at almost any drug store. Gas stoves, enamel dishes, towels, etc., can be rented from many of the general nurses' registries in all large cities.

List of Principal Operations

The principal operations are the following:

Abscess, For, *i.e.*, a cavity containing pus.
Abscess Ischiorectal, For, *i.e.*, an abscess in the ischiorectal fossa.
Abscess Perinephritic, For, *i.e.*, an abscess around the kidney.

Adenectomy—The excision of a gland.
Advancement—An operation to remedy strabismus.
Alexander's Operation—Fixation of the uterus by shortening the round ligaments.
Amputation—The removal of part of the body.
Ankylosis, For, *i.e.*, stiff joints.
Appendectomy or Appendicectomy—Excision of the vermiform appendix.
Arthritis, For, *i.e.*, inflammation of a joint.
Bursitis, For, i. e., inflammation of the bursa—a small sac between movable joints.
Cellulitis, For, i. e., inflammation of the cellular tissue.
Cholecystectomy—Excision of the gall-bladder.
Cholecystorrhaphy—Suturing of the gall-bladder.
Cholecystotomy—The formation of a fistula into the gall-bladder.
Cholecystostomy—Incision of the gall-bladder.
Chololithotomy—Incision of the gall-bladder for removal of stone.
Circumcision—Excision of the prepuce or foreskin of the penis.
Coccygectomy—Excision of the coccyx.
Colectomy—Excision of a portion of the colon.
Colorrhaphy—Suture of the vagina.
Colostomy—Formation of a colonic fistula.
Colotomy—Incision of the colon.
Colpeurysis—Dilatation of the vagina.
Curettage—Scraping.
Cyst, For, i. e., Membranous sacs containing fluid.
Cyst, Dermoid, For, i. e., a cyst containing bone, teeth, or hair, etc.
Cyst, Follicular, For, i. e., a cyst due to the occlusion of small follicle or gland.
Cyst, Retention, i. e., a cyst due to the retention of the secretion of a gland.
Cyst, Sebaceous, i. e., a retention cyst of a sebaceous gland.
Cystotomy—Incision of the bladder.
Ectopic Gestation, For, i. e., extra-uterine pregnancy (pregnancy outside the uterus).
Empyema, For, i. e., pus in the pleural cavity.
Enterorrhaphy—Suturing the intestines.
Enucleation—The shelling out of a tumour.
Epithelioma, For, i. e., a cancerous growth of the skin.
Evisceration—Removal of the cornea and entire contents of the eyeball.
Fissure, For, i. e., a cleft.
Gastrectomy—Resection of the pyloric end of the stomach.
Gastroenterostomy—The formation of a fistula between the stomach and intestine.
Gastroenterotomy—An intestinal incision through the abdominal wall.
Gastorrhaphy—Suture of a wound of the stomach.
Gastrostomy—The formation of a gastric fistula.
Hernia, For, i. e., protrusion of part of the viscera.
Hernia, Femoral, For, i. e., a hernia through the femoral canal.
Hernia, Inguinal, For, i. e., a hernia into the inguinal canal.
Hernia, Strangulated, For, i. e., a hernia that is impossible to reduce.
Hernia, Umbilical, For, i. e., a hernia through the umbilicus.
Hernia, Ventral, For, i. e., a hernia through the abdominal wall.
Hypospadia, For, i. e., a fissure in the under surface of the penis.
Hysterectomy—Excision of the uterus.
Hysterorrhaphy—Suture of the uterus.
Keloid, For, i. e., a tuberculous skin disease.
Kerectomy—Cutting out of a portion of the cornea.
Laminectomy—Excision of the vertebral lamina.
Lipoma, For, *i. e.*, a fatty tumour.
Lupus, For, *i. e.*, a tuberculous skin disease.
Mastoidectomy—Incision for mastoiditis (inflammation of the mastoid cells).
Myomectomy—Removal of uterine myoma (muscular tumours).
Nephrectomy—Excision of the kidney.
Nephrotyomy—Incision of the kidney.
Nephrolithotomy—Incision of the kidney for calculus.
Nephropexy—The fixation of a floating kidney.
Nephorrhaphy—Suture of the kidney.
Oophorectomy—Excision of the ovaries.
Osteomyelitis, For, *i. e.*, inflammation of the marrow of the bone.
Osteoplastic—Plastic operations upon bone.
Panhysterectomy—Excision of the ovaries, and uterus.
Perineorrhaphy—Suture of the perineum.
Plastic Operations—Operations to restore lost or imperfect parts.
Prostatectomy—Excision of the prostate gland.
Salpingectomy—Excision of a Fallopian tube.
Salpingo-oophorectomy—Excision of a Fallopian tube and ovary.
Sclerotomy—Incision of the sclera (the outer membrane of the eyeball).
Sequestrotomy—Excision of necrosed bone.
Splenectomy—Excision of the spleen.
Splenopexy—Fixation of a movable spleen.
Suprapubic cystotomy—Incision into the bladder above the pubes.
Tenorrhaphy—Suturing of a tendon.
Thyroidecction—Excision of the thyroid gland.
Torticollis, For, *i. e.*, contraction of cervical muscles.
Trachelorrhaphy—Suturing the neck of the uterus.
Tracheotomy—Incision into the trachea.
Tumours, For removal of, *i. e.*, a new non-inflammatory growth.
Tumours, Benign, For, *i. e.*, not malignant.
Tumours, Cystic, For, *i. e.*, made up of cysts.
Tumours, Fibroid, For, *i. e.*, a fibroma (a tumour of fibrous tissue.
Tumour, Gummatous, For, *i. e.*, a gumma (a tumour of syphilitic origin).
Tumours, Myoma, For, *i. e.*, a tumour of muscular tissue.
Ureterostomy—The formation of an ureteral fistula.
Ureterotomy—Incision of an ureter.
Urethrotomy—Incision of the urethra.
Ventral Fixation—Fixation of the uterus by suturing to the abdominal wall.
CHAPTER XXIII

A SYNOPSIS OF IMPORTANT DISEASES


PART I

Communicable, Contagious, and Infectious Diseases

DISEASE is the result either of germ invasion or of abnormal changes generated within the body as a natural sequence to irritation, debility or degeneration of the organs of the body due either to inherited or acquired weakness.

Diseases due to micro-organisms are known as communicable, contagious, and infectious.

1. Communicable. A communicable disease is one which may be transmitted either directly or through an intermediary host, as malaria or yellow fever, the intermediary host in both these cases being a distinct species of mosquito.

2. Contagious. A contagious disease is one which is readily communicable. It may be contracted by
any one coming within a certain radius of the patient, or by coming in contact with anything that has been near the patient and not properly disinfected, e. g., scarlet fever, measles, etc.

3. Infectious. An infectious disease is a disease caused by the entrance into the body and the proliferation there of pathogenic micro-organisms.

Diseases such as cholera, tuberculosis, and typhoid are infectious but not contagious, because, though they are due to germ infection, they can be contracted only by direct contact either with the specific excreta containing the medium of infection or by something which has been soiled by the same and not properly disinfected.

Bacteria which cause disease gain entrance to the body, with few exceptions, either through the respiratory or alimentary tracts, and not—like those producing inflammation of the cellular tissue, suppuration, and other complications of surgery—through abrasions in the skin and mucous membrane.

When a disease attacks many people at the same time, it is said to be epidemic; when the epidemic is confined to some particular locality it is called endemic; when it spreads over the greater part of the world it is known as pandemic. Cases which occur singly, and independently of any discoverable infection are called sporadic.

Stages in Infectious Disease

The stages in infectious disease are:

1. Incubation. Incubation is the period between the exposure of the person to the disease and the appearance of the symptoms. The patient may feel
perfectly well during this time, or there may be malaise and slight febrile symptoms, which are spoken of as prodromal symptoms.

2. Invasion. The appearance of the active symptoms of the disease is called the invasion.

3. The febrile or active stage.

Certain infectious diseases are characterised by specific eruptions, which are known as the exanthemata. In such diseases, the eruptive stage is followed by desquamation, and, in the majority of cases, isolation is necessary till this has entirely ceased.

**Disinfection in Infectious Disease**

The prophylactic measures required in infectious diseases vary in the different types. Thus, in malaria and yellow fever, the destruction of and protection from the intermediary vehicle of infection is all that is required.

In infectious diseases, the amount of disinfection necessary varies in different cases. The discharges and excreta containing the germ should always be either burned or disinfected. The linen and utensils used by the patient and the hands of the nurse, after attending to him, should be thoroughly disinfected. Soiled linen taken from the bed of a patient suffering from an infectious disease should never be placed on chairs or tables, but put immediately into a pail or other receptacle containing water kept for the purpose, and carried in this to the disinfecting room.

Linen is disinfected either by exposure to live steam, boiling, or soaking in a disinfectant. Carbolic $1:40$ or formaline solution $\frac{1}{2} \%$ are the disinfectants most commonly used. When it is impossible to disinfect linen
immediately, it should be kept submerged in water. Utensils and dishes are disinfected in the same way. Where it is impossible to disinfect these thoroughly, they should be kept separate from those used by other people: also, the towels used for drying them.

When caring for patients suffering from an infectious disease, a nurse should always have her sleeves rolled up to or above her elbows, that the cuffs may not become infected, so endangering herself and others. After attending to the patient, she should immerse her hands in a disinfectant (bichloride of mercury 1:1000 is frequently used) before touching anything, and then wash them with soap and hot water. This point must be remembered. Nurses are constantly washing their hands and touching their faces, screens, door handles, etc., before disinfecting them.

In contagious cases, complete isolation of the patient, of everything, and of every one coming within a certain radius of him, is essential.

Isolation and Disinfection in Contagious Diseases

When a patient is isolated, no one but the physicians and nurses should be allowed to enter the room, unless permitted by the physicians.

The Room.—When possible two rooms and an adjoining bathroom should be given up to the patient and his attendants. These should be on the top floor of the house, or if in a flat, in the most isolated portion. Other important points to consider in choosing the sick-room are the exposure to sun and daylight and facilities for ventilation. An abundant supply of sunlight is absolutely essential, and the ventilation must be continuous, and so arranged that the air from
the sick-room will not pass through other rooms. To guard against this it is well to hang a sheet wet in a disinfectant inside the closed door. When the room is prepared for the patient, before he is taken to it, remove all unnecessary furniture, rugs, ornaments, draperies, and clothing, and exchange all valuable articles of furniture for such as will not be destroyed by the use of disinfectants. When the patient—if ill with an infectious disease—is already in the room nothing must be taken from it without first being disinfected. Put away all superfluous draperies and other unnecessary articles in a cupboard or drawer, and disinfect them when the room is fumigated after case is over.

The room must be dusted daily with a duster moistened in a disinfectant. Cover the broom used for sweeping with a duster likewise moistened. After use, these dusters should be soaked in a disinfectant and then washed. At the close of the disease the room must be fumigated or disinfected. In doing this, seal all ventilators, key-holes, cracks, and seams around windows and doors by pasting paper over them; open all cupboards and drawers; pull down shades, and hang rugs, clothing, etc., over lines stretched across the room, that the fumes of the disinfectant may permeate them.

Formaldehyde gas is the disinfectant most commonly employed at present. It has many advantages over any previously discovered, viz.: it is really a germicide, is easy to use, and does not change the colour or harm fabrics of any kind, wall paper, paint, leather, or metal. There are several different lamps and preparations for generating this gas.

The lamps are generally considered more efficient
than the compressed candles and cones of formaldehyde. Instructions for use are written on the boxes containing the various apparatus and preparations. In all instances, the room must be left closed for at least eight hours. It is then opened and aired for several hours before being cleaned.

Sulphur was formerly almost entirely used for fumigating, but it has been proven that it is much less efficient than formaldehyde. Besides, it discours and injures many fabrics.

To use sulphur: Put in a tin case three pounds of sulphur for every 1000 cubic feet of air space to be fumigated. Place this on a brick or inverted tin, in a saucepan or tub of water. Pour some alcohol over the sulphur, light it (burning coals can be used instead of alcohol), and leave the room immediately. Seal the cracks and keyhole. The room is left thus for twenty-four hours, after which, as when formaldehyde is used, it is opened and aired.

Fumigation by sulphur is not very efficient, however, especially in scarlet fever, and further treatment is, therefore, necessary. The walls should be rubbed down with bread and the crumbs burned. The woodwork should be washed with bichloride 1:1000, or formaline 2%, and all metal should be washed with carbolic 1:20 or formaline.

Dishes.—The most convenient way of caring for the dishes used by the patient and nurse is to place them in a metallic vessel containing water. This vessel should be draped in a sheet wrung out in a disinfectant outside the door of the isolated room. Once in each twenty-four hours it should be removed, —by some one who has not been in the sick-room—to the kitchen stove and its contents thoroughly boiled
for twenty minutes in the same vessel. When the two rooms have been isolated, a gas stove can be kept in the outer one and the dishes boiled there after use. Unused food can be put into a covered pail likewise draped and kept outside the room. This food should be carried to the kitchen and burned at least three times in each twenty-four hours.

**Bed Linen.**—Bed linen, towels, and such articles can be removed to the kitchen and boiled in the water in which they are carried down, or they can be carried to the kitchen in a sheet wet in disinfectant or put directly into a boiler of water and boiled one-half hour.

**Excreta.**—Urine and faeces should be received into a vessel containing a disinfectant such as carbolic 1:20, formaline 2%, or fresh solution of chloride of lime 1%. After the vessel has been used add a quantity of disinfectant equal to the amount of excreta. Mix the two thoroughly and set aside for at least half an hour before emptying into the closet. Keep a disinfectant in the bed-pan when it is not in use. Before giving the bed-pan to the patient rinse it in hot water and dry it, since there is danger that the strong disinfecting solutions will burn the patient.

**Sputum Cups.**—Paper sputum cups, or gauze handkerchiefs, which can be burned are preferable. When necessary to use china cups, they must be one-fourth filled with a disinfectant, emptied and boiled at least twice in each twenty-four hours.

**Nasal Discharges.**—Nasal discharges should be received on gauze handkerchiefs, and, in such a disease as diphtheria, these should be burned immediately (in a covered pail outside the window), or, if this is not convenient, thrown into a covered sputum cup containing a disinfectant and burned as soon as possible.
The Patient.—For the patient, the first consideration is absolute cleanliness. The patient should be bathed daily unless the doctor has ordered otherwise. The mouth should be cleansed before and after each feeding, and any residue of sputum, nasal or aural discharge, should be removed immediately. The buttocks and perineum should be washed after each stool. When desquamation begins, the skin should be anointed daily with some oily substance to prevent its dissemination. After recovery, the patient should be given a warm bath and shampoo with bichloride 1:5000, rolled in a sheet, which has not been in the isolated rooms, and taken to another room where he can be dressed as desired.

The Physician.—A large gown (one can be improvised with a sheet), see Chapter XXII, a cap (one can be improvised with a small towel or table napkin), and a pair of rubbers should be kept ready for the doctor to put on when he enters the sick-room. These should hang in the outer room if there are two rooms. If not, they should be rolled in a disinfected sheet and kept in a drawer or cupboard in the sick-room. A basin of hot water, soap, and disinfectant should be ready for the doctor to use before leaving the room.

The Nurse.—The nurse should never leave the room without washing her face and hands with bichloride and attiring herself as the doctor does when he enters the room. Her gown, etc., should hang just outside the door of one of the isolated rooms under a sheet or curtain. She should never loiter when going through the house. While in the sick-room, she should wear a cap that will completely cover her hair. When going out of doors, she should take a
bath, wash her face and hands with bichloride, and change all her clothes.

For her own protection, she should observe the following rules: She should, if possible, take a daily walk in the fresh air; disinfect and wash her hands before meals, and rinse her mouth with listerine or other disinfectant mouth wash. Unless absolutely unavoidable she should not take her meals in the sick-room but when this is necessary the tray should never be allowed to stand uncovered. When irrigating a diphtheria patient’s throat she should wear glasses to protect her eyes, and a piece of gauze tied over her mouth, as the patient frequently coughs up pieces of membrane very forcibly. Another very important point to remember, and one which, when nursing, it is well to observe at all times, is, not to put the hands to the face and especially near the mouth or eyes. More than one nurse has lost her eyesight by doing the latter.

At the termination of the case, the disinfection for the nurse is practically the same as for the patient.

**Anthrax**

Anthrax is a disease contracted by man from animals. The bacillus anthracis is the cause of infection. It is now rarely seen in this country.

**Incubation.**—The incubation period varies from a few hours to three days.

**Chicken-Pox (Varicella)**

The specific cause of chicken-pox is not known. It is transmissible from the stage of invasion till the crusts have disappeared.
Incubation.—The period of incubation is ten to seventeen days, generally two weeks.

Symptoms.—The invasion is generally sudden, but mild. There may be vomiting, restlessness, and slight pains in the back and legs.

Eruption.—The eruption appears within twenty-four hours upon the face, scalp, and neck; later, upon the extremities and the back. In some respects, the eruption resembles that of small-pox. But, though the macule appears in the first stage of chicken-pox, it changes to a vesicle in a few hours. The spots are never umbilicated, as in small-pox, the fluid contained in the vesicle is thinner, and, unless infected, it seldom becomes pus. Crusts form by the fourth or fifth day, and fall off in a few days. New crops sometimes appear before the earlier ones have faded. Scratching or uncleanliness will result in scars.

Temperature.—There is seldom much fever. The temperature only ranges from $100^\circ$ F. to $102^\circ$ F. for the first two or three days and, then, falls to about normal.

Nursing.—The patient should be isolated till the crusts disappear. The body should be sponged daily and the crusts well oiled. The hands are sometimes covered with mittens, and tied to prevent scratching.

A thorough cleansing and airing of the room at the close of the disease is all that will be needed by way of disinfection.

Cholera (Cholera Vera) (Asiatic Cholera)

Cholera occurs principally among the natives of India and China. Filth and hot weather further its propagation. It is caused by the spirillum cholerae
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asiaticæ,¹ which enters the system through the mouth and is discharged in the intestinal evacuations. Water and clothing, which have been contaminated with the fæces of the rectum, and flies, which have rested upon the same and then upon articles of food, are the most common vehicles for spreading the disease.²

**Incubation.**—The period of incubation is three to five days.

**Symptoms.**—There are four distinct stages of the disease:

1. The premonitory stage, which is marked by a slight fever, nausea, vomiting, headache, diarrhœa, and prostration.

2. The stage of serious purging. In this stage, which may only last a few hours, there is a constant purging of a serous, frothy, alkaline fluid, containing small white particles of epithelium, whence the name "rice water stools." The skin is cold, wrinkled, and livid. There is intense thirst, vomiting, pain in the legs and abdomen, a diminished secretion of urine, and rapid emaciation.

3. The algid stage, or stage of collapse: In this stage, the vomiting and diarrhœa cease, but the patient sinks rapidly into a stage of collapse or perhaps coma. Asphyxia, due to the weakened action of the heart is often present, and tonic convulsions of the muscles cause intense agony. The patient often dies in this stage from heart failure.

4. The reactionary stage. If the patient does not die in the algid stage he passes into this stage in which

¹ Discovered by Koch in 1884.

² In times of epidemic all water used for drinking should be boiled and only cooked foods eaten.
the symptoms abate, the surface of the body becomes warmer, and recovery slowly ensues.

Nursing.—Rigid isolation must be maintained. To lessen the danger of heart failure the patient must be kept absolutely quiet. The maintenance of continual external heat, to lessen the danger of collapse, is essential.

Hypodermoclysis and enteroclysis of hot saline solution are now commonly given to counteract the effect of the constant purging upon the system.

Diphtheria

Etiology.—Diphtheria is an acute contagious disease characterised by the production of a greyish-white membrane, and by grave constitutional symptoms. It is caused by the Klebs-Löffler bacillus.¹

Infection.—Diphtheria may attack any of the mucous membranes and the skin. The germs enter the body either through abrasions in the cuticle or through the respiratory tract. The posterior pharyngeal walls, the larynx, and the trachea are the most frequent seats of the disease. In diphtheria of the throat and nose, the infection is usually given off in the discharges when coughing. In diphtheria of the other mucous membranes, the skin, and cellular tissue, the infection is given off in the discharges from the affected part.

When proper care is taken to prevent all discharges containing the germs from drying and being blown about, the air directly surrounding the patient only will be infected. For this reason, patients suffering from diphtheria may be more easily isolated at home

¹ So called because discovered by Klebs and Löffler (1893).
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than those afflicted with small-pox, scarlet fever, and measles. The germ is, however, long lived, and a severe epidemic may result from lack of disinfection or improper disinfection.

INCUBATION.—The period of incubation is one to seven days.

SYMPTOMS.—General malaise, sore throat, but not much fever.

TEMPERATURE.—The temperature is irregular, but it seldom rises above 102° F. It lasts a week or ten days in ordinary cases and goes by lysis.

PULSE.—The pulse is frequent, and, in a case of any severity, will be weak and irregular. A pulse below sixty, or one above 120, indicates cardiac weakness.

THE THROAT.—The throat is first red and swollen. By the end of the first day, a pale grey membrane forms and spreads rapidly, becoming thicker and more opaque. If stripped off, it leaves a bleeding surface and will quickly reform. On recovery, the membrane curls at the edges and comes off in flakes.

In laryngeal cases, the membrane is not always seen, and, apart from the general malaise, the dreaded diphtheritic croup may be the first intimation of its presence. Such cases are always more serious than pharyngeal diphtheria. So also is the nasal form. In the latter, the child will have snuffles, mouth-breathing, sneezing, and a thin, putrid discharge.

1 A sore throat with low temperature should always be regarded with suspicion, especially if the temperature remains low after a membrane forms.

2 This membrane is supposed to be the result of the coagulation of the inflammatory exudate (which has transuded from the capillary walls) by a ferment derived from the disintegrated leucocytes.
from the nose, containing the Klebs-Löfller bacillus. The toxæmia is very great in these cases.

The most common causes of death in diphtheria are toxæmia, asphyxia, and sudden heart failure.

Dyspnoæa, which is often severe, is, in diphtheria, not only the result of obstruction in the breathing, but also of the toxæmia.

**Complications.**—The most frequent complications are: heart failure, acute nephritis, broncho-pneumonia, and paralysis (particularly of the recti muscles of the eye, the muscles of the tongue, and those of degluti-tion). Regurgitation of the food is the premonitory symptom of the latter, and, whenever this happens, it should be reported to the doctor.

**Nursing.**—Isolation of the patient should extend from the first throat symptoms till two cultures show absence of the Klebs-Löfller bacilli. Particular attention must be paid to the pulse, because heart failure is a very common complication. Spraying and irrigation of the throat must be faithfully performed, as much depends upon it. When spraying the throat, the nurse should wear glasses to protect her eyes, and tie gauze loosely over her mouth and nose. Calomel fumigation is often used (see Chapter XV). It is often difficult to make the patient take sufficient nourishment, but this should be insisted upon, it being very necessary to keep the patient well nourished in order that the system may be better able to combat the toxic effects of the disease. Since the advent of

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1 An exception is made to this rule in cases in which the bacilli persist longer than one month after the disappearance of the membrane. It has been demonstrated that, after that length of time, the germ is not more noxious than that found in the throats of those in health.
antitoxine the need for intubation has decreased enormously. Antitoxine is now given as soon as the diagnosis is made, and is sometimes repeated in twelve or twenty-four hours. It is also given to all those who have been exposed to the disease.

**Pseudo-Diphtheria**

Pseudo-diphtheria often complicates such diseases as scarlet fever and measles. The lesion is much the same in appearance as in the true diphtheria, but it is less adherent and is more often limited to one tonsil. Furthermore, the temperature is higher and the toxæmia less than in diphtheria.

This disease is caused by streptococci or by bacilli very closely resembling the Klebs–Löffler bacilli, but not by Klebs–Löffler bacilli.

**Dengue (Break-Bone Fever)**

The specific cause of dengue is unknown. It occurs chiefly in Southern and tropical climates.

**Incubation.**—The period of incubation is one to four days.

**Symptoms.**—The symptoms of dengue in its initial stage are: Sudden rise of temperature 101°-103° F.; intense pain in the bones, muscles, head, and eyes; a slight rash, which is sometimes not more than a redness of the skin, but which is often associated with an intense itching. The temperature falls on the third or fourth day and remains low for twenty-four or thirty-six hours, after which there is a secondary but milder attack. The rash in the second attack is papular in character. It may appear only in spots, or may spread over the body. It fades in a day or two and is followed by a fine mealy desquamation.
Dysentery

Dysentery is a disease of the lower bowel. There are four distinct forms: Acute catarrhal dysentery, croupous dysentery, amœbic dysentery, and acute specific dysentery.

Acute Catarrhal Dysentery.—The specific cause of acute catarrhal dysentery has not yet been positively ascertained. It occurs at all ages, but especially in children. Unsanitary surroundings, hot weather, and unsuitable food are predisposing causes.

Symptoms.—It usually begins with an ordinary diarrhoea, the stools gradually becoming more and more frequent and containing mucus, divers bacteria, epithelium, and sometimes blood and pus, but no faecal matter. There is severe intestinal colic, which is relieved by abdominal pressure, thirst, anorexia, and sometimes vomiting. The temperature varies from 101° to 104°.

The continued appearance of faecal matter in the stools, with the diminishing of the stools and of the abnormal constituents will be the first symptoms of convalescence. Continued acute attacks of dysentery or wrong treatment of the same is liable to end in a chronic catarrhal condition of the intestine.

Croupous, or Diphtheritic Dysentery.—The specific cause of croupous dysentery is unknown.

Symptoms.—The onset is abrupt, the fever rising almost immediately to 104°-105° F. There is intense abdominal pain and tympanites. The diarrhoea is not as constant as in the catarrhal form of the disease, but the stools are larger. They contain blood, pus, mucus and faecal matter, sloughs, and various
bacteria. In two or three days a marked typhoid condition occurs.

Death often occurs in one to three weeks. If the patient recovers, convalescence is slow, and relapses are common.

Amœbic Dysentery.—Amœbic dysentery is more common in tropical countries. It is supposed to be caused by the amœba dysenteriæ.

Ulcers form in the cæcum and flexures of the colon and rectum followed by necrosis and sloughing of the mucous surface of the same.

Abscess of the liver is a common complication.

Symptoms.—Frequent, offensive, watery stools containing mucus, albumin, and sometimes blood. There is colic, rapid emaciation, and the patient soon becomes anæmic. The tongue is usually much coated. The temperature is seldom high, but often subnormal.

Death often occurs within a few days from hæmorrhage, perforation, peritonitis, or exhaustion. At other times the disease continues for months and either terminates fatally or in a long convalescence or becomes chronic.

Acute Specific Dysentery.—The bacillus of Shiga is now supposed to be the cause of this form of dysentery. It is more common in hot countries.

Symptoms.—The onset is acute, but the temperature is not high during the first few hours of the disease. It rises, however, on the second or third day to 103° or 104° F., and, unless death intervenes, or the case is unusually mild, remains at that point for two or three weeks. There will be colic, thirst, and all other symptoms of dysentery.

Nursing Dysentery.—Fresh air, cleanliness, quiet, and the application of external heat are four of the
most essential points to be remembered in nursing all forms of dysentery. Rectal irrigations are often ordered. They must be given very slowly, otherwise intense pain will be excited. During the acute attack, the patient is, as a rule, kept on a Pasteurised milk diet. As convalescence begins, the diet is slowly increased by the addition of arrowroot, milk puddings, and other easily and quickly digested foods. All highly flavoured foods must be avoided, spices and other flavouring extracts being irritating to the intestines.

**Erysipelas**

Erysipelas is caused by the streptococcus erysipelatis. It enters the body through abrasions or wounds in the skin or mucous membrane.

**Incubation.**—The period of incubation varies from three to fourteen days.

**Symptoms.**—In severe cases there are generally a chill, followed by a rise of temperature from 103° F. — 104° F., and the usual constitutional symptoms associated with fever. The tissues of the affected part become red and swollen, and there is a strong line of demarcation around the edge of the inflamed area.

In facial erysipelas, the inflammation usually begins on the bridge of the nose or around the mouth. It may spread over large areas of the body. When this occurs, the disease is known as migratory erysipelas. Such cases may be protracted for weeks. In ordinary cases, convalescence occurs at the end of one or two weeks.

**Complications.**—Complications are rare; but abscesses, malignant endocarditis, pneumonia, nephritis,
and, in cases where the larynx is involved, oedema of the glottis sometimes occur.

Nursing.—The danger of infection is limited to wounds, so that absolute isolation, except in a surgical ward, is unnecessary; but all discharge and soiled dressings should be disinfected or burnt immediately. The nursing is the same as in all cases of fever.

Gonorrhoea

Gonorrhoea is an acute, infectious, and virulent process which attacks most frequently the mucous membrane of the urethra and the structures in anatomical relation with it, though other parts of the body, especially the eye,¹ may be the seat of infection.

Gonorrhœal Arthritis

Gonorrhœal arthritis is due to the presence of gonococci in the joints.

Symptoms.—The symptoms are in some respects similar to those of rheumatism; but the fever and constitutional symptoms are slight, and the swelling in the joints is seldom present in the beginning of the attack. Urethral discharge should be watched for in such cases, and nurses should be careful to disinfect their hands thoroughly after caring for the patient.

Gonorrhœal Vaginitis

The vaginal mucous membrane is reddened and covered with papillae. There is a profuse discharge, which is serous at first, but soon becomes a thick, purulent pus. The condition is highly contagious and has been known to spread rapidly through an entire

¹ See Diseases of the Eyes.
hospital ward. Children are particularly susceptible.\(^1\) Too much stress cannot be laid upon the importance of the immediate isolation of the patient, and of the careful disinfection of the articles coming in contact with her, and of the hands, after touching her or such articles.

**Hydrophobia (Rabies)**

The specific germ of hydrophobia has not yet been isolated;\(^2\) but the toxin which it develops is obtained from the central nervous system and the secretions of animals suffering from the disease. Man most frequently contracts the disease by inoculation with the saliva of such animals when bitten by them.

**Incubation.**—The period of incubation averages six weeks, but may be longer—five or six months.

**Symptoms.**—The onset is gradual and is characterised by pain and congestion in the cicatrix, together with great mental depression, irritability, and hyperaesthesia of the special senses. This is followed by the spasmodic stage, in which the nervous symptoms are all increased and convulsions may be induced by attempting to swallow, by noise, or even by draughts of air. The pain in the laryngeal muscles is severe, dyspnœa is at times intense, the respiration is spasmodic, and there is foaming at the mouth, due to the excess secretion of saliva caused by the constant

\(^1\) Nurses are always held responsible for the spread of this disease in a hospital ward. They should therefore be keen in recognising and reporting the presence of any vaginal discharge.

\(^2\) Recent investigation makes it seem probable that it is caused by protozoa, *i. e.*, bodies found in large nerve cells of animals dying of rabies.
spasm of the jaws. The temperature varies, being subnormal in some cases, while in others there is a moderate fever of 100° to 102° F. The stage of paralysis is marked by the cessation of spasms, and a paralysis of the muscles and nerves of sensation.

Prognosis.—Death results in from 60 to 80 per cent. of the cases of hydrophobia. Bites on exposed surfaces such as the face and hands are the most dangerous. When they are on other parts of the body, the clothing absorbs a certain amount of the saliva and thus lessens the infection.

Treatment.—Immediately after the accident, apply a cupping-glass to the wound or suck the poison out and then cauterise the part. If the wound is on the extremities, first apply a tight bandage above it, and leave this on till the wound has been cauterised. In localities where the specific antitoxine virus can be obtained, the patient should be inoculated with it as soon after the accident as possible.

Nursing.—Extreme quiet in a darkened room is one of the most important specific points in the nursing. It is often necessary to feed the patient by gavage. While doing so, or while cleansing the mouth, a gag should be used to prevent the tube or fingers from being bitten. The wearing of rubber gloves when performing these offices is a safe precaution.

Influenza

Influenza is an acute, infectious disease, due to the bacillus of Pfeiffer.

Incubation.—The period of incubation is from two to four days.

Symptoms.—The symptoms vary considerably in different cases. The onset is generally sudden. There
may be a slight chill followed by rise of temperature. There are an intense aching of the muscles, especially those of the legs and lumbar region, coryza and catarrh of the throat and bronchi, the discharges from which will contain the infection. Nervous symptoms, such as headache, prostration, and neuritis, predominate in some cases, while others are characterised by severe abdominal and gastro-intestinal phenomena. There is seldom leukocytosis.

Temperature.—The temperature varies considerably, according to the severity of the case. In mild cases, it remits between $100^\circ$ and $102^\circ$ F., while in severe cases it will remain persistently between $103^\circ$ to $104^\circ$ F. It falls by lysis. When uncomplicated, recovery will probably be fairly well established in two or three weeks, though a feeling of lassitude and depression may persist for some time.

Complications.—Otitis media, bronchitis, and pneumonia are the most common complications.

Nursing.—The disinfection necessary for all infectious diseases should be carried out. The general care is the same as in all fever cases.

**Leprosy**

Leprosy is a chronic infectious disease caused by the bacillus lepræ. Infection is transmitted by direct contact and by fomites, the germ entering the body through abrasions in the skin or mucous membrane.

There are two types of the disease: (1) tubercular leprosy, characterised by the formation of tubercular nodules in the skin and mucous membrane, followed by ulceration, which sometimes erodes so deeply that the loss of fingers and toes results. (2) Anaesthetic leprosy, in which, owing to the invasion of the nerve
trunks by the bacilli, portions of the skin become anaesthetic and the muscles of the extremities contract and atrophy.

Nursing.—There need be no fear of infection if all abraded surfaces on the hands are protected and the hands are carefully disinfected after doing anything for the patient or touching anything that has come in contact with him. The patient must be kept well nourished, clean, and as much as possible in the open air. The ulcers should be treated as a wound.

Malaria.

Malaria is an endemic, infectious disease caused by a unicellular animal organism. It is characterised by an enlarged spleen and by paroxysms of chill, fever, and sweating, which occur at definite intervals. A certain species of mosquito (the female of the Anopheles maculipennis) is now known to be the only vehicle of transmission.

Malaria is more prevalent in southern and tropical countries, and, particularly so where the land is low, marshy, or badly drained.

There are five distinct varieties of the disease:

1. Intermittent malarial fever.
2. Remittent malarial fever.
3. Æstivo-autumnal (summer-autumn) fever.
4. Pernicious malaria.
5. Chronic malaria or malarial cachexia.

Intermittent Malarial Fever.—The intermittent type of the disease is the most common.

According to the number of hours between the chills (which always occur at regular intervals), intermittent malaria is known as single tertian, double tertian, or quartan intermittent fever.
In single tertian, the paroxysms occur every forty-eight hours, the tertian parasite requiring forty-eight hours to develop and form its spores.

In double tertian (also called "quotidian") fever, the paroxysm occurs every twenty-four hours. In double tertian, there are two broods of parasites in the blood, and each brood completes its development upon a different day.

In quartan intermittent fever, the paroxysms recur every seventy-two hours, the quartan parasite taking longer to complete its cycle. There will be a double quartan, or a triple quartan, if the broods develop on different days.

During the malaria chills, the temperature of the skin is lowered, but the blood temperature is high, 105° to 106° F. The chill over, the patient feels intensely hot, even though the blood temperature is often not higher than during the chill. This stage may endure for some hours. It is generally, though not always, followed by a profuse sweating; but, even when the perspiration is absent, the temperature falls to or below normal in from twelve to sixteen hours.

The pulse during the paroxysm is rapid and hard. There will probably be headache, nausea, and vomiting.

Anæmia is liable to complicate repeated attacks of any of the types of malaria, owing to the destruction

1 Upon inoculation, the malarial organisms make their way into the red blood corpuscles, each one taking possession of a different corpuscle. Here they grow, and as they become larger, they separate, forming spores. These spores break out of the corpuscles into the blood where they remain a short time and then enter other red blood corpuscles. It is when the spores break loose that the chill occurs.
of the red blood corpuscles by the malarial organisms. Herpes labialis is frequently present.

Remittent Malarial Fever.—Remittent malarial fever is the result either of a mixture of the above species of malaria or of an irregular development of different broods of the same species. In this type there is no decided remission of fever, the temperature remaining continuously high.

Æstivo-Autumnal Fever.—In æstivo-autumnal fever the paroxysms vary and are of longer duration, the fever having a tendency to become remittent in time. This is a more serious form of malaria than either of the other two. It is more common in tropical countries.

Pernicious Malaria.—Pernicious malaria is seldom seen except in tropical lands. When it does not follow æstivo-autumnal fever, its onset is generally very sudden. It usually begins with a chill which is followed either by violent delirium or rapidly developing coma. The prognosis is bad.

Chronic Malaria or Malaria Cachexia.—Chronic malaria is generally the sequence of repeated attacks of intermittent malaria.

The most prominent symptoms are varying fever, anæmia, and enlarged spleen, the rupture of which sometimes causes death. In severe cases hæmorrhages may occur from the mucous membrane.

An enlarged spleen is one of the diagnostic physical symptoms in all forms of malaria.

Nursing.—During the chill, keep the patient well covered, having a blanket next his body. Place hot-water bags at his feet, in the axilla, and over the heart. Give hot drinks, unless there is nausea. During the hot stage, apply cold compresses to the head, and, un-
less the patient is ordered sponge baths, give frequent alcoholic rubs. In this disease the patient should be screened to keep out the mosquitoes so that the infection be not carried to others.

**Malta Fever (Mediterranean Fever) (Neapolitan Fever)**

Malta fever is an acute infectious epidemic and endemic disease. It is found chiefly in cities bordering the shores of the Mediterranean, but also, to some extent, in other hot countries.

**Incubation.**—The period of incubation varies from a few days to a fortnight.

**Symptoms.**—In the beginning, the disease resembles typhoid, but the fever is remittent. After two or three weeks it reaches normal, remains so for two or three days, and is then followed by a relapse, which is often more severe than the primary invasion. It is marked by frequent chills, a high, but intermittent temperature, delirium, diarrhoea, excessive weakness, and a tendency to collapse. This stage may endure for five or six weeks. Recovery may then take place, or, after a few weeks or even months of convalescence, another relapse may occur.

**Nursing.**—The treatment and general care of the patient is the same as in typhoid fever.

**Measles (Rubeola)**

Measles is undoubtedly the result of a germ infection, but the specific organism has not yet been isolated. It is highly contagious, but the infection is usually less severe and shorter-lived than that of scarlet fever.

Measles are contagious from the onset until desquamation ceases.
INCUBATION.—The period of incubation is ten to fourteen days.

SYMPTOMS.—A child during the incubation of measles will probably be fretful and feverish. The invasion is characterised by a gradually rising temperature, coryza, sneezing, cough, and a thin nasal discharge. Nausea and vomiting are also common.

ERUPTION.—The eruption appears on the fourth day. It can often be first seen on the mucous membrane of the mouth. Later it appears successively upon the chin, forehead, sides of the throat, face, and chest. It consists of red elevated spots that tend to coalesce into crescent-shaped blotches but which do not become confluent as in scarlet fever. The rash persists for from two to five days and then fades, in the order of its appearance, and is followed by a fine, mealy desquamation that will continue for a week or more.

With the appearance of the rash the patient will probably become quite ill, the tongue will be heavily coated, the tonsils swollen, and the coryza worse. These symptoms abate as the rash fades, and when no complications ensue convalescence is generally rapid.

THE TEMPERATURE.—The temperature rises to 102°-104° F. on the first day. It remits one or two degrees during the next two days. It rises again when the rash appears, and remains up till the rash fades, when it falls, sometimes by crisis, at other times by lysis.

COMPLICATIONS.—The possible complications are broncho-pneumonia, laryngitis, otitis media, chronic conjunctivitis, fatal epistaxis, purpura.

NURSING.—The general nursing is the same as in
all other fevers. Isolation should be continued from the invasion until desquamation ceases. The eyes require special attention. They must be shaded from the light and cleansed as often as necessary (boric acid 2% is always safe to use if the doctor gives no special prescription). The patient should not be allowed to read, even during convalescence. The nose, mouth, and throat must also be constantly cleansed. Otitis media being generally the result of improper care of the same. The room must be kept well ventilated and at a uniform temperature, 68° F. All draughts must be guarded against, especially during convalescence. A sudden chilling of the skin or cold throws extra work upon the kidneys and may cause a nephritis.

**German Measles (Rubella)**

The specific cause of German measles is unknown. It is an infectious disease and is by some authorities considered contagious. Though it resembles measles in many points, it bears pathologically no relation to it.

**Incubation.**—The period of incubation is ten to fourteen days.

**Symptoms.**—German measles is marked by enlargement of the cervical lymphatic glands, and, in some cases, of those of the axilla and groins also. The other symptoms resemble those of measles, but are milder.

**Eruption.**—There are two types of eruption, one being somewhat like that of scarlet fever, and the other like that of measles, except that it never takes a crescent form. The rash appears about the second day, first behind the ears and around the mouth, whence it spreads to the chest and over the body. It lasts
two or three days and may be followed by a slight desquamation.

Temperature.—Unless there is more than the ordinary degree of inflammation of the lymphatics, the temperature seldom rises above 100° or 101° F., and it rarely persists longer than one or two days.

Nursing.—The patient should be kept quiet—not necessarily in bed—in a uniformly heated room. Isolation should be continued till desquamation ceases, which is usually after ten to fourteen days. A thorough airing of the room and disinfection of utensils and clothing are all that is necessary in the way of disinfection at the end of the case.

Meningitis. Cerebro-Spinal Meningitis (Spotted Fever)

This is an infectious disease caused by the meningococcus or diplococcus intracellularis. It is characterised by an inflammation of the cerebral and spinal meninges.

Predisposing Causes.—The predisposing causes of meningitis are: other diseases, such as diphtheria, influenza, measles, and pneumonia, general debility, exposure to wet and cold.

Incubation.—The period of incubation is uncertain.

Symptoms.—The onset is generally sudden, beginning with a chill or convulsion, and followed by a rise of temperature, intense headache, projectile vomiting, photophobia, and strabismus. There is often delirium, even in the early stages of the disease. The patient may be exceedingly restless, emitting from time to time a sharp typical cry. The muscles of the neck become rigid, causing a retraction of the head. The patient often lies with the thighs flexed, so that they
form a right angle with the trunk, and the legs cannot be extended. This is known as Kernig’s sign. There is generally hyperæsthesia of the skin and muscles. Convulsions may occur at any time during the disease. Petechiae and herpes are common, and at times there is general purpura.\(^1\) Lumbar puncture usually shows an increased amount of fluid from the spinal canal, and the specific germ is often found therein.

**The Temperature.**—The temperature varies greatly in different types of the disease. Its course is very irregular. In mild cases there will be little rise of temperature, and the other symptoms will be correspondingly slight. Recovery generally takes place in a few days. In abortive cases the initial symptoms are similar to severe cases, but they cease suddenly after a few days. In intermittent cases the temperature periodically falls and other symptoms abate, but the improvement only lasts a few hours or days. Chronic cases sometimes drag on for months, with frequent exacerbations and remissions. The patient may be continually restless or may lie in a state of semi-coma. Such cases are generally fatal. Malignant cases end fatally in from twelve hours to three days, death being due to toxæmia.

**Complications.**—The possible complications are pneumonia, pleurisy, endocarditis, pericarditis, otitis media (followed by deafness), optic neuritis and other inflammations of the eye that may cause permanent blindness, paralysis, and mental feebleness. In children, growth may be stunted, and chronic hydrocephalus may appear even some weeks after convalescence.

The other most common forms of meningitis are:

\(^1\) The name of spotted fever was formerly given to meningitis on account of the purpura often associated with it.
purulent meningitis, in which the inflammation is generally due to infection from otitis media, mastoiditis, etc.; and tubercular meningitis, in which it is due to the tubercle bacilli.

**Nursing.**—The patient should be kept quiet in a cool, 65° F., dark room. All discharges from the throat and mouth should be disinfected, and gauze, which must be burnt after use, should take the place of handkerchiefs. Feeding, which frequently must be done by nasal gavage, is of the utmost importance.

**Mumps (Infectious Parotitis)**

The specific cause of mumps is unknown. It is contagious from onset until after the swelling entirely disappears.

**Incubation.**—The period of incubation is two to three weeks.

**Symptoms.**—The symptoms are headache, nausea, pain, and swelling of the parotid glands.

**Temperature.**—In mild cases the temperature varies between 100° and 102° F.; in severe cases it may go as high as 105° F.

When no complications ensue, recovery is generally complete in a week or ten days.

**Complications.**—Earache, otitis media. The generative organs are sometimes affected. Meningitis has occurred and also suppuration of the parotid gland, but the last three complications are rare.

**Nursing.**—The patient should be isolated till all symptoms subside, and kept in bed while there is any fever. The frequent cleansing of the mouth is of the utmost importance, as the majority of cases in which otitis media develops may be traced to neglect in this matter.
The specific cause of the plague is the bacillus pestis. It occurs in the buboes, urine, faeces, and blood. It is frequently found in the soil, in countries where the disease is prevalent. The disease attacks the lower animals, especially rats, and they, flies and fleas, are often the means of spreading it. It can be contracted through the respiratory and alimentary tract, but inoculation is the most common method of infection.

PREDISPOSING CAUSES.—The predisposing causes are diet, crowding, and lack of proper nourishment.

INCUBATION.—The period of incubation is three to seven days.

VARIETIES.—There are three varieties of the disease: the bubonic, the pneumonic, and the septicæmic.

THE BUBONIC.—The bubonic type is the most common.

Symptoms.—The onset is abrupt. There is a chill, followed by a fever 102°-106° F., and leucocytosis. The prostration is marked. The buboes appear from the second to the fifth day. The axillary, femoral, and inguinal nodes are the ones usually attacked. These buboes may soften and resolve, they may suppurate and break through the skin, or they may become gangrenous.

The Temperature.—The fever remits soon after the appearance of the buboes, but it quickly rises again, remains high for about a week, and finally falls by lysis.

Prognosis.—The mortality is about 50 per cent.

The Pneumonic Type.—In the pneumonic type there is a broncho-pneumonia and the bacillus pestis is found in the blood and sputum.
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Prognosis.—The mortality is 95 per cent.

Septicaemic Type.—In the septicaemic type, there are no buboes, but the entire system is poisoned by the infection.

Prognosis.—Many patients collapse and die in a few hours, while others live for two or three days. The mortality is 80 per cent.

Nursing.—The buboes, unless they suppurate, are generally incised. The after-treatment is then the same as for any suppurating wound. Rigid isolation, cleanliness, and fresh air are of primary importance. The febrile symptoms are treated as in any other case of fever. The tendency to sudden collapse must be remembered, and treatment for it started at the first symptoms.

Pneumonia

Lobar pneumonia is an infectious disease caused by a specific organism, "the micrococcus or diplococcus lanceolatus or bacillus pneumoniiæ (pneumococcus),” which produces an acute inflammation and consolidation of the lung tissue and a severe constitutional toxaemia. One or both lungs may be affected, or only a portion of one or more of the lobes. When both lungs are affected it is called "double pneumonia."

Predisposing Causes.—Cold, the inhalation of smoke, of gas, and sometimes of ether, a too long continuance in one position, any injury to the chest, and indeed any factor which tends to irritate the lung substance, may predispose to pneumonia. Pneumonia is also likely to complicate accidents which necessitate the performance of artificial respiration, and it frequently complicates or follows other diseases. Alcoholic habitués are particularly subject to pneu-
monia, and the prognosis in such cases is very unfavourable.

Symptoms.—The disease generally comes on suddenly with a severe chill, followed by a rise of temperature to 104°-105° F., increased respiration, and a cough accompanied by pain. The face is flushed, particularly the cheeks, the nostrilla dilate with each inspiration, and herpes is generally present, especially around the lips.

Sputum.—The state of the sputum is also of diagnostic value in pneumonia. During the first stage it is a frothy serous fluid mixed with mucus. But in the second stage it becomes extremely tenacious and streaked with blood. In some cases the sputum is often a reddish-brown colour—a prune-juice sputum. This is always a grave indication. When resolution begins, the expectoration gradually ceases to be blood-streaked, and becomes at first more abundant, and then gradually less in quantity.

Stages.—There are four distinct stages in the course of the disease: (1) onset, (2) fastigium, (3) crisis or lysis, (4) convalescence. The first three are also known as engorgement, red hepatisation (or consolidation), and grey hepatisation (or resolution), respectively. In the first stage, the lung tissue is a deep red colour, and firmer and more solid than the normal lung. It still crepitates, though indistinctly. In the second stage, the portion of the lung involved becomes solid and airless. The third stage is marked by the gradual softening of the exudate and the return of the tissue to its normal state.

Temperature.—The temperature rises immediately after the initial chill to about 104° or 105° F., and remains there, with but slight remission, till resolu-
tion takes place. This happens, as a rule, either on the third, fifth, seventh, or ninth day. In the majority of cases it then falls by crisis. Occasionally it falls by lysis, taking three or four days to reach the normal line. If it remains continuously high for a much longer period, it may be due to complications or to delayed resolution.

Pulse.—In pneumonia the pulse is full and bounding, ranging from $96^\circ$ to $120^\circ$ or $140^\circ$. There is perhaps no disease in which it is more important to note the pulse carefully, since death occurs in a large number of cases from heart failure.

Respirations.—The respirations are shallow and rapid, and there is always more or less dyspnöea. Increasing respiration and cyanosis are of serious import.

Leucocytosis.—The leucocytosis is high—25,000 to 35,000.

Tympanites.—Tympanites in pneumonia is due not only to decreased peristaltic action, but also to the excess of carbonic gas in the blood, caused by its lack of proper oxygenation.

Complications.—The most common complications of pneumonia are pleurisy, endocarditis, pericarditis, oedema of the lung, and, in alcoholic patients, delirium tremens.

Sequelæ.—The most frequent sequelæ are empyema, abscess of the lung, and gangrene of the lung.

**Broncho-Pneumonia**

Broncho-pneumonia, in which the bronchi are affected as well as the lung, is the most frequent form of pneumonia in children and the aged. It is even more liable to prove fatal than lobar pneumonia, and
complications, such as abscess of the lung and gangrene, are more likely to follow.

**Embolic Pneumonia**

Embolic pneumonia is due to embolism of the vessels of the lung.

**Hypostatic Pneumonia**

Hypostatic Pneumonia is generally due to a failing heart. It may also be caused by a too long continuance in one position.

**Inhalation Pneumonia**

Inhalation pneumonia is due to the inhalation of smoke, gas, etc., or to the introduction of fluid or vomitus into the trachea.

**Migratory Pneumonia**

Migratory pneumonia affects one lobe after the other.

**Septic Pneumonia**

Septic pneumonia is due to absorption of septic material.

_Nursing._—In pneumonia, the nursing is directed principally toward making the patient comfortable in the most restful position that will allow free play of all the muscles of the chest. Therefore he should be kept perfectly quiet, being permitted no conversation or exertion that may agitate or excite to effort, and thus increase the respiration and heart action. After coughing, he should be urged to expel the spu-
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tum, using a gauze handkerchief. This is often a difficult matter, since the tenacious character of the sputum makes it cling to the lips and tongue. The nurse must remove it frequently with gauze and a wooden spatula, and, as all expectoration contains the germs of the disease, it must be burned at once. Delirious or semi-conscious patients often expectorate upon the bed-clothes, walls, and floor,\(^1\) or into the face of the nurse. The nurse may guard against the last by turning her head aside. The bowels must be kept free and tympanites relieved by the tube or turpentine stupe. The inflammation of the lungs is by some physicians treated with topical applications, i.e., hot poultices, ice compresses, ice poultices, cold packs. Others employ the fresh-air treatment, which consists in treating the patient, whose body is well protected from the cold, in the open air, or placing him directly in front of an open window, allowing the air to blow constantly through the room regardless of atmospheric temperature. Restraint, when it becomes necessary, should not interfere with the movements of the chest. The hands and feet, however, must be made absolutely secure, especially in the case of alcoholic pneumonia, when the patient is apt to be violent in the extreme. Heart failure and oedema of the lungs (accompanied by a dusky hue and labored respirations) are constantly to be watched for and reported. Heart stimulants are usually called for, when the pulse becomes feeble, rapid, and irregular. For oedema, dry cupping of the anterior and posterior chest is sometimes ordered, the cups being applied very rapidly and allowed to remain on only a few

\(^1\) When this occurs, the bed-clothes, walls, and floor should, of course, be disinfected.
seconds. The sudden drop of temperature to sub-normal which follows the crisis of pneumonia is sometimes alarming and calls for prompt action. Extra blankets, hot bottles, and a hot drink are remedies any one may use with safety.

**Rheumatic Fever (Acute Articular Rheumatism)**

Rheumatic fever is an acute infectious, contagious disease caused, it is believed, by a streptococcus. It is usually characterised by poly-arthritis and inflammation of the fibrous membrane of the joints, resulting in pain and swelling of the same.

**PREDISPOSING CAUSES.**—The predisposing causes are exposure to cold and damp, and lack of proper nourishment.

**SYMPTOMS.**—The disease sometimes sets in abruptly but, as a rule, it is preceded by a slight malaise, pain in the joints, and sore throat. The affected joints become red, swollen, and painful. There are apt to be profuse sweats, and the perspiration has a strong sour odour and acid reaction, owing probably to the large amount of lactic acid in the system.

**ERUPTION.**—Sudamina, or a red miliary rash is often present, and sometimes purpura.

**URINE.**—The urine is scanty, highly coloured, and strongly acid.

**TEMPERATURE.**—The temperature varies from 102° to 104° F., with marked remissions. Defer- vescence is gradual.

**PULSE.**—The pulse is generally frequent and weak. Its character must at all times during the disease be carefully noted, as cardiac complications are likely to occur.
There will be a marked leucocytosis.

Course.—The attack may last for weeks. The swelling often disappears for a day or two, and then a relapse occurs.

Complications.—The possible complications are endocarditis, myocarditis, pericarditis, erythemas (especially erythema nodosum, or purpura), tonsillitis, and anæmia.

Diet.—While the temperature is high, milk and gruels are given, but meat broths are seldom allowed. When the fever falls, the following articles are allowed: vegetable soups, farinacious puddings, unsweetened or sweetened with saccharine, unsweetened milk toast, and, gradually, fresh vegetables, fish, eggs, and chicken. Other meats are generally withheld for some time, as they increase the formation of lactic acid; also sweets, fermented liquors, and sweet wines.

Nursing.—The general treatment is the same as in all fevers. Local applications are generally ordered, and care must be taken in applying the same to move the extremities as gently and as little as possible, for every movement is painful in the extreme. The extremities are often immobilised by the application of splints, sand-bags, or pillows, and they should be protected by "cradles" from the weight of the bed-clothes. Flannel sheets, owing to the excessive perspiration, are often preferred to cotton, and unless it is too painful for the patient, they should be frequently changed. Move the patient as little as possible, and never allow him to exert himself, thereby avoiding unnecessary strain upon the heart. Be careful not to jar the bed nor to allow any sudden noise such as slamming of doors or window shutters to startle the patient.
Mallory has found certain bodies in and between the epithelial cells of the skin in scarlet-fever patients which he suggests may be specific protozoan bodies. Infection is principally spread by means of the desquamated epithelium. Scarlet fever is contagious from the onset to the end of desquamation. The germ is long-lived and hard to destroy. Clothing worn by a scarlet-fever patient has been known to cause infection years later.

**Incubation.**—The period of incubation varies from one to ten days.

**Symptoms.**—The onset is sudden. Young children often have convulsions, older children and adults a chill. In other cases, the secondary symptoms, viz: vomiting, sore throat, headache, and abrupt fever, 103° to 105° F., come on immediately.

**Eruption.**—The eruption, which appears within eighteen to thirty-six hours, comes out first on the neck, chest, and back, and then spreads rapidly over the entire body and the upper part of the face. The rash in scarlet fever rarely involves the chin and the outside of the mouth. It is, however, very apt to be found in quite thick patches in the pharynx. The eruption consists first of pale red points, which, in a few hours becomes confluent, producing a uniformly red surface which continues for four or five days. At the end of this time it fades, and is followed a few days later by desquamation, which continues from one to three weeks.

**Tongue.**—The condition of the tongue is of diagnostic value in scarlet fever. It is at first white and coated, but in a day or two the fungiform papillae
become red and swollen, producing what is called the
"strawberry tongue."

**Temperature.**—The temperature remains high for two or three days. Then it falls by slow lysis, lasting to the eighth or ninth day. A leucocytosis is present.

**Complications.**—The possible complications are œdema of the glottis, suppuration of the lymph-nodes in the neck, adenitis, cellulitis of the neck, purulent otitis media, acute endocarditis, nephritis, and arthritis. There is a false membrane covering the tonsils as in diphtheria, but the Klebs-Löffler bacilli may or may not be present.

**Sequelæ.**—The possible sequelæ are chronic endocarditis, chronic nephritis, deafness, paralysis, and blindness— from iritis or neuro-retinitis.

**Prognosis.**—Healthy children, when well cared for, generally recover, but sequelæ may follow.

**Immunity.** One attack generally renders a person immune.

**Nature of Desquamation.**—The desquamation in scarlet fever differs from that of any other disease, in that the superficial skin can be peeled in long strips.

**Nursing.**—The general treatment is the same as in all febrile diseases. Strict quarantine must be observed from the onset till desquamation ceases. This generally means six to eight weeks, the forty-day limit being usually set. The room should be kept well ventilated, but free from draughts, and at a uniform temperature, 68° F. The urine should always be measured, and any change in its amount or appearance reported immediately to the physician. The care of the mouth and throat is of the utmost importance. Bathe and anoint the skin daily during des-
quamation, being careful not to clog the glands with the ointment. Report carefully even insignificant symptoms.

**Septic Diseases**

**Septicaemia.**—Septicaemia is a disease caused by certain species of bacteria, which enter the body through wounds or abrasions in the skin or mucous membranes. They cause suppuration of the tissue and the formation of toxins, which, being absorbed by the blood or lymph, poison the system. The uterus after labor or abortion is a frequent site of infection. Sepsis may also follow suppurative diseases of any of the organs of the body. The microorganisms most commonly associated with this condition are the streptococcus, and staphylococcus of suppuration, and, sometimes, the pneumococcus, meningococcus, gonococcus, etc.

**Symptoms.**—Twelve hours to two or three days after the infection there is a chill, the temperature rising during the chill to 104° or 105° F. There will be nausea, headache, anorexia, and all other febrile symptoms. Leucocytosis, is pronounced. In mild cases, under proper treatment, the symptoms may subside after a few days. In severe cases, the patient quickly passes into a typhoidal condition. The mind may remain clear or there may be delirium. The temperature remains persistently high, the surface of the skin is often cold and covered with perspiration, cyanosis is often marked, and the face is pinched and drawn. The discharge from the wound is diminished, but the tissues are brown and dry, and there is a foul, fetid odour. In cases of puerperal sepsis, the lochia becomes exceedingly foul. In progressive sepsis the
symptoms are much the same, but come on more slowly, the temperature is irregular, and there is a continual series of chills, fever, and sweating. Various eruptions, such as erythema and petechiae, often appear.

**Nursing.**—The treatment is the same as in all surgical and febrile cases. When the patient recovers, convalescence is liable to be long and tedious. Fresh air and nourishing food are then two of the most essential things to be considered in the nursing.

**Pyæmia.**—Pyæmia is caused by the same organisms as septicæmia, but, owing to the entrance of the bacteria into the veins, thrombi form and embolism results. The emboli, being septic, break down and form abscess cavities wherever they lodge.

The formation of an abscess is generally marked by a chill. This may occur daily, or even more frequently. The temperature falls before the chill and rises during it, mounting, sometimes, even as high as 107° F. The other symptoms are those of septicæmia in a marked degree.

The prognosis is very bad, death usually resulting within a few days.

**Malignant Endocarditis.**—Malignant endocarditis is an inflammation of the endocardium caused by one or another of the pyogenic bacteria.

**Symptoms.**—The symptoms are those of a severe endocarditis and sepsis combined.

**Small-Pox (Variola)**

The specific germ of small-pox is supposed to be a protozoan. It is an extremely virulent and highly contagious disease, characterised by a high fever and typical eruption.
Incubation.—The period of incubation is one to three weeks, usually twelve days.

Symptoms.—The symptoms are a sudden intense fever, 103°-105° F., that may or may not be preceded by a chill, or in children by a convulsion; severe headache; intense pain in the lumbar region and extremities; vomiting; and, often, delirium.

Eruption.—The eruption proper appears on the third day, but it is often preceded by an initial roseola that resembles the rash of scarlet fever.

The typical eruption has five stages—the macule, the vesicle, the pustule, the crust, and the cicatrix. Each of the first two stages continues for three days. 1. A small, hard lump is felt under the skin. 2. A vesicle forms above the skin. 3. The serous fluid of the vesicle turns to pus. The duration of this third stage depends upon the severity of the disease. It is followed by the formation over the surface of each vesicle of crusts, the nature of which also depends upon the severity of the disease. In mild cases they are little more than scales of skin, while in others they are of a thick crusty character and leave a deep pitting when they drop off, as they generally do by the end of the third or fourth week. Owing to the improved treatment of the present day, the cicatrix is not now either as deep or as permanent as formerly. During the eruption there is always more or less burning and itching of the skin.

The eruption is classed, according to its nature, as discrete, confluent, or hæmorrhagic. In the first, the pustules remain separated, and dry up by the thirteenth or fifteenth day. In the confluent type, the pustules increase in size and run together. The swelling around them is more marked than in the dis-
crete type, as are also the pain and the itching. The patient often dies of sepsis in a few days. If he survives, the pustules dry up during the third week and the resulting crusts will probably be off by the end of the fourth. There are two varieties of the haemorrhagic type.

1. Purpura variolosa. The onset is severe, there is bleeding from all the mucous membranes, and the patient often dies before the appearance of the rash.

2. Variola pustulosa haemorrhagica. The eruptions are of the confluent type with haemorrhage into the pustules. These cases seldom recover.

Temperature.—The temperature rises rapidly after the initial chill to 103°-105° F., and remains high until the eruption appears. It then falls, remaining lower (99°-101° F.), till the pustules form, when it gradually rises, reaching its height about the ninth day. In mild cases lysis then begins, but in severe cases the temperature will remain high for some days longer. The leucocytosis is high.

Complications.—The possible complications are septicæmia, pyæmia, empyema, myocarditis, nephritis, pharyngitis, abscesses, and cellulitis of the skin and subcutaneous tissue.

Varioloid.—Varioloid is a mild form of small-pox, which attacks those who have been vaccinated. The invasion is much the same as in small-pox, but the symptoms are all milder. The eruption is less in quantity and degree, and the secondary fever is slight.

Vaccination (see Chapter XX).—Vaccination should be performed in infancy; again, about the seventh year; in early adult life; and during epidemics, or after exposure to small-pox, when such
exposure occurs more than five or seven years after the last vaccination.

Nursing.—The strictest quarantine must be observed from the onset till the falling of the last crust. The pus from the sores should be cleansed by sponging with disinfectants. Itching can be much relieved by frequent sponging and by soaking the crusts in oil or vaseline. To prevent pitting, the patient must be restrained from scratching himself. This is best accomplished by encasing his hands in gloves, tying his wrists so that the face cannot be reached, and fitting a mask of lint over his face. The mask and gloves are kept constantly moist with different antiseptic solutions or ointments.

The eyes should be irrigated every two hours, and the mouth, as in all contagious cases, cleansed after and before each feeding. Fresh air and cleanliness are of more than ordinary importance.

Syphilis

Syphilis is a chronic infectious and constitutional disease transmitted by inoculation. It enters the system by means of the blood-vessels and lymphatics. It first attacks the connective tissues, but it may, during its course, attack every tissue and organ of the body.

It may be inherited or acquired. When the disease is inherited, the symptoms may appear immediately, but more commonly they come on about the second month. The skull shows prominent frontal eminences, and there is thickening around the anterior fontanel. A rash appears, usually erythematous in character, but sometimes papular or pustular. Ulcers will form
on the mucous membrane. There will probably be a more or less purulent discharge from the nose, eyes, or ears, and in female children from the vagina. The child invariably has the snuffles, is thin, marasmic, and looks old. During this stage it can infect others.

When such children live they are liable to be epileptic, idiotic, or hydrocephalic. When the teeth appear, the upper central incisors are small, conical, and notched at the end ("Hutchinson teeth"). There will probably be keratitis, iritis, or deafness. Gummata may form in the viscera, and there may be periosteal nodes on the long bones.

Syphilis may be acquired by direct contact with some one suffering from it, or by using linen, dishes, or utensils used by such patients and not disinfected. The disease is infectious in the primary and secondary stages. The germ is in the blood, and in secretions from sores and mucous patches; these, therefore, are the source of infection. Nurses attending obstetrical or gynaecological cases complicated by syphilis are particularly liable to infection unless they exercise the greatest care.

INCUBATION.—The period of incubation is about three weeks.

SYMPTOMS.—The primary stage lasts about six weeks. There are no constitutional symptoms, but the glands (particularly those of the inguinal region) become enlarged, and the chancre or initial lesion appears at the point of infection.

The secondary stage may continue either for a few weeks or for two or three years. It is marked by eruptions of various types: mucous patches upon the

1 The tissue is moist, swollen, and covered with a greyish film.
mucous membranes of the mouth, nose, arms, or vulva; and various constitutional symptoms, such as slight fever, general malaise, headache, disturbance of the digestive organs, anæmia, iritis (and other inflammations of the eye), otitis media, deafness, pain in the bones, particularly at night, and a falling of the hair.

The third or tertiary stage does not always begin immediately after the symptoms of the second abate, and with proper treatment it may sometimes be avoided. There are various skin lesions. Of these, the papillomata and indolent ulcers with scaly crusts that after healing leave deep scars are especially common. Infection can be contracted from the discharge of these ulcers, otherwise there is no danger of contagion in the tertiary stage. Gummata may appear in any part of the body. Periosteal nodes form on the bones, especially on the shins. The bones of the nose may necrose, causing a sinking in of the bridge of the nose. There may be ulceration and necrosis of the laryngeal cartilages and vocal cords, with perforation of the hard or soft palate.

Nursing.—During the contagious stages, the disinfection usual in other infectious diseases should be carried out, and nurses should be particularly careful of their hands. Infection is frequently acquired by failure in this respect. Rubber gloves should be worn when giving inunctions, doing dressings, douching, etc. Mercury and potassium are the drugs most frequently used in this disease. (For the giving of inunction, see Chapter X. For calomel fumigation, see Chapter XV.)

1 A very large per cent. of blindness is due to infection from mucous patches of the vulva during delivery.
Tetanus

The specific cause of tetanus is the bacillus tetani, which enters the body through the wounds or abrasions in the skin and mucous membrane. Outside the body, it is most commonly found in the soil, in manure, and in damp cellars. It has also been found in the intestines of herbivora. In the human body, it is usually only found in and around the point of entrance.

**Incubation.**—The period of incubation is one day to three weeks, usually two weeks.

**Symptoms.**—The onset is gradual. There is a growing rigidity of the muscles of the neck and jaw, which spreads slowly to the trunk and legs. The arms are seldom involved. As the rigidity increases, spasmodic contractions of the muscles develop and increase in intensity, till the body at times rests on the head and heels. Severe clonic convulsions are often present. Noises, jarring the bed, or touching the patient will often produce these.

**Temperature.**—The temperature is variable. In mild cases there is sometimes only a slight elevation. Ordinarily it runs between 103° and 105° F., but in some cases it may be higher, and is frequently 110° F. and over before death.

**Treatment.**—The wound is either cauterised or the surrounding tissue excised. Bromides or chloral are generally given, and the convulsions are controlled by the use of chloroform.

**Nursing.**—Absolute quiet is one of the most essential specific points in the nursing. The patient should be placed in a darkened room. Either nasal or rectal feeding is resorted to when necessary, and to prevent
convulsions it is frequently necessary to keep the patient under the influence of chloroform during the process.

Tuberculosis

The specific cause of tuberculosis is the bacillus tuberculosis. The germ is found in the lesions and in the discharge from the seat of infection. Any part of the body may be affected. In children, the most frequent sites of the disease are the bones, joints, lymph-nodes, peritoneum, and meninges; in adults, the lungs. Other, though less common, seats of the disease are the lymphatic system, the nervous system, the alimentary tract, the genito-urinary tract, and the skin.

The germ enters the body with the breath or with contaminated food supplies. Milk is a frequent source of infection. The bacillus is long-lived and can be carried to great distances when discharges containing it are allowed to become dry and scatter. It is, however, easily killed: exposure to the direct rays of the sun will act as a germicide in six hours, and three minutes’ exposure to the action of boiling water will have the same effect.

In conjunction with the specific symptoms, tuberculosis is diagnosed by the finding of the germs in the discharge from the affected part. When the symptoms are doubtful, tuberculin is sometimes injected hypodermatically. If the patient has tuberculosis, the injection is generally followed by a rise of temperature within twenty-four hours.

Unsanitary conditions, lack of nourishing food, and

1 Discovered by Koch in 1881.
general debility are the most common predisposing causes of the disease.

**Acute General Miliary Tuberculosis.**—Acute general miliary tuberculosis generally occurs secondary to previous tuberculosis, either active or latent. There are three types—the typhoid, the pulmonary, and the meningeal.

1. In the typhoid type, there is generally toxæmia, resembling typhoid, accompanied by bronchitis and cyanosis. The temperature is more irregular than in typhoid, and the rose spots and abdominal symptoms are lacking.

2. Pulmonary type. The pulmonary type generally occurs in the course of a chronic pulmonary tuberculosis or an infectious disease. The symptoms are those of an acute tubercular broncho-pneumonia. The patient generally dies in a few weeks.

3. The meningeal type (tubercular meningitis). This type resembles cerebro-spinal meningitis in many respects, but the head is as a rule less retracted, the course of the disease is slower, and the fever moderate and irregular. Such patients rarely recover.

**Pulmonary Tuberculosis (Phthisis).**—Pulmonary tuberculosis may be either chronic or acute. The symptoms are much the same in both, but develop more rapidly and with greater severity in the acute form. If the course of the disease is not immediately checked, it will probably end fatally in a few weeks. The chronic form may drag on for years, or, if taken in time, may occasionally, under proper treatment and suitable surroundings; be partially or even entirely checked.

**Symptoms.**—The symptoms of pulmonary tuberculosis are anorexia; profuse perspiration, especially
at night; progressive emaciation and weakness; a short hacking cough, sometimes accompanied with pain in the lung, and a muco-purulent sputum containing the specific germ; a hectic flushing of the cheeks, particularly towards evening; anæmia; occasional attacks of diarrhœa and vomiting. The temperature generally runs a typical course, being comparatively low in the morning and rising towards evening. The pulse is soft and rapid. As cavities form in the lung the symptoms increase in severity; there are apt to be chills and hæmoptysis. The patient is hopeful of recovery till the very last.

**Acute Pneumonic Phthisis.**—Acute pneumonic phthisis begins much like a lobar pneumonia, but defervescence fails to take place. Night-sweats and other tubercular symptoms come on, and the tubercular bacilli will soon be found in the sputum. Death occurs in the majority of cases in from two to eight weeks; in others, the symptoms abate and a chronic phthisis ensues.

**Nursing.**—Careful disinfection of the specific discharge is necessary to avoid the spreading of the disease. Disinfection of the bed-clothes and, in advanced pulmonary tuberculosis, of all dishes used for eating and drinking is advisable.

The sputum is best received in sputum cups that can be burned daily. When these cannot be obtained, porcelain cups, half filled with formaldehyde solution 2%, or carbolic solution 1:40 can be used. These cups must be kept covered, emptied frequently, and boiled daily. Pieces of gauze and old linen that can be burned after use are preferable to handkerchiefs. A constant supply of fresh flowing air, cleanliness, and nourishing food are the other most important points
in the nursing of tuberculosis. When possible, the patient should be kept out-of-doors all day, and even all night when a sheltered place can be provided. When not, the window of the sleeping-room must be kept open and the patient's bed placed so that he will get the full benefit of the incoming air; but he must be protected from draughts, and kept well covered and warm. The open-air treatment is so well known that it needs no discussion here. When he is not too weak, a small amount of exercise, regulated according to his strength, is deemed advisable.

Owing to the tuberculosis patient's lack of appetite, the dainty serving of food is of more than usual importance; and, as indigestion and lack of proper assimilation of food are apt to complicate all forms of tuberculosis, it is best served in small quantities and often.

Diet.—In cases of severe indigestion, liquid diet is generally given. At other times, even when there is continued temperature, a generous diet is usually provided. Scraped beef, raw or slightly browned in the oven, is excellent. Milk and eggs are both very important factors in the diet. Fresh meat of all kinds, fresh fish, vegetables, cereals, and fruit are all allowed. Fats, when the patient can digest them, are also good. But sweets and richly cooked or highly seasoned foods are to be avoided. Alcohol, in the form of strong spirits, except in flavouring for egg-noggs, is seldom given; but claret, Burgundy, ale, and porter are frequently allowed.

Typhoid Fever (Enteric Fever)

Etiology.—Typhoid fever is an infectious disease caused by a germ called "Elberth's bacillus typho-
In autopsy it has been found in the lymphoid tissue of the intestines, the mesenteric glands, the spleen, liver, and kidneys. The poison is given off principally in the faeces, but the germ is also often present in the urine, blood, and the pus of abscesses when such complicate the disease.

Infection is by mouth. Typhoid can be transmitted by anything that has come in contact with any of the discharges containing the germ, provided the object has not been properly disinfected.

Lesions.—The principal seat of inflammation is the ileum, particularly that portion in which the glands of Peyer ("Peyer's patches") are situated.

Incubation.—The period of incubation is two to three weeks.

Primary Symptoms.—The primary symptoms are headache, nausea, pain in back, legs, and abdomen, loss of appetite, coated tongue, epistaxis, diarrhoea.

Later Symptoms.—The later symptoms are the enlarged spleen, Widal's reaction,¹ rash, and liquid yellow stools with a "pea soup" appearance. There may be either diarrhoea or constipation.

Temperature.—During the first week, the temperature rises steadily, being a degree or a degree and a half higher each evening, and higher each morning, generally reaching 103° or 104° F. by the end of the first week. During the second week, the fever remains continuously high with but slight morning remissions. In the third week, these remissions be-

¹ Widal's reaction was discovered by Widal in 1890. A drop of blood serum taken from a suspected typhoid patient is mixed with one drop of a culture of typhoid bacilli. As a rule, if the patient has typhoid the bacilli in the media will within a few minutes lose their motility and collect in clumps.
come more marked, and, in favourable cases, there is a gradual decline of the fever, the temperature in mild cases even reaching normal by the end of the week. In the majority of cases, it does not, however, do this until the fourth week, and in some cases not even then. It is always a serious symptom when the temperature and other symptoms do not abate by the end of the fourth week. In such cases, convalescence may be deferred till the fifth or sixth week and complications are likely to occur. A sudden drop of temperature at any time during the disease, unless the pulse rate decreases in proportion, is to be regarded with suspicion, as it is a symptom both of haemorrhage and perforation.

The Pulse.—During the first week, the pulse varies in rate from about 100 to 110. It is full in volume, of low tension, and very often dicrotic. In and after the second week, it is more rapid—110–115—but not generally dicrotic. As the temperature falls, the pulse should become slower and stronger. The pulse becoming suddenly rapid may indicate either haemorrhage, perforation, cardiac failure or dilatation.

The Tongue.—The tongue is at first coated and white. Later it becomes almost black in the centre and very dry. When the tongue begins to clear at the edges and to grow moist, the approach of convalescence is indicated.

The Rash.—The rash, as a rule, appears first on the abdomen. It consists of small, scattered, rose-coloured spots, that disappear temporarily on pressure. It develops from the seventh to the tenth day, persists for two or three days, and then fades, leaving a brownish stain for a time. Successive crops continue to appear and fade, till about the middle of the
third week. The spots are more abundant on the abdomen, the lower part of the chest, and the back, and sometimes are not present elsewhere.

Sudamina.—Sudamina may be present in some cases of typhoid. It has the appearance of small vesicles.

Mental Condition.—Typhoid patients are dull and stupid. They are apt to be delirious, though not violently so. They must at all times be carefully watched, as they invariably want to get out of bed. A continued low, muttering delirium with picking at the bed-clothes is always a bad symptom.

The Abdomen.—The abdomen may or may not be tender. It is sometimes much distended, owing to the presence of gas caused by fermentation, which may produce paralysis or partial paralysis of the intestine.

The Spleen—The spleen becomes enlarged in the very beginning of the disease. It can often be felt below the lower border of the ribs by the end of the first week.

Subsultus.—Subsultus or trembling is often present in severe cases. It is considered an untoward symptom.

Complications.—The two greatest dangers connected with typhoid are hæmorrhage and perforation, due to the ulceration of the intestine. Either of these complications may occur from the beginning of the third week. Sudden pain, fall of temperature, and quickened pulse are the symptoms of both. In perforation—which is the more serious of the two—the pain is generally continuous and very severe,

1 There is sometimes, but rarely, a hæmorrhage during the first or second week, due to congestion,
though sometimes there is no pain and the condition may only be discovered, after death, by autopsy. The cause of perforation is that the intestine has ulcerated to such an extent that it breaks, emptying its contents into the abdominal cavity, and, unless an operation can be done immediately, the patient may die of septic peritonitis in a few hours.

Nursing: Quiet.—Quiet is of the utmost importance in the nursing of typhoid fever. The patient must be kept absolutely at rest, in the recumbent position, only one pillow, preferably hair, being allowed. He must not be permitted to sit up or turn in bed, as any undue exertion puts an extra tax upon the heart and increases the danger of hæmorrhage. When turned on his side a pillow must always support the back.

Fresh Air.—The air of the room should be at all times fresh. A constant supply of "free, flowing air" must be provided, the patient being screened from draughts.

Application of Cold.—Headache, insomnia, restlessness, and irritability may be overcome by the use of cold compress, ice poultice, or ice-cap on the head, or by simple, cool sponging of the body, being careful always not to exhaust the strength by too much turning.

Delirium.—A patient suffering from typhoid fever should never be left alone. Attempts to get out of bed may bring on hæmorrhage; or, in a sudden attack of active delirium, the patient may jump from a window and a life be lost through carelessness.

Care of the Mouth.—The mouth and tongue require unremitting attention, and must be washed thoroughly before and after each feeding. Antiseptic
solutions and lubricating mouth washes give relief, but the greatest care must be exercised not to irritate the tissues nor cause abrasions of the mucous membrane. The lips are to be kept from becoming dry and cracked by the use of some emollient. A mixture of epithelium, decomposed foods, and microorganisms must never be allowed to accumulate on the teeth or tongue. Even twelve hours' neglect in this matter will bring about a lamentable condition. Failure to remove it may result in increased tympanites, infection of the salivary glands, infection sometimes extending to the middle ear through the Eustachian tube, ulceration of the mouth and tongue, and even re-infection of the patient.

CLEANLINESS.—The hands of the patient must be frequently washed with hot water, soap, and nail brush and kept free from faeces, a prolific source of re-infection. The nails must be kept short and clean. The morning and evening cleansing bath is usually permitted, even when baths for the reduction of temperature are contra-indicated. The bed and body clothing must be kept fresh and free from odour. Where involuntary movements of the bowels are frequent, the mattress should, if possible, be changed. Two rubber sheets can be alternated, one being disinfected and aired while the other is in use. Oakum pads or two or three thicknesses of Japanese paper napkins, which can be burned, may be used to receive the discharges, and thus save much extra washing of linen. The bed-clothing must be scant—a single sheet suffices for covering when the body temperature is high—and in many instances the patient is more comfortable if the night-shirt is omitted during the acute stages of the disease.
The Bowels.—Either diarrhoea or constipation is usually present. When the former is excessive (more than four or five movements a day), the treatment is directed toward checking the excess. The patient should be bathed locally with an antiseptic after each movement of the bowels. When constipation is present, medication likely to cause peristaltic action is generally avoided, but it is essential that the intestines be kept as free as possible of faeces, which are filled with bacteria and their toxic products. A soap-suds enema is usually given each morning, but never except by the physician’s order. The greatest caution must be observed both in the insertion of the tube and in regulating the flow of the water, which should run very slowly. If possible, the lower bowel should be emptied, thus preventing impaction of the rectum and sigmoid flexure and possible re-infection of the patient.

Bladder.—Evacuation of urine must be carefully noted and the amount measured. The danger of over-distention and consequent inability to void urine is common in this disease. The condition occurs most frequently in cases where the urine and faeces are passed involuntarily. Frequent percussion of the bladder should be made to ascertain whether it be full or empty. Sometimes catheterisation is ordered, as the bladder must be kept free of urine.

Tympanites.—The rectal tube is often used for relief of gas in the intestine. Sometimes it is allowed to remain for several hours, and should be watched and kept in place. Turpentine stupes and turpentine enemata, too, are employed for this purpose by some physicians. They must be applied with the utmost care and attention that the patient be not burned.
Bed-Sores.—Owing to the protracted course and toxic nature of typhoid fever, there is liable to be extreme emaciation and general debility of the system. For this reason, and also because the patient usually lies upon his back in order to avoid any pressure upon the abdomen, the danger of bed-sores is more imminent than in any other acute disease. Their formation will only be prevented by constant and careful bathing with soap and hot water, hardening of the skin by the use of alcohol, prevention of chafing by dusting the surface with powder, relief from pressure by the use of pillows and rings and frequent turning of the body, and improvement of the circulation by local massage in the parts likely to be affected.

The Pulse.—The condition of the pulse must be constantly watched. When it becomes suddenly rapid or feeble, be on the look-out for hæmorrhage and report at once to the physician. A rapid, full pulse, showing over-stimulation, should also receive immediate attention.

Temperature.—The temperature is often reduced by the use of the Brandt method, the slush bath, or alcohol sponging, all of which are fully described in the chapter on baths. When the bath is indicated, its effect upon the nervous system and upon the alimentary tract is often magical. The patient becomes quiet, the tongue clears up, and digestion improves. One or another form of bath is usually ordered when the body temperature is above 102.5° F. This does not take the place of a thorough cleansing bath of warm water and soap, which should be given at least once a week.

Diet.—There is at present considerable diversity in the dietetic treatment of typhoid. Some physicians allow a variety of easily digested solid food during
the entire course of the disease. Others keep the patient on liquids until the temperature reaches normal, when a progressive diet is started—that is, a little more solid or semi-solid food is added each day to the bill of fare, as follows:

First day. One soft-boiled egg is given in the middle of the day.

Second day. Either an egg or a piece of milk or cream toast is given at 4 P.M., in addition to the egg given at dinner.

Third day. A raw-beef sandwich may be added, the bread being cut very thin and the crusts removed. Thus, gradually, light, easily digested food, such as oysters, rice, farinaceous puddings, custard, jellies, chicken, chops, steaks, and white fish may be given; but all rich foods, those difficult to digest, and anything of a crusty nature must be avoided for some weeks.

**Disinfection.**—The minutest attention must be given to detailed precautions, re-infection of the patient, infection of others, or infection of the nurse herself. After handling clothing or utensils, bathing, or in any way touching the patient, the hands of the nurse must at once be disinfected before anything else is touched. A basin or plunge of bichloride solution 1:1000 should always be in readiness, and no haste or confusion should prevent its use. The hands should, in addition, be well scrubbed with hot water and soap, using a brush. The doors, knob, bedstead, chart board, and floor about the bed should be kept free from germs. All articles used must be either boiled or disinfected. Formaldehyde 2% is valuable for use in private homes, as it is both effective and odourless. A

1 Junket is generally included in liquid diet.
large pail (if possible tin or agate) partially filled with water can be kept just outside the infected room, and all clothing immersed in this will be perfectly safe till taken to the range and boiled either in the same pail or in a wash boiler kept for that purpose. When the bed-clothes are being removed, a rubber or cotton sheet should be placed on a chair or on the floor. The soiled clothes are enveloped in this and carefully carried at arms' length from the room. The practice of gathering soiled clothing in the arms, thus bringing it in contact with the uniform or scattering poisonous germs that may dry and thus be disseminated through the air to be afterwards inhaled or swallowed by the unwary, is unhygienic in the extreme. The proper disposal of excreta in this disease is of the utmost importance, as the germ is known to reside in both urine and fæces. A small amount of disinfectant should always be kept in the bed-pan, which should be covered, on being removed from the patient. When it is necessary to retain fæces for inspection, a thick cloth or old bath towel well saturated with disinfectant should be drawn tightly over the pan. The fæces must be well broken up and saturated with equal parts of a disinfectant before it is thrown into the sewer pipes. In caring for a case of typhoid in the country, the excreta should be mixed with sawdust and burned. If this be impossible, a trench may be dug, not less than three feet deep, and at a safe distance from the water supply, into which the excreta can be thrown and then covered with a quantity of chloride of lime or plain slacked lime sufficient to insure the rapid destruction of the germs. Earth closets or vaults should never be used, as there is danger of contamination of the water supply. When the disease terminates,
fumigation of the room, blankets, and articles used is a wise measure.

**Typhus Fever**

Typhus fever is one of the most highly infectious diseases. It is both endemic and epidemic. It is essentially a filth disease, and occurs chiefly in dirty, overcrowded tenement districts. In former years, outbreaks of the disease were common in jails and camps, and it often followed times of famine.

**Incubation.**—The period of incubation is about twelve days.

**Symptoms.**—The symptoms are chill, rapid rise of temperature, accompanied by the usual febrile symptoms, intense headache, delirium, and a typical rash which appears on the fourth day. This rash comes out gradually and is very diffuse, especially upon the chest, abdomen, arms, and thighs. It consists at first of slightly elevated, irregular, rose-coloured macules, which soon grow dusky in hue, lose their elevation, and become petechial.

**Temperature.**—The temperature remains continuously high during the first week. In the second week, its morning remissions are more marked, and on the thirteenth or fourteenth day it falls to normal. Convalescence is prompt.

**Prognosis.**—In severe cases the patient may die in three or four days, before the appearance of the rash.

**Nursing.**—The nursing is the same as in all febrile infectious diseases. An abundant, continuous supply of pure, fresh air is of the utmost importance.

**Whooping-Cough (Pertussis)**

The specific cause of infection has not yet been discovered, but it is probably given off in the breath and
sputum. It enters the body through the respiratory tract. The disease is characterised by an acute catarrh of the mucous membrane of the respiratory organs.

**Incubation.** The period of incubation varies from four to fourteen days.

**Symptoms.**—In the first stage, which lasts from one to two weeks, the symptoms are those of an acute bronchitis with slight fever ($101^\circ$ to $102^\circ$ F.). In the second stage, the fever subsides, the cough becomes more frequent and is often accompanied by paroxysms of breathlessness, caused by a spasmodic closure of the glottis, which gives rise to the characteristic whoop. In mild cases, there may be only two or three paroxysms a day, while in others there are as many as fifty to eighty.

**Complications.**—The possible complications are ecchymosis of the eye, nose, and throat; severe vomiting and diarrhoea; broncho-pneumonia and convulsions. Collapse of the lungs sometimes occurs in infants.

**Nursing.**—Isolate the whooping-cough patient from children. Disinfect his sputum. See that he is warmly but loosely clad. Keep him as much as possible in the open air. At all times provide a constant current of fresh air, but guard against draughts.

Severe paroxysms can sometimes be checked by inducing vomiting.

**Yellow Fever**

Yellow fever is a disease peculiar to tropical and semi-tropical countries. It is transmitted by means of a specific mosquito—*Stegomyia fasciata.*
A Synopsis of Important Diseases

INCUBATION.—The period of incubation varies from a few hours to five days.

SYMPTOMS.—The invasion is acute, beginning, as a rule, with a chill, or, in children, with convulsions. The temperature rises, during the chill, to 103°-104° F. There is muscular pain, especially in the legs and lumbar region, jaundice of the skin and conjunctivæ. The eyes look watery, glazed, and sunken. Albuminuria appears early in the disease, but usually clears up as soon as the other symptoms subside. There may be hæmorrhage from any part of the body. The “black vomitus” signifies hæmorrhage into the stomach.

TEMPERATURE.—The temperature, except during and after the chill, is rarely very high even in extreme cases. As a rule, it falls shortly after the chill to 102° or 103° F., and remains so until the second, third, or fourth day, when it falls to about normal. It remains thus for twenty-four to thirty-six hours, and then rises to 102° or a little above. If recovery takes place, it subsides either by crisis or lysis—in a day or two.

THE PULSE.—During the initial fever, the pulse varies from 90 to 115, but during the secondary fever, unless hæmorrhage takes place, it is generally comparatively slower. It may be exceedingly feeble. Suppression of urine and hæmorrhage are the two most dreaded features of the disease.

NURSING.—The specific points to be remembered are: the necessity of keeping the patient quiet, to lessen the danger of hæmorrhage; doing everything possible to relieve the muscular pain, which is at times intense; and watching the quantity and quality of

1 Hot applications, counter-irritants, and massage are the treatments most frequently ordered for this purpose.
the urine. The patient should be kept screened from mosquitoes to avoid the spreading of the disease.

Convalescence is comparatively rapid in yellow fever, but there may be some irritation of the stomach, feebleness of the heart action, and lack of general tone for some weeks.

**Diseases Due to Animal Parasites**

**Cestodes (Tapeworms).**—There are several varieties of cestodes, some of which infest the intestines and others the viscera. The former are the most common. The most frequent method of inoculation is by eating infected meat. Their presence is indicated by the segments of ova of the worms in the stool, and by diarrhœa, colic, fever, anæmia, and nervousness. When the worm is expelled, it is always important to notice if the head is there, as the worm will grow again if the head remains in the intestine.

**Nematodes.**—The eggs of the nematodes are ingested with water or uncooked food. There are several varieties:

1. *Ascaris lumbricoides*, the "round worm." It looks like an earthworm. The males are five to six, and the females eight to ten inches long.

2. *Oxyuris vermicularis*, the thread or seat worm, a fine white worm, one-fifth to two-fifths of an inch long. When ingested, it multiplies with great rapidity in the rectum and cæcum. It produces pruritis ani, restlessness and nervousness, and in children is frequently the cause of convulsions. When any of these symptoms are present without discoverable cause, the dejections should be carefully inspected. Anthelmintic enemata are generally ordered. The liquid must be injected as high as possible, since to be of use it should
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reach the cæcum. When there is any irritation around the rectum, the affected surface should be washed with warm water and soap, well dried, and powdered at least three or four times a day.

3. Ankylostoma duodenale, a small worm that attacks the intestine, producing uncinariasis. It is common in Southern countries. It may cause anorexia, diarrhœa, and severe progressive anæmia.

4. Filaria, which causes filariasis. These worms develop in the lymphatics of the trunk and limbs. The embryos, called *Filaria nocturna*, are discharged into the lymph, and at night they enter the peripheral blood-vessels. During the daytime they remain in the deeper organs.

5. Trichina, which is derived from eating imperfectly cooked infected food, and which causes trichiniasis (trichinosis). The embryos enter the intestinal lymph spaces, and thus reach the voluntary muscles where they lodge and develop within the sarcolemma.

**Arachnids—Scabies (Itch).**—Scabies is due to a small parasite just visible to the naked eye. The impregnated female burrows in the soft skin between the fingers, the folds of the elbow, etc., and deposits eggs. The larvæ also burrow in a fine line about one-eighth of an inch long. Papules, vesicles, and pustules form around the points of entrance, and there is an intense itching, especially at night. The disease is highly contagious. Can be carried in bed or body clothing.

(For malaria see page 259. Yellow fever, page 400. Amœbic dysentery, page 253.)

**Insects—Pediculosis Capitis (Head Louse).**—The pediculosis infests the head and deposits ova (nits) on the hair. The lymph nodes may be enlarged
and tender. Eczema of the scalp, extending over the neck and behind the ears, is generally present.

*Treatment.*—To treat a person infected with head lice, saturate the scalp and hair with equal parts delphinium and ether, put on a handkerchief bandage of the head, and leave for several hours. Then comb the hair with a fine comb. If the nits are not dissolved, wash the hair with hot vinegar. Repeat the treatment as often as necessary (see Chapter VI.).

**Pediculosis Corporis.**—The pediculosis corporis lives on the clothing and infests the hairless parts of the body, especially where the clothes press at the waist and shoulders (see Chapter VI.).

**Pediculosis Pubis (Crab Louse).**—The pediculosis pubis infests the pubis and the other hairy parts of the body with the exception of the scalp.

**Part II**

**Non-Infectious Diseases**


**Constitutional Diseases**

Constitutional diseases are diseases which affect the entire system. The principal constitutional diseases are the following:

**Beri-Beri.**—Beri-Beri is a disease of malnutrition due to an excessive farinaceous diet. It is found chiefly in oriental, tropical, and sub-tropical countries. There are several types, the most common being (1) the
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rudimentary, which is characterised by paralysis of the muscles, and (2) the atrophic, in which atrophy of the muscles takes place.

Diet.—A lack of proteid diet being the principal predisposing cause of the disease, an ample proteid diet is of primary importance in the treatment.

Diabetes Mellitus—Etiology.—Diabetes mellitus is a disease affecting all the organs of nutrition. It is characterised by the accumulation of glucose, or grape sugar, in the blood, and the excretion of it in the urine, which is voided in varying, but usually excessive, quantities (six to forty pints a day).

Symptoms.—The symptoms, in addition to the excessive micturition, are intense thirst, a continual craving for food, especially sweets, coated tongue, dry tongue, bad breath, intestinal disorders (constipation is more common than diarrhoea), rapid emaciation, and loss of strength. Eczema of vulva is very common in women and is sometimes one of the first symptoms. The urine is of a high specific gravity—1030 to 1050 and even higher.

Causation.—The principal causes of diabetes mellitus are heredity, sedentary habits, over-indulgence in drinking and eating, exposure to cold, wet, and fatigue, and injuries to the head or nervous system.

Complications.—The possible complications are albuminuria, diabetic coma, eczema, gangrene, pneumonia, and tuberculosis.

Prognosis.—Many victims die within two or three years, but old people sometimes live ten to twenty years with no other symptoms than the presence of sugar in the urine.

Nursing.—The diet is one of the most important points in the care of diabetic patients. Sugars and
starches must be avoided (see Chapter XXIV.). Fresh air is imperative, but all draughts and sudden changes of air are to be guarded against. A moderate amount of daily exercise is advised when the patient is able to take it.

Diabetes Insipidus.—Diabetes insipidus is a disease of nervous origin, characterised by the secretion of an abnormally large amount of urine of low specific gravity, but which does not contain sugar.

The severity of the disease depends upon the primary trouble. When it complicates any organic disease, the general health may be much impaired, but in idiopathic cases it may persist for an indefinite period, even for years, and the patient be in comparatively good health.

There is little special treatment, cleanliness, fresh air, nourishing food, freedom from undue excitement and over-work being the chief points.

Gout.—Gout is more common in middle life and in men. The predisposing causes are heredity, over-indulgence in food and alcoholic drinks, chronic lead poisoning, and lack of exercise. It is characterised by an excess of sodium urates in the blood, due to the over-production or defective elimination of uric acid. Crystalline chalk-like deposits form in the cartilages of the affected joints, which sometimes necrose. In acute gout, there is pain and swelling, the big toe being generally the joint first affected. The condition is attended with symptoms of indigestion, varying fever, 101°-103° F., and anuria.

Rheumatism—Chronic Rheumatism.—Chronic rheumatism may come on gradually, or it may follow an attack of rheumatic fever. It is characterised by changes in the joints, due to thickening and contrac-
tion of the fibres, which frequently result in deformity and loss of motion.

**Temperature.**—Slight febrile attacks may occur from time to time, but there is no constant high temperature.

**Nursing.**—Hot-air baths, local douching, and massage are the general local treatments. Protection against cold, wet, and sudden changes of temperature, and seeing that the patient has proper food and warm clothing are the most important points in the nursing.

**Diet**—Plainly cooked white meats—never fried—fresh vegetables, fruits, cereals, and tea and coffee in small quantities are permissible. Avoid all foods not easily digested and those likely to tend to generate acid, such as red meat, pastry, rich or highly seasoned food of any kind, sweets, and fermented liquors. Starchy foods should be limited and all sweetening should be done with saccharine.

**Muscular Rheumatism (Myalgia).**—In muscular rheumatism, the irritation is localised in various muscles and there is little constitutional disturbance.

According to the group of muscles affected, the disease is known as: torticollis (muscles of the neck), pleurodynia (the intercostal muscles), lumbago (muscles of the back, especially those in the lumbar region), cephalodynia (muscles of the scalp).

**Treatment.**—The treatment generally consists in the application of heat, counter-irritants, and massage.

**Acute Rheumatic Fever.**—For acute rheumatic fever see "Infectious Diseases."

**Rickets (Rachitis).**—Rickets is a disease of malnutrition supposed to be due to lack of fat, proteid food, and salts. It occurs generally in bottle-fed babies and in children of the tenements. There is a
lack of lime salts in the bones, which are consequently flexible and often misshapen. Such children are late in learning to walk and talk and are particularly susceptible to disease and attacks of convulsions.

Nursing.—As in all diseases of malnutrition, fresh air, cleanliness and wholesome, easily digested food are of primary importance. In rickets, food rich in mineral matter, such as fruit juices, and, if the child is old enough, vegetables and rare or uncooked beef should be given. Massage is often ordered, as massage and proper manipulation of the extremities will do much toward correcting any tendency to deformity due to the lack of firmness of the bones. Children with rickets should be kept off their feet and trained to sit and lie straight.

Diseases of the Brain, Spinal Cord, and Nerves

Abscess of the Brain.—The most frequent causes of abscess of the brain are: inflammation of the middle ear, mastoiditis, caries of the bones of the nose or skull, infected wounds of the skull, and certain infectious diseases—such as influenza, sepsis, erysipelas, and infected emboli.

Symptoms.—Acute cases are generally accompanied with high fever, but chronic cases develop slowly, and in them the fever may be slight or absent. The cerebral symptoms resemble those of meningitis.

Apoplexy—(Cerebral Hæmorrhage), (Thrombosis), or (Embolism).—The predisposing cause of apoplexy is arteriosclerosis. The exciting cause may be anything which leads to an increased blood pressure, such as overexertion, excitement, overeating, and overstimulation.
**Symptoms.**—Sudden vertigo, faintness, and disturbed speech, followed by coma. The face becomes flushed and dusky, or, in very severe cases, ashy pale. The breathing is stertorous, slow, irregular, and often Cheyne-Stokes. The pulse at first is soft, slow, and compressible, but later full, rapid, and bounding. The eyes are fixed and staring, the pupils varying, but generally unequal. There may or may not be seizures.

The patient may die within a few days or hours; he may partially recover and then relapse, or he may recover. As he regains consciousness a paralysis will be observed, the form depending upon the seat of the lesion.

**Treatment.**—The patient should be put in the recumbent position, his clothing loosened, the head of the bed elevated, and ice applied to his head.

**Chorea (St. Vitus’s Dance).**—Chorea has been variously attributed to cerebral neurosis, a small cerebral embolism, and endocarditis. It is most common between the fifth year and puberty and in pregnancy. It is characterised by involuntary contractions either of single muscles or of groups of muscles, the force and frequency of which may be slight or very severe. The movements are generally absent during sleep and are always increased by attention, emotion, or fatigue.

**Nursing.**—Nourishing food, fresh air, freedom from excitement and fatigue, are the special points for the nurse to remember. Severe cases are kept in bed, and it is often necessary to bandage the extremities to keep them from becoming chafed. Sedatives may be needed. Fowler’s solution in gradually increasing doses is a frequent form of treatment.
Eclampsia.—In adult life, toxic poisoning, especially uraemia, is the most common cause of an attack of general convulsions. In children, convulsions may mean much or little, since they may be caused by indigestion, worms, teething, brain lesions, and the onset of disease, especially disease of an infectious character.

Treatment.—For treatment see Chapter XVI.

Edema (Wet Brain).—Edema may complicate obstruction of the veins, nephritis, general oedema, tumours of the brain, and abscesses, especially if the patient has been addicted to the overuse of alcohol.

Encephalitis (Inflammation of the Brain).—Encephalitis may be either acute or chronic.

Acute Encephalitis.—Acute encephalitis may follow alcoholism, infectious diseases, or trauma. The majority of sufferers from this disease die in a short time, and there is seldom more than a partial recovery, some form of paralysis almost invariably remaining.

Chronic Encephalitis (Dementia), (Paralytic General Paresis).—Chronic encephalitis is nearly always due to syphilis. The symptoms are those of increasing insanity and inco-ordination of motion, with paralysis progressing.

Epilepsy (Falling Sickness).—The most frequent predisposing causes of the brain lesion to which these attacks are due are heredity, chronic alcoholism, rickets, infectious diseases, intense fright, heart disease, trauma, and pregnancy.

Symptoms.—There is generally some premonitory symptom of the onset of an attack, known as the "aura," the nature of which varies in different individuals. It is followed shortly by a loud cry and the patient becomes unconscious. The spasm is at first tonic, but after a few seconds becomes clonic (see
Chapter VII. All the muscles are involved. Owing to the excessive movement of the jaws, there is an increased secretion of saliva, which flows from the mouth. The face is cyanosed, the respiration irregular and noisy, and the pupil reflexes are lost. The convolution subsides in a few seconds or minutes. The patient may then pass into a state of coma, remaining so for several hours, or he may regain at least partial consciousness at once.

Nursing.—In all cases of convulsions, a nurse should take means to prevent the patient from biting his tongue by forcing a folded handkerchief or piece of wood between the teeth, or otherwise hurting himself. She should also observe carefully the parts of the body involved in the convolution, since this knowledge is an important aid to the physician in localising the seat of trouble.

Herpes Zoster (Shingles).—Herpes is an acute inflammation of the spinal ganglia on one side of the body. It is accompanied by acute neuralgic pain in the intercostal, lumbar, or supra-orbital nerves, and a vesicular rash—like a "cold sore"—which is limited to the locality of the affected nerve.

Hydrocephalus.—Hydrocephalus is due to excessive secretion of cerebro-spinal fluid. In children this causes separation of the cranial bones with consequent enlargement of the skull. The condition may be congenital or it may occur in meningeal diseases, in cachexia, and in old age. In congenital cases, the fontanels fail to close, the head is abnormally large, and the forehead bulges, making the face look small. Children thus afflicted are never bright. They are liable to have frequent attacks of eclampsia, and death generally occurs in one to four years.
Hysteria.—"A functional neurosis which causes a defect in the controlling power of the psychic centres." The predisposing causes are heredity or continued over-fatigue either of mind or body, combined with an early training which has failed to teach self-control and unselfishness.

Attacks of hysteria take many forms. For instance there may be unconsciousness which often lasts many hours, or even days; convulsions, phantom tumours, spurious pregnancy, catalepsy of an extremity,\(^1\) localised hypersæthesia or anaæthesia, and real or imaginary loss of one or another of the special senses.

Nursing.—Such cases are among the hardest that a nurse has to deal with. Tact, kindness, patience, firmness, and infinite resource on her part are most essential. The patient should be kept quiet, yet amused and interested. As a rule, he is not allowed to see many, if any, friends. Therefore the task of providing him with amusement and diversion devolves entirely upon the nurse, and it is a very essential part of the treatment, as it is of primary importance to keep the patient from thinking of himself and of his real or fancied ailments.

Nurses undertaking the care of nervous patients should have some knowledge of massage and hydrotherapy, as they are important factors in the treatment. It must always be remembered that hysteria is as much a disease as typhoid, pneumonia, or any other radical derangement of the functions.

In hysterical convulsions the patient usually falls so that he is not hurt by the fall. The eyes seem fixed, but pressure upon the supra-orbital nerve usually

\(^1\)If a leg or arm, for example, is placed in a certain position, it will remain so, even for hours.
brings about reaction. The mention of the application of a cold douche or other severe measure often restores consciousness.

**Locomotor Ataxia.**—The majority of cases of locomotor ataxia follow attacks of syphilis, but trauma to the spine or continued arduous work will at times bring about the same condition. It is marked by a lack of co-ordination and sensation in the extremities, especially the legs, which makes walking a matter of difficulty.

**Meningitis.**—For meningitis see “Infectious Diseases.”

**Myelitis.**—Myelitis is a degeneration of the nerve fibre in the spinal cord, resulting from inflammation, haemorrhage, or injury to any segment of the same. It causes a partial or complete paralysis of the legs and bladder and loss of sensation in the lower part of the body.

There is great danger of bed-sores.

**Neuralgia.**—Neuralgia is a paroxysmal pain along the course of the nerves. It may be due to neuritis, but there is often no discoverable lesion. The predisposing causes are neurasthenia, a condition of debility following disease, overwork, worry, insufficient sleep, lead poisoning, diabetes, nephritis, syphilis, and uterine disease. Attacks are most frequently induced by exposure to wet or cold, and local or reflex irritation of a nerve.

**Neurasthenia.**—The causes of neurasthenia are heredity, over-work, worry, excitement, loss of bodily strength by long illness, and the use in excess of stimulants.

**Symptoms.**—The principal symptoms are restlessness, insomnia, constant imaginings of pain—which
are very real to the patient,—attacks of vertigo and palpitation, fear of disease, or in some cases of crowds or open spaces, an increasing inability to fix the attention upon or to do mental work, and a tendency to hysteria. In many cases there are specific complications, such as anorexia, constipation, indigestion, and migraine.

NURSING.—As in all nervous diseases everything depends upon the personality of the nurse and on her understanding the physical conditions that control the patient. She must be firm, resourceful, kind, and very determined. Such cases often require one or two years for recovery and are very taxing, as the nurse must constantly give the moral support that is lacking in the patient. It is of the utmost importance for the patient to have his attention diverted from himself; to avoid all fatigue, both mental and bodily; and to do everything to build up the system. Hydrotherapy is now much used for the relief of restlessness and insomnia.

NEURITIS.—Neuritis is inflammation of a nerve or nerves. When only one nerve is affected, it is called localised neuritis; when many, multiple neuritis or polyneuritis.

Localised Neuritis.—Localised neuritis is generally due to either contiguous inflammation, trauma, or stretching of a nerve. It is characterised by intense pain along the course of the affected nerve and hyperæsthesia, followed in severe cases by paræsthesia, numbness, and later by loss of sensation and paralysis. The symptoms may abate in a few days, but sometimes they continue for weeks.

Polyneuritis.—May be caused by: prolonged exposure to cold; poisoning by alcohol, ether, lead,
arsenic, or mercury; infectious diseases—especially sepsis,—and other diseases such as anaemia and cancer. The lesions are the same as in localised neuritis, but several nerves in different parts of the body are affected, and constitutional symptoms are more pronounced. The onset is generally abrupt, beginning with a chill and followed by high fever and often by delirium. The worst cases die in one or two weeks from paralysis of the respiratory muscles or of the heart. Other cases continue to grow worse, or remain stationary for a few weeks and then recover slowly, sometimes taking a year or more to convalesce. In the longer cases, permanent contractions are frequent.

Neuroma.—Neuroma is a nodular enlargement of a nerve. Some neuromata cause no trouble. Others give rise to pain, anaesthesia, paraesthesia, or paralysis. Such, when accessible, are generally excised.

Nursing.—Local applications are of small value. There is therefore little to be done except to keep the patient warm, well nourished, and diverted.

Paralysis.—Paralysis is a loss of function or voluntary control in a muscle or group of muscles. The condition is generally due to some lesion of the brain, spinal cord, or peripheral nerves. The muscles affected will depend upon the seat of the lesion in the brain or cord, or, if the condition is due to injury to or disease of a nerve, the muscles affected will depend upon the location of that nerve and the nature of its trouble.

When only one extremity is paralysed the paralysis is known as monoplegia. Paraplegia signifies a loss of power in either both arms or both legs; and hemiplegia, paralysis of one whole side of the body. When there is only a partial loss of power the condition is known as paresis.
There are many forms of paralysis. The following are among the most common:

1. Ascending paralysis, which begins in the legs and spreads rapidly to the trunk, arms, shoulders, and neck, causing death in a short time, from paralysis of the respiratory organs.

2. Bulbar paralysis, due to degeneration of the motor cranial nerve nuclei in the medulla. The onset and course of the disease are slow. The tongue is first affected, then the lips, palate, pharynx, and larynx, successively. Death is finally due either to marasmus or paralysis of the respiratory centres.

3. Diphtheritic paralysis, which sometimes follows diphtheria. The muscles of deglutition are the muscles most frequently affected.

4. General paralysis, due to organic lesion of the brain. It is characterised by a gradual loss of power, and deterioration of the mind.

5. Hysterical paralysis, which is associated with hysteria. There is no causative lesion.

6. Infantile paralysis (acute anterior poliomyelitis), which occurs most frequently from the second to the fourth year. The onset is generally sudden, beginning either with acute fever or convulsions and a sudden loss of functional power in one or more of the extremities. The primary symptoms subside in a few days, but the paralysis remains, and there is seldom a complete recovery.

7. Paralysis agitans (palsy), characterised by a constant tremor of the muscles.

8. Writers' paralysis (occupation neurosis), (writers' cramp), which occurs in penmen, pianists, violinists, seamstresses, etc. It is characterised by pain and either lack of control or loss of motion in the
affected fingers. It occurs most frequently in neurotic subjects.

Nursing.—An easily digested, nourishing diet, plenty of fresh but not too cold air, and massage are the main points in the treatment. The more than usual danger of bed-sores due to defective circulation must be remembered and guarded against.

Pott's Disease (Caries of the Spine).—Pott's disease may follow trauma or it may occur spontaneously. It is of a tuberculous nature. The pressure upon the cord occasionally causes partial or complete paralysis below the affected point. Almost all "hump backs" are due to Pott's disease.

Spina Bifida.—Spina bifida is a tumour present at birth of a child, on its vertebral column, usually over the sacral vertebrae. It is caused by the protrusion of the spinal meninges through an opening in the spinal canal. This tumour is filled with cerebro-spinal fluid.

Tumours.—Both the brain and the spinal cord may be the seat of new tumorous growths, malignant or otherwise. The resulting pressure will cause loss of function in some part of the body, the part depending upon the locality of the tumour.

Diseases of the Respiratory Organs

The Nose—Adenoids.—Adenoids are an hypertrophy of the adenoid tissue. It is a common disease of childhood. If the adenoids are of any considerable size, the patient usually keeps his mouth open and thus acquires a stupid expression. There is a tendency to catch cold and to have catarrh. They should if possible be removed during early childhood. The Eustachian tube is often obstructed and from this ear trouble may result. After puberty, the adenoid tissue
generally shrinks to its normal size, but the ill effects are liable to be permanent.

Hay Fever.—Hay fever is an acute catarrhal condition with asthmatic breathing due to some irritant, usually the pollen of a plant. The predisposing causes are a neurotic idiosyncrasy or some nasal abnormality.

Acute Rhinitis (Coryza), (Cold in the Head).—Acute rhinitis is an inflammation of the mucous membrane of the nose accompanied by a watery or muco-purulent discharge.

Chronic Rhinitis (Chronic Nasal Catarrh).—Chronic rhinitis may follow repeated attacks of acute rhinitis, or be the result of disease, severe climatic changes, or the inhalation of irritants such as chemicals or dust.

The Pharynx and Tonsils.—Retropharyngeal Abscess.—Retropharyngeal abscess may occur as a primary disease, but it more often follows scarlet fever or some other infectious diseases. The abscess causes an obstruction in the throat, resulting in dysphagia and dyspnœa. The chief danger is when the abscess ruptures, as the pus may enter the larynx and cause asphyxia or pneumonia.

Follicular Tonsillitis.—Follicular tonsillitis is an inflammation of the tonsils, due to the streptococci or staphylococci of suppuration or to rheumatism. Predisposing causes are former attacks, enlargement of the tonsils, and exposure to cold or wet. Either one or both tonsils may be affected.

Symptoms.—The tonsils are red and swollen and covered, or partly covered, with whitish patches that somewhat resemble the false membrane of diphtheria. There are pain in the throat, a high temperature (103°
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F.), a general malaise, and marked prostration. As a rule, the fever falls by lysis, and the other symptoms abate within a week.

Suppurative Tonsillitis (Quincy Sore Throat).—Suppurative tonsillitis generally begins as a follicular tonsillitis, but the throat symptoms all rapidly increase. There is intense pain, and the throat is covered with a thick mucus. After a few days, an abscess forms, and, unless incised, ruptures, discharging a thick, fetid pus.

Ulcers of the Tonsils.—Syphilis is suspected when there are deep ulcers on both tonsils; carcinoma when there is an irregular spreading ulcer accompanied by a thin, greenish, fetid discharge.

Nursing.—Astringent and antiseptic gargles or sprays are the main features in the treatment of all diseases of the throat. The local inflammation is much relieved by the application of ice poultice bound firmly over the tonsil. A strong cathartic is usually ordered, not only to clear out the intestine, but also to act as a counter-irritant and, by exciting a strong peristaltic action of the intestine, draw the blood away from the point of congestion. As the tonsils are directly connected with the cervical lymph glands, any disease attacking them is liable to be associated with comparatively severe constitutional symptoms and a general debility of the system. To counteract this condition as much as possible, a liberal wholesome diet should be given as soon as the throat symptoms abate.

The Larynx—Acute Catarrhal Laryngitis.—Acute catarrhal laryngitis is a catarrhal inflammation of the larynx due to cold, over-use of the voice, or local irritation,
Symptoms.—There is a tickling sensation in the throat and slight pain. The larynx and vocal cords are red and slightly swollen. The voice is hoarse and in some cases there is aphonia. There may or may not be a slight fever.

Steam inhalations are often prescribed.

Chronic Catarrhal Laryngitis. The symptoms are the same, only less severe, as in acute cases. They are more or less constant.

Edema of the Larynx.—Edema of the larynx may occur in connection with any severe inflammatory condition of the throat, or in nephritis.

Symptoms.—A puffy soft swelling of the larynx, aphonia, and dyspnœa may come on very suddenly, resulting, unless preventive measures are immediately taken, in asphyxia and death. Intubation or tracheotomy is often necessary, and the proper apparatus should in severe cases always be kept ready for instant use.

Spasmodic Laryngitis (Laryngismus Stridulus), (Croup).—Spasmodic laryngitis is a neurotic spasm of the adductors of the vocal cords. The symptoms are alarming but not dangerous. The child generally awakens in the night with a hoarse, croupy cough, dyspnœa, and, unless relieved, cyanosis. The attack may last for an hour or two, after which the child will then go to sleep, awakening in the morning perfectly well or with only a slight laryngitis. The attack may be repeated on two or three successive nights.

Treatment.—The treatment consists of steam inhalation, hot compresses to the throat, and cold compresses to the head. A hot bath 105° F. is also sometimes given. Inducing vomiting, by means of an
emetic or by tickling the back of the throat with the finger, will abort a spasm.

**Syphilis of the Larynx.**—In syphilis of the larynx there will be congestion and ulceration of the larynx, resulting in change of voice, pain in swallowing, and permanent deformities. Severe cases may die of asphyxia from oedema of the larynx. This, like all other forms of syphilis, is highly infectious, and, to prevent infecting herself and others, the nurse must disinfect her hands thoroughly after touching the patient or anything used by him; also the bed-clothes, towels, dishes, and the specific discharge. The use of paper sputum cups and gauze, instead of handkerchiefs, should be insisted on, and these should be burned.

**Tubercular Laryngitis.**—Tubercular laryngitis usually occurs as a complication of pulmonary tuberculosis. In the primary stages there is anæmia of the mucous membrane. Later, ulcers develop, the cartilages may become necrotic, the vocal cords paralysed, and the swelling so intense that tracheotomy will be necessary. The danger of infection must be remembered and the disinfection usual in such cases adhered to.

**The Bronchi—Acute Bronchitis.**—Acute bronchitis is an acute catarrhal affection of the trachea and bronchi. It may be caused by the inhalation of irritating gases, by exposure to cold and wet, or it may complicate or follow other diseases.

**Symptoms.**—There are sore throat, a general malaise and a constant cough which causes pain in the sternal region. The sputum is scanty at first, but later is abundant and of a viscid, muco-purulent nature. The temperature is generally about 101°
or 102° F., but may run as high as 103° F. It generally falls within a week, though the cough and other symptoms may continue for some time longer.

**Chronic Bronchitis.**—Chronic bronchitis occurs after repeated acute attacks. It is also frequently associated with other chronic diseases, and is a frequent complaint of the aged. The symptoms are those of acute bronchitis, but much modified.

**Nursing.**—The cough in bronchitis is frequently very distressing. Poultices are often ordered to relieve it, and hot drinks, especially hot lemonade, are very effective and should be tried. Steam inhalations are frequently ordered (for methods of giving see Chapter XV.). In bronchitis, as in all lung diseases, it is exceedingly necessary to have a constant supply of fresh air; but the greatest care must be taken to guard against draughts and to keep the patient warm and well covered.

**Bronchial Asthma.**—Bronchial asthma is characterised by paroxysms of dyspnœa, which are supposed to be due to spasm of the muscles of the bronchi. In addition to the dyspnœa, there will be cyanosis, vertigo, sweating, a sense of suffocation, and a weak, frequent pulse.

**Treatment.**—Nitrate of amyl or inhalations of stramonium leaves are often ordered. The patient should be given plenty of fresh air. Hot drinks or a hot foot-bath will frequently give relief. Change of climate is often advised.

**The Lungs—Abscess of the Lung.**—Abscess of the lung generally occurs as a secondary condition to pneumonia or suppurative disorders of the upper air-passages.

**Symptoms.**—There are a more or less marked
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septic condition, pleurisy, cough, and a foul, fetid pus expectoration.

Congestion of the Lung.—Congestion of the lung is characterised by an increased blood supply which produces dilatation and congestion of the pulmonary vessels. It may be caused by the inhalation of irritating substances, by cold, or by alcoholism; or it may occur in patients lying for a long time in the same position. It is also a frequent symptom in cardiac disease.

Œdema of the Lungs.—Œdema of the lungs is characterised by a transudation of serous fluid from the blood-vessels into the stroma and air spaces. It frequently occurs in anaemia, severe cases of pneumonia and other lung diseases; heart, kidney, brain, and infectious diseases. Its advent is recognised by a stertorous, rattling breathing, increasing dyspnœa, and cyanosis.

Emphysema.—Emphysema is generally due to a diseased condition of the lungs. The air cells become distended and the walls between them broken down. As a natural consequence, the cells are larger and the number of blood-vessels relatively fewer, and this means a diminished surface for the aeration of the blood. Emphysema may also be the result of injury, especially of wounds of the trachea.

Gangrene of the Lung.—Gangrene or necrosis of the lung tissue is due to the action of putrefactive bacteria. The predisposing causes are pneumonia, diabetes, wounds of the lung, embolus, or aneurism.

Symptoms.—The symptoms resemble those of abscess of the lung, but the sputum is more abundant, darker, fetid, and putrid.

Hydrothorax (Fluid in the Thorax).—Hydro-
thorax may be due to local causes, such as cancer of the lung or pressure upon the vena cava, or it may be part of a general anasarca. There are dyspnœa, more or less cyanosis, and a constant short cough. Aspiration is generally performed to draw off the liquid.

Pleurisy.—Pleurisy is an inflammation of the serous membrane which covers the lungs and lines the thoracic cavity. It may be either local or general, and either dry or with effusion.

Symptoms.—It may begin with a chill and fever (101°–103° F.), or the onset may be gradual. There is a short dry cough, severe pain on coughing or breathing, and rapid, shallow respiration. There is less pain in pleurisy with effusion than with dry pleurisy, the fluid acting as a lubricant to the inflamed surfaces.

Treatment.—The patient should be kept quiet, and a tight binder or strapping of adhesive plaster applied to restrict the breathing and thus lessen the pain.

Pneumonia.—For pneumonia, see "Infectious Diseases."

Pneumothorax.—Pneumothorax is air in the pleural cavity. This is generally the result of perforation of the lung, due to tuberculosis, abscess of the lung, gangrene, empyæma, a fractured rib, improper use of the aspirating needle, or sudden extreme muscular effort.

Diseases of the Heart

Concerning Compensation.—The heart has a certain reserve force, by means of which it can, for a certain length of time, do more work than it is usually called upon to perform, and which, when any part
of it becomes diseased, often allows of its adjusting itself to the new conditions, thus minimising the ill effects of the disease. When this happens, the heart is said to be compensated, and a patient may have heart disease for years without knowing it or being incomed by it, beyond an occasional shortness of breath when climbing or walking quickly. If, for any reason, the heart ceases to adjust itself to the conditions forced upon it by disease, there is said to be "a failure of compensation." Failure of compensation may be caused by illness, extreme exertion, or emotion. Sudden deaths are frequently due to failure of compensation.

**Angina Pectoris.**—Angina pectoris occurs in connection with various heart lesions, such as coronary sclerosis, myocarditis, and aortic insufficiency. The most frequent exciting causes are undue exertion or emotion, severe climatic changes, and indigestion. The condition is characterised by a sudden intense pain in the heart (radiating to the left shoulder and down the left arm). The pain is frequently the only symptom, but sometimes there are pallor, cold, clammy sweat, and dyspnoea. The pulse is generally accelerated, irregular, and of a high tension, and there is an intense fear of impending death. As a rule, the attack proper lasts only a few seconds or minutes, but it may be days before the patient recovers from its effects.

**Dilatation.**—A certain amount of dilatation is frequently one of the means by which the heart adjusts itself to the extra work forced upon it by disease. It may cause no adverse symptoms, but, at times, there may be headache, dyspnoea, syncope, and cardiac pain. These symptoms will all be increased,
if over-dilatation takes place, and death may ensue. This may be the result of failure of compensation; severe over-exertion, such as mountain climbing; or of prostrating disease.

**Endocarditis.**—Endocarditis is an inflammation of the endocardium, the membrane lining the heart. There are three forms, acute, chronic, and malignant.

**Acute Endocarditis.**—Acute endocarditis is usually secondary to acute rheumatism, scarlatina, pneumonia, or tuberculosis of the lung. It sometimes occurs in chronic endocarditis, diabetes, nephritis, infectious diseases, and diseases of malnutrition. The condition may clear up in a few weeks, but it more commonly becomes chronic.

**Chronic Endocarditis.**—Chronic endocarditis may follow acute endocarditis, or it may be chronic from the start. It is frequently associated with inflammation of other organs of the body.

**Malignant Endocarditis.**—Malignant endocarditis is usually secondary to some other disease. The condition is that of an intensified acute endocarditis.

**Fatty Heart.**—Fatty heart is generally caused by over-eating and lack of exercise. It is a fatty infiltration of the tissue.

**Hypertrophy.**—Hypertrophy is a thickening of the heart muscle. It is the principal factor in compensation. The condition sometimes, however, causes headache, tinnitus, flushing of the face, cardiac pain, etc.

**Neurosis.**—Neurosis is a nervous affection of the heart in which there is no real heart lesion. It occurs most frequently: (1) in connection with hysteria, neurasthenia, gastric distention, and anæmia; (2) in organic disease of the heart; (3) as a result of the over-use of tobacco, or stimulants. The symptoms
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occur only in paroxysms. They are: a consciousness of violent, rapid, and often irregular heart action; cardiac pain; dyspnœa; and a sense of suffocation.

Pericarditis.—Pericarditis is an inflammation of the pericardium, the membranous sac which surrounds the heart. It is usually secondary to other diseases.

Valvular Disease of the Heart.—Valvular disease of the heart is both congenital and acquired. When the former, it is usually the valves of the right side which are affected; when the latter, those of the left. Its more common cause is one or another of the infectious diseases, particularly rheumatism. One or more valves may be affected at a time. Valvular disease is always associated with endocarditis.

Regurgitation.—Regurgitation is a flowing back of the blood, due to the improper closing of the valve. This is most commonly the result of endocarditis.

Stenosis.—Stenosis is a thickening of the valve which obstructs the blood current. If the mitral valve is affected, it is called mitral stenosis, if the aortic, aortic stenosis.

Nursing.—A most important point in the nursing of patients troubled with heart disease is to keep them in a comfortable condition. This is at times very difficult and requires considerably ingenuity as owing to the presence of oedema and dyspnœa, such patients are liable to be very restless and in great bodily distress. When dyspnœa is present, a patient generally requires to be propped up in bed, or an easy chair, and supplied with a sufficient number of pillows to support him comfortably and to provide a rest for his arms. It is also generally necessary to devise some arrangement, such as is
suggested in Chapter VI., to keep him from slipping down in bed. Freedom from worry, exertion, and excitement is imperative, and all sudden movements and startling noises should be avoided. As in every disease complicated by dyspnœa, fresh air is of more than usual importance, but the air must be warm, since owing to a defective circulation, such patients generally feel the cold intensely. The diet is also of consequence and a difficult matter to regulate. As there is always a tendency to flatulence in heart disease, foods, such as sugar and starch, which will increase this condition, are generally restricted; also liquids, when there is œdema. A milk diet is most commonly given during exacerbations of any cardiac disease, and in order to give all the nourishment possible in small volume, the milk is often fortified with such substances as egg albumen, lactose, etc.

**Diseases of the Arteries**

**Aneurism.**—Aneurism is the dilatation of an artery due to the weakening or rupture of one or more of its coats. Aneurisms are named, according to their shape, fusiform, sacculated, or dissecting. In the last-named form, the coats of the artery are torn and the blood current forces its way between them. The thoracic aorta is the most common seat of aneurisms. Fatal hæmorrhage, either internal or external, may occur from rupture of the aneurism.

**Arterio-sclerosis.**—Arterio-sclerosis is an induration, or hardening, of the walls of the arteries. It comes on naturally in all old people; but certain things, such as heredity, disease, the over-use of
alcoholic stimulants, etc., sometimes lead to its early development, or to its development to an unusual degree. When the latter is the case, renal or cerebral complications are liable to occur.

Disease of the Veins

Phlebitis.—Phlebitis is inflammation of a vein. It is nearly always associated with thrombosis. It most frequently occurs as a complication of typhoid or other infectious disease, or of varicose veins, the femoral vein being the one most frequently affected.

Nursing.—The extremity is generally elevated and ice-caps applied. It must be kept quiet and never rubbed, as rubbing might dislodge the thrombus and allow it to be carried to the heart or brain, which would prove fatal.

When a thrombus moves from its primary positions, it is called an embolus.

Diseases of the Blood, Ductless Glands, and Spleen

Addison's Disease.—Addison's disease is caused by tubercular or other disease of the adrenals, or suprarenal capsules, and by disease of the abdominal sympathetic ganglia. It frequently follows tuberculosis in other parts of the body.

Symptoms.—The principal symptoms are: a bronze-coloured skin, pigmentation of the mucous membranes, attacks of dyspnœa, headache, syncope, weak, rapid pulse, lack of mental vigour, apathy, slowness of speech, lack of appetite, and indigestion.

Anæmia.—In anæmia there are certain differences in the proportion of the red blood cells to the amount of hæmoglobin and in the number of the leucocytes. Anæmia may be primary or secondary. For the
former, no adequate cause has been discovered. There are several varieties; they are generally due to changes in the blood-forming organs. The latter follows haemorrhage, starvation, diseases which interfere with the organs of digestion or in which there is excessive albuminous waste, and any chronic wasting disease. In it, the number of red blood cells and hæmoglobin are reduced and the red blood cells are small and pale.

The symptoms are pallor of the skin and mucous membrane, dyspnœa on exertion, indigestion, loss of appetite and strength. Fainting and neuralgia are common, also œdema of the ankles, at night, and puffiness of the eyelids.

Pernicious Anæmia.—The symptoms are those of a severe anæmia. There is a characteristic lemon-yellow skin, the blood coagulates slowly, and there is a tendency to haemorrhage into the skin and mucous membrane. In severe cases, pus may form around the edges of the teeth.

Chlorosis.—Chlorosis is a form of anæmia common to young girls, especially those who are improperly fed, over-worked, or subjected to great mental strain. The symptoms are dependent on the extent of blood change. There may be malaise, dyspnœa, constipation, cessation of menstruation, and a characteristic greenish-yellow complexion which gives the disease its name.

Nursing.—The diet is a very important factor in the treatment of anæmia. Food rich in salts, such as rare beef, vegetables, sweet fruits, etc., should be given in abundance. Fresh air in all such cases is of more than usual importance, since, owing to the destruction of the hæmoglobin, the oxygen carrier
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of the blood, the blood is deficient in oxygen. The air must be warm, however, as anæmic patients feel the cold intensely.

Leukæmia.—Leukæmia is a disease of the blood marked by a large increase of the white blood corpuscles. There are three forms of leukæmia: (1) lymphatic, in which the lymphatic glands are enlarged; (2) myelogenic, which involves the bone marrow; (3) splenic, associated with enlargement of the spleen. The spleen may also be enlarged in either of the other varieties.

Pseudoleukæmia (Hodgkin's Disease.)—In pseudoleukæmia the lymph-nodes are enlarged, there is moderate anæmia, the skin is sometimes jaundiced or bronzed, and œdema is common. The course of the disease is slow, often lasting two or three years or even more. Death, unless caused by inter-current disease, is generally the result of exhaustion or of pressure by the enlarged nodes on one of the vital centres.

Purpura.—Purpura is a bleeding into the skin, mucous membrane, serous cavities, or viscera. The exact cause is as yet unknown. There are changes in the blood which cause its coagulation to be retarded and, in some cases, there is a diseased condition of the walls of the blood-vessels. Purpura may follow infectious diseases, diseases of malnutrition, tuberculosis, cancer, anæmia, leukæmia, rheumatism, and scurvy. It is common in the aged and in nervous conditions. When the spots under the skin are small, they are called "petechia"; when in streaks, "vibices"; and when in blotches, "ecchymosis." There are several forms of this disease.

Arthritic Purpura.—Arthritic purpura is ac-
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accompanied by various constitutional symptoms, such as sore throat, fever, arthritis, and oedema. The purpura appears chiefly around the joints and on the legs. Patients usually recover in a week or two.

**Purpura Hæmorrhagica.**—Purpura hæmorrhagica is most common in delicate girls. There may be extensive bleeding into the mucous membranes of the alimentary canal, into the lungs, kidneys, and central nervous system. There is marked anæmia and prostration. The fever is moderate. Slight cases generally recover in a few weeks, but the prognosis is bad in severe cases.

**Hæmophilia.**—Hæmophilia is strongly hereditary. It is transmitted through the women, who, as a rule, are not themselves bleeders, to their male children. Such children may bleed to death from the slightest scratch. After puberty, the tendency to bleed is somewhat lessened.

**Scurvy.**—Scurvy has been variously classed as a disease of the blood, of malnutrition, and of infection. The chief predisposing factors are lack of fresh air and vegetable food; excessive use of salt meats. Infantile scurvy occurs chiefly in children who have been fed on sterilised or condensed milk or proprietary foods. The principal symptoms are emaciation, weakness, indigestion, and purpura. The gums are swollen and bleed easily, the teeth are loosened, the tongue is swollen, the breath is foul, and in children, especially, the lower ends of the femur and the tibia are swollen from subperiosteal bleeding.

**Nursing.**—Frequent cleansing, scrupulous care of the mouth, and the provision of fresh air and of food rich in salts, especially fruit juices, are the main points in the treatment.
Diseases of the Thyroid Gland

Goitre.—Goitre is rare in this country, but it is particularly common in Switzerland. It is supposed to be due (1) to the drinking of waters containing a large amount of magnesium limestone, and (2) to infection.

Symptoms.—There is a tumour on one or both sides or in the middle of the neck. The general health is not, as a rule, much affected.

Exophthalmic Goitre.—Exophthalmic goitre is known variously as Parry's, Graves's, and Basedow's disease. The thyroid is enlarged and the blood-vessels are dilated. The pulse is generally very rapid. There are breathlessness on exertion, exophthalmos, i.e., abnormal protrusion of the eyeballs; extreme nervousness; and general dyspeptic symptoms.

Myxoedema.—Myxoedema is supposed to be due to the absence of thyroid secretion.

Symptoms.—The entire body looks swollen, the skin becomes dry and rough, the hands broad, the expression stupid, the hair thin and brittle. The onset of the condition should be recognised, as treatment, to be of much benefit, must be begun early in the disease.

Enlargement of the Spleen.—The spleen is temporarily enlarged in the majority of infectious diseases. It becomes permanently enlarged in chronic malaria, leukaemia, cirrhosis of the liver, and splenic anemia.

Diseases of the Digestive Organs

The Mouth—Acute Glossitis.—Acute glossitis sometimes follows abrasions of the tongue. It may

\[1\text{ Such water can be rendered harmless by boiling.}\]
be due either to infection, or to a general run-down condition of the system. The tongue becomes inflamed and cracked. There is dysphagia, salivation, and, in severe cases, dyspnœa, cyanosis, and fever.

**Aphthous Stomatitis.**—Aphthous stomatitis is more common in young children than in adults. It usually occurs in connection with fevers or other indispositions, especially when the mouth has not been properly cleansed. Small ulcers form on the inner surface of the cheeks and lips, and along the edge of the tongue.

**Gangrenous Stomatitis.**—Gangrenous stomatitis occasionally follows infectious diseases; or it may be due to the uncleanness of the mouth, especially where there is a general debility of the system. It begins as an ulcer, but gangrenous sloughs rapidly develop. There is a high fever, and general septic condition. About 80% of such cases die within a couple of weeks.

**Parasitic Stomatitis (Thrush).**—Parasitic stomatitis is caused by the Oidium Albicaus, yeast fungus. It is seen in poorly nourished babies, when the mouth has not been properly cared for. It may also be the result of dirty nipples, feeding-bottles, etc. It occasionally occurs in adults, when there is a general debility of the system, especially after long illness. A white fungus appears on the tongue, and the mouth is dry and sore. The saliva has an acid reaction.

**Ulcerative Stomatitis.**—Ulcerative stomatitis is due to certain poisonings, notably, lead, mercury, and phosphorus. It is also caused by scurvy and lack of cleanliness. The gums are swollen and red, and they bleed easily. Ulcers form along the edge
of the teeth, the teeth loosen, and there is salivation.

Nursing.—Careful cleansing of the mouth before and after each meal is imperative in all the above diseases of that organ (see Chapter VI.). In any severe disorder the patient is often fed by nasal gavage, and care must be taken to pass the tube well into the oesophagus so that the liquid will not get into the mouth.

The Stomach—Carcinoma of the Stomach.—The predisposing causes of this trouble are hereditary tendency, chronic gastritis, ulcer or other disease of the stomach. In addition to the physical symptoms, which are frequently lacking, till the disease is far advanced, there is a gradual failure of the general health, pain in the stomach and back, and rapid emaciation, followed by vomiting of undigested food, and, as the disease advances "coffee-ground," vomitus. After a test breakfast, the result of the siphonage contains an abundance of lactic and fatty acid, but the HCl. is diminished or entirely absent.

Prognosis.—The disease is generally fatal within a year.

Dilatation of the Stomach.—Dilatation of the stomach generally occurs as a complication or sequela to some other disease of the stomach, especially to pyloric obstruction and chronic gastritis. The stomach holds an abnormally large amount of food which accumulates there, and ferments, causing eructations of gas, and the vomiting, every few days, of large amounts of sour foul-smelling matter.

Gastric Neurosis.—Gastric neurosis often complicates nervous disorders. The three most common forms are:

1. Motor neurosis, in which there is a super-
motility of the stomach which causes it to discharge its contents too quickly. There are nervous eructations of gas, and often vomiting, almost immediately after meals and without nausea.

2. Secretory neurosis, which affects the secretory functions of the stomach. In some cases, the percentage of HCl. in the gastric juice is increased during digestion; in others, it is diminished; and in still others, there is either an increase or decrease of the total amount of gastric juice.

3. Sensory neurosis. In this, there may be: gastrologia, the pain of which resembles that of gastric ulcer; hyperæsthesia, which will cause a sense of fulness and burning in the epigastrium; or nervous anorexia, which often leads to an extreme distaste for food, resulting in emaciation and a general lowering of the body vitality. In the majority of cases, all three forms are present, and there may be marked variations in the symptoms.

Gastritis.—Gastritis is an inflammation of the lining membrane of the stomach. It may be acute, chronic, membranous, phlegmonous, or toxic. The first is commonly caused by an excess of food, bad food, irritating drugs or micro-organisms. It may also complicate various diseases. Chronic gastritis is most commonly caused by excessive eating, improper mastication of food, indigestible food, drugs, over-indulgence in alcohol, tea, or coffee. It also frequently accompanies chronic diseases.

Ulcer of the Stomach.—Ulcer of the stomach occurs most frequently in young women who are badly fed. There is pain in the epigastrium and vomiting. The latter is sometimes the first symptom. The vomitus is usually pure blood.
Nursing.—In all disorders of the stomach, the diet is of course of primary importance. In severe cases the patient is generally ordered such liquids as whey, barley water, etc. When he is allowed to have solid food, it must be carefully cooked that it may be as digestible as possible. Only such things should be given as the doctor orders.

The Intestines—Appendicitis.—Appendicitis is inflammation of the vermiform appendix. It may be caused by infection, or by irritation due to obstruction in or around the appendix. An attack may come on gradually, with constipation, nausea, and increasing abdominal pain; but, as a rule the onset is sudden with severe abdominal pain, either localised or general, nausea, and obstinate constipation. Within forty-eight hours, the pain generally becomes localised to the right iliac region, the temperature rises from 101°-103° F., and there is sometimes a high leucocytosis.

Recovery may take place in a few days; or the condition may persist and go on to ulceration, necrosis, gangrene, or abscess formation, which will be followed, unless operative measures are resorted to, by perforation and peritonitis.

Nursing.—The application of ice-bags over the region of the appendix is a frequent treatment. These, to be of any use, must be kept continuously cold. It is as important to keep the patient quiet before operation as after and to move him very carefully. Any sudden movement might rupture the abscess and cause a general peritonitis.

Cholera Infantum.—The most frequent causes of cholera infantum are improper food and feeding, dirty surroundings, and bad air. It is usually ushered
in by some intestinal disturbance. The temperature rises from \(103-105^\circ\) F., the pulse becomes frequent and feeble, the tongue coated, the mucous membranes dry, the face pallid and shrunken, and the surface of the skin cold. The stools are at first diarrhoeal, but, after a few hours, become frequent and watery with little smell. There is incessant vomiting and colic.

**Nursing.**—In nursing such cases, the tendency to collapse must be remembered and guarded against. The child must be kept warm, its food must be carefully prepared and given in small amounts, sometimes only in drachm doses, at regular intervals.

**Colic.**—Colic is due to an accumulation of gas in the stomach and intestines. Pain is relieved on pressure. The most frequent causes are overfeeding or improper feeding, and cold feet. It will often be relieved by the application of hot stupes to the abdomen.

**Acute Colitis.**—There are two types of acute colitis. In the more common type, the onset is sudden with abdominal pain and large, watery movements. The pain is in the lower abdomen, and just precedes the movement. The movements are mostly watery, contain undigested food and a little mucus. General prostration and, if stools continue, emaciation result.

In the other type, the onset is sudden with frequent passages of bloody mucus, at times pure blood which looks like currant jelly. There is severe tenesmus and sometimes abdominal pain.

**Treatment.**—For either type, the first thing to be given is castor-oil. In type one, this is followed by large doses of bismuth, also Dover's powder. In type two, irrigations, diet liquids, and bed till stools are normal help most. Type two is more often protracted.
CHRONIC COLITIS.—Chronic colitis is similar to type one, if it is in the upper bowel; similar to type two, if in the rectum and sigmoid.

DIARRHŒAS OF CHILDREN.—Diarrhœas of children are especially common during the summer months. The most usual causes are overfeeding, improper feeding; sour milk, infected milk, milk containing too much casein or fat, dirt, and bad air. The stools are watery but faecal, and are greyish or green in colour. In bad cases, they may be frothy or contain blood. The disease is protracted, and it may be weeks before the intestines are in a normal condition.

Treatment.—The milk is generally stopped for a few days, and barley water given in its stead. A cathartic is administered to clear the intestine of irritating substances. Fresh air is of the utmost importance and, even when in bed, the child should, if possible, be kept in the open air. As improvement takes place, milk is added to the feedings in gradually increasing amounts.

Dysentery.—For dysentery, see "Infectious Diseases."

Enteritis.—The common causes of enteritis are improper food, impure drinking water, anaemia, and infectious diseases. There are intestinal colic, tympanites, diarrhœa, and nausea. The patient generally lies with the knees drawn up, seeking relief from pain by relaxing the abdominal muscles. Heat and abdominal pressure will often afford relief.

Nursing.—The usual treatment consists of the application of hot fomentations or a hot-water bag to the abdomen, and the administration of a strong cathartic to rid the intestine of the irritating substance. The cathartic is sometimes followed by a
hot rectal injection, or by a few doses of bismuth, if the diarrhoea is not checked. Rest in bed, and a boiled milk diet is imperative. If the condition is neglected, a severe illness may ensue.

Intestinal Obstruction.—The most common causes of intestinal obstruction are: strangulation of the intestine; strictures, due to cicatricial scars; pressure from new growths; and impaction from faeces, gall-stones, etc. In children, intussusception (the telescoping of one part of the intestine into another) may also be a cause.

Symptoms.—The symptoms of intestinal obstruction are acute abdominal pain and increasing abdominal distention, constant vomiting of vomitus that gradually assumes a faecal odour, absolute constipation, cold clammy skin, shallow breathing, marked prostration, frequent feeble pulse, and leucocytosis, but no fever.

Nursing.—Keep the patient in bed and give nothing by mouth unless ordered by the doctor. High enemas, with the patient in the knee-chest position, if possible, and rectal irrigation, are generally tried. If these fail operative measures are resorted to, as otherwise the condition generally proves fatal in a few days.

The Peritoneum—Ascites.—Ascites is a collection of fluid in the peritoneal cavity. The most frequent causes are: such cardiac, renal, or blood conditions as cause dropsy in other parts of the body; cirrhosis of the liver; portal obstruction; obstruction of the lymphatics; abdominal tumour, and tumours of the peritoneum.

Acute Septic Peritonitis.—Acute septic peritonitis is inflammation of the peritoneum. The most
common causes are: perforation in appendicitis, gastric ulcer, and typhoid; rupture of an abscess of the kidneys, liver, ovaries, or tubes; extension of inflammation of any of the abdominal organs; and infected abdominal wounds.

Symptoms.—The usual symptoms are a rise of temperature, frequent, feeble, irregular pulse, rapid respiration, nausea, projectile vomiting of dark, greenish-brown vomitus, hiccup, constipation, tympanites, and in severe cases delirium or stupor. When the peritonitis is due to perforation, these symptoms are preceded by a sudden intense abdominal pain followed by a fall of temperature and accelerated pulse.

Nursing.—The patient must be kept quiet. Frequent sponging and rubbing with alcohol is one of the surest means of obtaining this result. A cradle should be placed under the bed-clothes when their weight causes discomfort.

Chronic Peritonitis.—Chronic peritonitis may be simple or tuberculous. The septic condition is lacking, and the disease runs a longer course.

The Liver—Abscess of the Liver.—There are two varieties of abscess of the liver, the amœbic, and the septic. The former follows, or is associated with, amœbic dysentery. It is more prevalent in tropical climates.

In the septic form, the infection may be due to any of the bacilli which promote suppuration. They may reach the liver either through the hepatic artery or vein, the portal vein, the gall ducts, from a wound extending to the liver or from a wound of the contiguous organs or tissue. The symptoms are those of sepsis associated with pain in the
liver. Operative measures are generally resorted to.

**Carcinoma of the Liver.**—Carcinoma of the liver seldom occurs as a primary growth, but generally follows cancer of some other organ of the body.

**Symptoms.**—In addition to the physical sign, *i.e.*, the presence of the tumour, the usual symptoms of cancer are cachexic, more or less pain, jaundice, and leucocytosis. The fever is variable.

**Cirrhosis.**—Cirrhosis of the liver is most frequently the result of intemperance in either drinking or eating, particularly the former. Syphilis, rickets, tuberculosis, cancer, and many of the infectious diseases are also predisposing causes. The connective tissue of the liver is thickened, and the functions of the liver are interfered with. This results in many constitutional disturbances. Ascites is the most frequent complication.

There are six forms of the disease:

1. Atrophic cirrhosis, associated with atrophy of the liver.
2. Biliary cirrhosis, in which there is chronic retention of bile.
3. Capsular cirrhosis, associated with syphilis, interstitial nephritis, etc., in which the liver is atrophied and the capsule much thickened.
4. Fatty cirrhosis, in which the hepatic cells become infiltrated with fat.
5. Hypertrophic cirrhosis, in which the liver is hypertrophied.
6. Syphilitic cirrhosis, due to syphilis.

**Fatty Liver.**—Fatty infiltration of the liver is generally the result of over-indulgence in eating and in alcoholic drinking. It also follows chronic
phosphorus poisoning, severe anaemia, cancer, and tuberculosis.

There are no severe constitutional symptoms associated with the condition.

**Gall-Bladder and Ducts—Cholecystitis.**—Cholecystitis is acute inflammation of the gall-bladder. In light cases, there is simply a catarrhal condition of the cystic duct and gall-bladder. In severe cases—suppurative cholecystitis—the cystic duct is almost closed and the bladder is distended with pus.

**Symptoms.**—In addition to the symptoms of general sepsis, there will be severe vomiting, constipation, and abdominal pain. There is seldom any jaundice. Cholecystitis is very often mistaken for appendicitis.

**Cholelithias (Gall-Stones).**—Cholelithias is generally due to the entrance of bacteria into the gall-bladder, which start a catarrh of the mucous membrane that results in the secretion of an increased amount of cholesterol and lime salts. The stones may vary in number from a single one to many hundreds. They may be black, white, or any intermediate shade, and they are usually either ovoid or spheroidal in shape. They may form or lodge in the gall-bladder, the cystic duct, the common duct, or the intestine.

**Biliary or Hepatic Colic.**—Biliary colic occurs during the passage of a stone from the gall-bladder. During the attack, there is intense paroxysmal abdominal pain, together with nausea and vomiting. As vomiting may relieve the pain, it is often induced. There may be chills and fever. The pulse is generally rapid and weak, and the skin is covered with a cold perspiration.

**Jaundice.**—Jaundice is a symptom rather than
a separate disease. The three most frequent causes of this condition are:

1. Obstruction of the bile ducts. This obstruction may be caused by: inflammation of the duct or of the duodenum; impaction of the duct by gall-stones, or other foreign bodies; cancer of the duct or duodenum; or pressure upon the same by tumours of any of the contiguous organs.

2. Toxæmic poisoning. This may be due to certain infectious diseases, such as yellow fever, pernicious malaria, and pyæmia, or to certain poisons, such as phosphorus, arsenic, mercury, snake-venom, etc.

3. Shock or excessive emotion.

In protracted cases of jaundice, the blood and all the tissues, with the exception of nervous tissue, contain bile and it is given off in the urine and perspiration. When jaundice is due to obstruction, the stools are clay-coloured and very foul.

Bile in the blood impairs, in a greater or less extent, its coagulable property. There is, therefore, an increased danger of hæmorrhage after injury or operation, when there is any degree of jaundice.

Bile is the great emulsifier of fat. Fat, therefore, should be withheld from the diet when there is jaundice, as there cannot then be sufficient bile in the intestine to digest the fat.

Icterus Neonatorum.—Icterus neonatorum is the name given to the jaundiced condition very frequently present in new-born infants. It appears about the second or third day. In mild cases, the jaundice disappears in a few days. In severe cases, it may be due to congenital stenosis, constriction of the hypathic duct, syphilis, or septic infection of the cord.

The Pancreas—Abscess of the Pancreas.—Ab-
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Scess of the pancreas is generally the result of obstruction of the duct. There is septic fever, jaundice, and diarrhoea. Surgical treatment is fairly successful.

Carcinoma of the Pancreas.—In carcinoma of the pancreas, there is marked and persistent jaundice. The stools show lack of pancreatic secretion. The patient suffers from severe attacks of pain associated with nausea, flatulence, faintness, cold clammy skin, and other symptoms of collapse.

Pancreatic Calculi.—In a case of pancreatic calculi there are sharp attacks of pain, as in carcinoma of the pancreas, but there is no jaundice. The stones lodge in the duct and cause dilatation of the same, and sometimes even a fistula into the stomach or peritoneal cavity. They may result in pancreatic abscess, and they predispose to carcinoma and the formation of cysts.

Pancreatitis.—Pancreatitis is inflammation of the pancreas. Obstruction of the duct is its most common cause. The condition may be either acute or chronic. There are three varieties of the acute form, suppurative, haemorrhagic, and gangrenous. They are generally fatal.

Nursing.—As the condition of the stools is generally of diagnostic value in diseases of the pancreas, they must be always carefully inspected when such disorders are suspected and any abnormality reported or the stool saved for the doctor's inspection. The tendency to sudden collapse also must be remembered and watched for.

Diseases of the Urinary Tract

The Kidneys—Dropsy (Oedema).—Dropsy, or oedema, was at one time thought to be a disease,
but it is now recognised as a symptom of many of the diseases which affect the kidneys and the circulation. It is characterised by an excess of liquid in one or more of the serous cavities of the body, or in the areolar tissue. It may be either general or local.

General œdema is known as anasarca.

If the liquid collects in the abdominal cavity, it is called ascites.

If the liquid collects in the pleural cavity, it is called hydrothorax.

If the liquid collects under the pericardium it is called hydropericardium.

If the effusion is into a joint it is known as hydrarthrus.

If the cerebro-spinal fluid increases sufficiently to enlarge the head, it is known as hydrocephalus.

The most dangerous sites are the throat (œdema of the glottis), the brain, the lung, the heart, and the serous sacs.

CONGESTION OF THE KIDNEYS.—Congestion of the kidneys may be caused by cantharides, turpentine, cubebs, copaiba, by anaesthetics, especially ether, and by chilling of the skin.

Symptoms.—The symptoms are lumbar, pain, malaise, and slight fever. The urine is diminished in quantity, dark coloured, and of high specific gravity and generally contains a slight amount of albumin. Unless nephritis follows, the condition will, with care, be relieved in a few days.

CHRONIC CONGESTION OF THE KIDNEYS.—Chronic congestion of the kidneys frequently complicates disease of the heart, lungs, and liver.

FLOATING KIDNEY.—Floating kidney is generally due to: the disappearance of perirenal fat; increased
weight of the kidney; congenitally lax peritoneal attachment, with long renal arteries and veins; or tight lacing.

Symptoms.—The symptoms are pain in the lumbar region, and mental depression. Neurasthenia, dyspepsia, and abdominal colic are also frequently present. In bad cases, there may be chills and fever and constant vomiting.

Operative measures are frequently required for the relief of this condition, but it can sometimes be remedied by constantly wearing a suitable pad and belt.

Acute Nephritis (Acute Bright's Disease.)—Acute nephritis is an acute inflammation of the kidney. It may result from exposure to cold and wet, extensive burns, or diseases which have interfered with the function of the skin. It is a very common complication of scarlet fever, diphtheria, and other acute infectious diseases. It sometimes occurs in pregnancy and sometimes follows the use, in excess, of arsenic, carbolic acid, cantharides, iodoform, mineral acids, lead, phosphorus, and mercury.

As a sequela to skin diseases or burns, nephritis generally occurs late, often in convalescence. It may come on very suddenly. In pregnancy, however, its onset is slow, and it is a very serious complication.

Symptoms.—Chills or convulsions frequently mark the onset. The fever varies from 101° to 103° F., the skin being pale and dry. Ædema may be quite marked in a few hours. There is albumin in the urine.

The usual treatment is: to keep the patient in bed; to administer daily saline purges, hot packs or other measures to produce sweating; to insist upon a milk
diet, and to provide, when the œdema is not marked, copious drinks of water.

Chronic Nephritis (Chronic Bright’s Disease).—There are two varieties of chronic nephritis: parenchymatous, the inflammation of the substance proper of the kidney; and interstitial, the inflammation of the connective tissue of the kidney. In the former, the kidney is enlarged; in the latter, it is usually atrophied.

Symptoms of Parenchymatous, Nephritis.—Parenchymatous nephritis may follow acute nephritis. The symptoms in the latter abate somewhat, but the anæmia, dropsy, and albuminuria persist and gradually become more marked. Parenchymatous nephritis may come on insidiously with headache, gastro-intestinal disturbances, anæmia, dropsy, and urinary and cardiovascular changes. The quantity of urine voided is diminished, it is of a dark colour, has a heavy sediment, and contains albumin. Sometimes, there is albuminuric retinitis. Attacks of uræmia may occur at any time and often cause a fatal termination of the disease. Patients frequently die in six months to a year; but the disease may drag on for several years with exacerbations or with no symptoms except an occasional albuminuria.

Treatment.—A warm, equable, climate is generally advised, but draughts or sudden chilling of the skin must be guarded against. The patient should be out of doors as much as possible. Saline cathartics and diaphoretics are frequently given, as in acute nephritis, and, when œdema is not marked, copious drinks of water. Meats, meat broths, and extracts are given sparingly at all times and are withheld entirely during acute attacks (see Chapter XXIV.).
Symptoms of Interstitial Nephritis.—In interstitial nephritis, the quantity of urine voided is increased. It is of pale colour, and low specific gravity. Albumin is often present, but not in large amounts, nor does it persist as in the parenchymatous type. There is frequently dimness, or other disturbance, of vision. General oedema is not so common as oedema of the lungs. Acute attacks of uræmia are not infrequent.

Treatment.—The main points of the treatment are much the same as in the parenchymatous type.

Nephrolithiasis (Stone in the Kidney).—Stones are formed in the kidneys by the aggregation of solid substances precipitated from the urine in the pelvis of the ureters. This precipitation is partly caused by an excess in the urine of the substance precipitated and, partly, by some abnormality in the condition of the urine, which makes it less soluble.

Symptoms.—Gravel and even fairly large stones, may be passed for a long time and give no definite symptoms; or there may be more or less pain in the kidneys. If, in its passage, the stone becomes impacted in any of the ducts, “renal colic” will ensue. The onset is generally abrupt, there is an intense, agonising pain which radiates along the ureter, there may be a chill followed by fever 100° F.; the skin is cold, pale, clammy, and covered with perspiration. Frequent, painful micturition is common. The attack may only continue a few hours, or it may persist with or without intermission for some days. There may be blood in the urine for some days after an attack. There may be repeated attacks of renal colic, or but a single one. Congestion of the kidney or pyelitis may complicate the condition, or there may be no marked ill-health between attacks.
Treatment.—For the colic, hot baths are often ordered and copious hot drinks. Morphine is generally given for relief of pain.

Perinephritic Abscess (Abscess of the Kidney).—Perinephritic abscess may be caused by trauma, it may follow infectious fevers, or may be the result of infection from perforation of the appendix, colon, or pleural abscess. The onset is sometimes sudden, but more commonly it comes on gradually. There is continuous pain over the kidney and the usual symptoms of sepsis.

Pyelitis.—Pyelitis is an inflammation of the mucous membrane lining of the pelvis of the kidney. The condition may vary from that of a slight congestion and mild catarrh, to necrosis and suppuration.

Tumours.—The kidneys are sometimes the seat of tumours, both malignant and benign.

Uraemia.—Uraemia is a toxic condition supposed to be due (1) to retained excrementitious matter that the kidneys have failed to eliminate and (2) to perverted metabolism, in consequence of which abnormal compounds that act as poisons have been formed. It sometimes complicates nephritis and anuria.

It is characterised by headache, vomiting, dyspnoea, Cheyne-Stokes respiration, coma, and convulsions.

The Bladder—Cystitis.—Cystitis is inflammation of the mucous membrane of the urinary bladder. The most common causes are: germ infection, irritation by an excessive or improper use of the catheter, cold, poisoning by cantharides, etc. Cystitis due to germ infection is generally the result of unsterile catheterisation. The condition is exceedingly hard to cure. It has a strong tendency to become chronic, in which case it is the cause of endless suffering to the
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victim. Therefore, too great stress cannot be laid upon the necessity for absolute cleanliness and perfect sterilisation of everything used for the operation and of the nurse’s hands. To prevent the too frequent use of the catheter, the instructions given in Chapter XI. regarding the methods of making a patient void urine voluntarily must be remembered and resorted to.

Diseases of the Uterus and Appendages

Exact diagnosis of the various diseases of the uterus and its appendages is made chiefly by vaginal examination, the symptoms being much the same regardless of the organ affected: viz.; pain in the lumbar region and lower part of the abdomen, nervousness, frequently a vaginal discharge, the nature of which assists in diagnosis; menorrhagia, and, if pus is present, more or less marked septic symptoms.

The Uterus—Anteversion.—This is a pushing forward of the uterus, a condition generally due to the presence of some mass behind it. The most pronounced symptoms are dysuria and irritability of the bladder.

Anteflexion.—A bending forward of the uterus upon itself.

Endometritis.—Endometritis (from the Greek words, “endo,” within, and “metra,” uterus, and the termination “itis” meaning inflammation) is an inflammation of the membrane lining the uterus.

Laceration of the Cervix Uteri.—Laceration of the cervix uteri is a tear of the neck of the uterus. This usually occurs during confinement.

Metritis (Inflammation of the Uterus).—Septic metritis is most commonly caused by infection during or after labour.
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PROLAPSE.—Prolapse is a falling down of the uterus, generally due to loss of tone and relaxation of the uterine ligaments.

RETROVERSION.—Retroversion is a backward displacement of the uterus. The distinctive symptoms are a feeling of weight and bearing down of the pelvis, which is aggravated by standing menorrhagia and leucorrhoea.

TUMOURS.—The uterus and its appendages are frequently the seat of tumours. They may be cystic—that is containing fluid, such are known as cysts,—or solid; malignant, that is of a virulent nature, such as sarcoma, or benign.

The most common benign tumours are:
Angeioma, a tumour formed of blood-vessels.
Dermoid or dermatoid, a cyst or tumour containing hair, bone, etc., these more often occur in the ovaries.
Myoma, a muscular tumour.
Polypus, a pedunculated tumour.
Sebaceous cyst, a retention cyst of a sebaceous gland.

THE VAGINA AND PERINEUM—CYSTOCELLE.—Cystocele is prolapse or relaxation of the anterior wall of the vagina including the bladder.

RECTOCELLE.—Rectocele is prolapse of the posterior wall of the vagina, including the rectum.

VAGINITIS.—Vaginitis is inflammation of the vagina. For vaginitis due to gonorrhoeal infection, see "Infectious Diseases," page 356.

LACERATION OF THE PERINEUM.—Laceration of the perineum is a tear in the perineum. When the tear extends through the sphincter muscle of the rectum, it is known as complete laceration; when it is not so extensive, as partial laceration.
Care of Perineorrhaphies.—Perineorrhaphy is the suturing of the perineum.

There are, perhaps, no surgical cases which require more care than perineorrhaphies, or in which the success of the operation depends so largely upon the nursing. For the first forty-eight hours and longer, if the patient is restless, the knees should be bound together to avoid any strain on the stitches when the patient moves. If there is the slightest straining during defecation, put on a sterile rubber glove, or wrap the hand in sterile gauze, and hold the sutured parts together. Some surgeons require oil enemas to be given before each defecation to soften the faecal matter. Besides the danger of the stitches being broken by straining, there is that of infection to avoid which latter, the stitches and surrounding tissues must be most carefully irrigated and dried after every defecation and micturition. The irrigation can be done either with a syringe or with the douche apparatus, using a glass pipette instead of a douche nozzle. Regulate the flow of water so that it is very gentle, and be sure to remove all foreign substance. Dry the parts thoroughly by gently pressing sterile sponges against the surface. Apply a sterile gauze dressing, cover with a sterile pad, and keep in place with a T binder. To avoid irritating the stitches, many surgeons require perineorrhaphy patients to be catheterised for at least twenty-four hours after the operation.

When douches are ordered it is generally better to substitute a straight glass catheter for the ordinary douche nozzle.

Abnormalities Attending Menstruation—Amenorrhoea.—Amenorrhoea is absence of menstruation.
It is physiological before puberty, after the menopause, and during pregnancy and lactation. The pathological causes are: changes of climate or occupation; psychical disturbances; catching cold; getting the feet wet; sea-bathing or over-exertion during menstruation; such diseases as chlorosis, the infectious fevers, chronic nephritis and diabetes, myxœdema and Addison's disease.

The only symptom may be absence of the discharge; but, if the trouble is long continued, psychical symptoms such as hysteria, melancholia, and even a species of dementia may occur at the menstrual period.

Attention to the general health is the main feature in the treatment.

**Menorrhagia.**—Menorrhagia is an excessive or prolonged menstruation. Endometritis, sclerosis of the uterine blood-vessels, tertiary syphilis, malignant disease, tuberculosis, the presence of tumours, etc., are the most common causes.

**Metrorrhagia.**—Metrorrhagia is a bleeding from the uterus at frequent irregular intervals; the causes are the same as those of menorrhagia.

**Dysmenorrhœa.**—Dysmenorrhœa is painful menstruation. There are pain in the pelvis and back and general nervous symptoms during the first twelve to thirty-six hours of the flow. In severe cases, there may be nausea, vomiting, hysterical convulsions, or syncope. The common causes are ill development of the uterine blood-vessels, a narrow cervical canal, obstruction of the cervical canal, anteflexion of the uterus, hyperæsthesia of the lining membrane of the uterus and nervous disorders.

**Treatment.**—The general health must receive attention, especially the nervous condition. A laxative
should be given just before the beginning of the period and the patient kept in bed for the first twelve hours. Local treatment or operative measures are sometimes necessary.

The Fallopian Tubes—Extra-Uterine Pregnancy.—Extra-uterine pregnancy is pregnancy which occurs outside the uterus. This most frequently happens in the tubes and is known as tubal pregnancy. When it occurs in the abdominal cavity it is called abdominal pregnancy.

Hæmatosalpinx.—Hæmatosalpinx is hæmorrhage into the Fallopian tubes.

Hydrosalpinx.—Hydrosalpinx is a form of tubal inflammation in which there is an accumulation of serous fluid in the tubal canal.

Pyosalpinx.—Pyosalpinx is pus in the Fallopian tubes, due to infectious salpingitis.

Salpingitis.—Salpingitis is inflammation of the tubes. It may be either infectious or non-infectious. The latter type may result from cold, injuries, the introduction of irritating substances into the uterus or tortuosity of the tube. Infectious inflammation is the more common. The gonococci are the most frequent cause of the infection and, next the streptococci.

The Ovaries—Abscess of the Ovary.—Abscess of the ovary is a collection of pus in the ovary.

Oöphoritis (Ovaritis).—Oöphoritis is inflammation of the ovary. This is generally due to microbic infection. The most common infection are the streptococci, resulting from puerperal infection, and the gonococci.

Diseases of the Muscles

Myositis.—Myositis is inflammation of the muscles. It is characterised by pain, swelling, and loss of func-
Myositis may be local or universal. The latter begins in the lower extremities and ascends, involving other muscles. Atrophy may occur and the muscles become more or less rigid. The progress is gradual. Death occurs when the respiratory muscles become involved.


Diseases of the Bones

The principal diseases of the bones are the following:

1. Caries—ulcerous inflammation of bone.
2. Necrosis—death of bone. This is always due to injury of the periosteum, which shuts off the supply of blood from the bone.
3. Osteoma—a bony tumour.
4. Osteomyeli is—inflammation of the marrow of the bone. This is one of the most important diseases which attack the bones. There are tenderness, redness, and swelling over the point of suppuration. There is usually high fever, and there may or may not be chills.
5. Osteonecrosis—necrosis, or death of bone.
6. Osteoperiosteitis—inflammation of both bone and periosteum.
7. Ostitis or osteitis—inflammation of the bone.

Diseases of the Skin

Acne.—Acne is one of the most common skin diseases. It most frequently appears about the time of puberty, and is apt to run a chronic course until the body is fully developed, after which there is a tendency to recovery. The disease is characterised
by small papules, or, in the pustular type, pustules, around the mouth of the sebaceous glands and hair follicles. It is supposed to be due to the clogging of the sebaceous glands by an over-secretion and inspissation of fat. Any form of indigestion or malnutrition is apt to increase the trouble. Therefore, a wholesome, not too rich, easily digested diet, regulation of the bowels, absolute cleanliness, and exercise are of the utmost importance. No local applications ever avail, so long as these essentials are neglected.

Eczema.—Eczema is a non-contagious, inflammatory disease of the skin attended with itching, desquamation, and, usually, the exudation of serous or sero-purulent fluid.

Nursing.—It is important in all forms of eczema to keep the skin dry. Many physicians will only allow of the affected parts being cleansed with oils or prescribed ointments. The exclusion of the air is also necessary; this can be obtained by bandaging lint, etc., lightly over the part, or if the head is the seat of the disease, a cap of lint can be made; if the face, a mask. A mask can be more easily retained in place if the lint is cut large enough to come well up on the head and under the chin and a couple of darts taken on the head and under the chin. Holes are cut for the eyes, and of the nose, and mouth. These holes should not be larger than necessary. The mask can be either bandaged or tied on.

Epithelioma.—Epithelioma is cancerous growth in the skin.

Erythema.—There are several varieties of erythema. Two of the most common are: 1. Erythema hyperæmicum. This is a simple reddening of the
skin in localised patches due to irritation either internal or external. In some people it is caused by eating some particular food such as fish, etc. 2. Erythema intertrigo. This is an eruption which occurs between two folds of skin in fat people and babies. It should be treated by keeping the part dry and powdered.

**Favus.**—Favus is a contagious vegetable parasitic disease that attacks the scalp and very exceptionally the non-hairy parts of the skin.

**Furunculosis (Boils).**—Furunculosis is an acute, localised inflammation occurring around the sebaceous glands or hair follicles. The furunculi grow pyramidal in shape, and suppurate, the point of suppuration showing on the surface as a yellow spot.

**Herpes.**—Herpes is characterised by one or more vesicular eruptions upon reddened bases. Fever blister and cold sore are symptoms.

**Lupus.**—Lupus is a chronic tuberculous skin disease.

**Scabies (The Itch).**—A contagious, animal parasitic disease, due to the boring into the epidermis of a minute insect, the acarus scabiei. The penetration of this parasite leads to the formation of characteristic burrows and excites the development of a multiform eruption. The burrows are indicated by tortuous (rarely straight), thread-like lines of greyish, sometimes whitish, colour which are occasionally mottled with black points. They vary in length from one-eighth to half an inch. The digital spaces, the inner side, and the soles of the feet are the most frequent locations of the infection. The eruption, which itches intensely, especially at night, consists of papules, pustules, and vesicles.
Trichophytosis (Ringworm).—a contagious disease of the skin due to the infection of the trichophyton fungus. It is characterised by the formation of circular scaly patches, and if it occurs on the head, partial loss of hair.

Urticaria.—Hives, characterised by the wheel-like appearance of the eruption, most frequently caused by indigestion, constipation, or the eating of certain foods.

Diseases of the Ear

The Auricle.—The principal diseases of the auricle are:

1. Angiomata—growths consisting of blood-vessels.
2. Epithelioma—cancerous growth.
3. Othoematoma—an effusion of blood between the cartilage and the perichondrium, due to trauma and so frequently associated with insanity that it is known as the "insane ear."
4. Wens—not infrequently seen in or about the lobe of the ear.
5. Fibroma—of the keloid type usually due to piercing the lobe for ear-rings.

The External Meatus.—The principal diseases of the external meatus are:

1. Atresia—a narrowing of the external meatus. This may be due to malformation of the auricle, disease, or injury. Unless complete, it is not a direct cause of deafness.
2. Eczema—an inflammatory condition attended with desquamation.
3. Otitis external circumscripta or furunculosis—furuncles or abscesses in the external meatus. The
condition may last for weeks, or months, the subsidence of one furuncle being followed by the appearance of another. There may be considerable pain and, sometimes, temporary deafness, and rise of temperature.

4. Otitis externa diffusa—diffuse inflammation of the meatus. This may be due to diphtheria, erysipelas, syphilis, or other infection and to parasitic mould.

5. Otomycosis—the presence of parasitic moulds in the meatus.

6. Tumours.—The exostoses, or bony tumours, are the most common. Granulomata may protrude from the middle ear.

7. Wax impaction (ear wax).—This is usually due to a dirty occupation or to excessive interference with the meatus. If wax becomes impacted in the auditory canal, deafness, tinnitus, and a feeling of tension in the head ensue.

**The Tympanic Membrane.**—The principal disease of the tympanic membrane is myringitis traumatica or infecta. This is acute inflammation of the drum membrane due to irritation. The hearing is generally slightly impaired.

**The Middle Ear.**—The principal diseases of the middle ear are:

1. Acute otitis media—an acute inflammation of the middle ear, which results in temporary deafness, pain, and more or less fever, 101°–103° F. This is a frequent complication of the infectious diseases, and of all forms of nasal catarrh. Lack of the care of the mouth in illness, and improper syringing of the nose are two very common causes of the trouble. The infection travels through the Eustachian tubes or is carried by the blood.
Proper treatment is imperative, as spread of the infection may take place which may result in vertigo, tinnitus, permanent deafness, mastoiditis, epidural abscess, jugular thrombosis, meningitis, brain abscess and death.

2. Chronic suppurative and non-suppurative inflammation. Both these forms, of which there are many varieties, may follow acute otitis media; or they may be the result of adenoids or other abnormal nasal conditions, or of infectious diseases. The amount of the subsequent deafness depends on the extent of the inflammation and the presence or non-preservation of complications. Attacks of pain, in chronic suppurative inflammation, are a serious symptom. To avoid increasing the condition, it is of the utmost importance that any nasal or pharyngeal disease which may exist be treated, and that anything likely to cause irritation in the ears be avoided. The maintenance of good general health is also exceedingly necessary.

3. Granulations and polypi. These are frequent complications of chronic suppurative inflammation.

4. Necrosis and caries of the temporal bone and ossicles. This is usually the result of acute or chronic suppurative inflammation of the middle ear.

5. Otalgia—a neuralgia of the middle ear. It is frequently caused by caries of the teeth; less often, by throat and nose affections.

Chronic non-suppurative inflammation of the middle ear is the most common cause of deafness. It is usually due to chronic affection of the nasopharynx and sometimes to lowered general vitality. Attention should be given to it at once, for, if it becomes long standing the tissue-change results are
most difficult to benefit. The symptoms are variable, progressive deafness, tinnitus, sense of weight, and fulness of the ear.

The Auditory Nerve and Labyrinth.—Chronic non-suppurative inflammation of the middle ear is a common cause of gradual progressive disease of the labyrinth. There is tinnitus, loss of bone conduction, deafness, and often, vertigo. This condition may be caused temporarily by drugs, such as quinine and the salicylates, and it sometimes follows typhoid and other infectious diseases. When the result of disease, the deafness is frequently permanent.

Chronic meningitis may lead to deafness by causing destructive changes in the auditory nerve. Deafness from cerebro-spinal meningitis is generally the result of inflammatory changes either in the nucleus of the auditory nerve, its trunk, or in the labyrinth.

Nursing.—For methods of irrigating the ear, see Chapter XII. When there is any discharge, care must be taken to clean the ear thoroughly. If a plug is used it should be of absorbent cotton and should be put in loosely, that it may not interfere with the drainage. It must be changed frequently.

A large per cent. of deafness is due to neglect or to improper treatment. Nurses should discourage the use of unadvised remedies and recommend the consulting of an otologist (ear specialist) for all such aural defects as pain, tinnitus (ringing in the ear), discharge or deafness.

Diseases of the Eye

The Lids.—The principal diseases of the lids are:
1. Blepharitis—a chronic inflammation of the margin of the lids. It is caused by uncleanliness,
the exanthemata, over-use or strain of the eyes, and exposure to irritating conditions such, as, dust, wind, or smoke.

2. Chalazion—an enlargement of one of the Meibomian glands due to stoppage of its duct.

3. Ectropion—an eversion of the lid.

4. Entropion—a rolling in of the margin of the lid.

5. Hordeolum—or stye—an acute inflammation which occurs around the follicle of an eyelash.

6. Ptosis—a dropping of the upper lid.

7. Trichiasis—an inversion of the eyelashes which causes them to rub against the cornea.

8. Tumours. The most common benign tumours which attack the lids are: (a) the milium—a yellowish tumour about the size of a pin's head, due to retention in a sebaceous gland; (b) the molluscum—a white tumour about the size and shape of a small pea; (c) xanthelasma, a small elevation beneath the skin, due to degeneration of the muscle fibre.

Carcinoma is the most common form of malignant tumour.

Epithelioma is a common tumour of the eyelids in old people.

The Lachrymal Gland and Ducts.—The principal diseases of the lachrymal glands and ducts are:

1. Acute Dacryocystitis—an abscess of the lachrymal sac.\(^1\)

\(^1\) A row of small glands bordering the lids which secrete a thick liquid that prevents the tears from overflowing the lids.

\(^2\) The lachrymal gland is the gland which secretes the tears. It is situated at the outer and upper part of the orbit.

\(^3\) The lachrymal sac is a small sac near the nose which collects the excess moisture discharged from the duct.
2. Chronic Dacryocystitis—a chronic inflammation of the lachrymal sac, due to some obstruction in the nasal duct.

3. Epiphora ("Watery Eye").—This may be due to any affection or irritation of the lachrymal ducts or glands.

**The Orbit.**—The principal diseases of the orbit are:

1. Cellulitis—a suppurative inflammation of the cellular tissue of the orbit.
2. Exophthalmos—a protrusion of the eyeball from the orbit.
3. Periostitis—an inflammation of the orbital periosteum.

**The Conjunctiva.**—The principal diseases of the conjunctiva are:

1. Acute Catarrhal Conjunctivitis—an acute catarrhal inflammation of the conjunctiva, accompanied by a muco-purulent discharge.
2. Chronic Catarrhal Conjunctivitis.—A chronic inflammation of the conjunctiva. The discharge is less in quantity and not of as purulent a nature as in the acute form.
3. Croupous Conjunctivitis.—This is characterised by the formation of a membrane on the surface of the conjunctiva. There is no infiltration into the tissues as in the diphtheritic form. The condition is generally due to irritants, chemical, mechanical, or thermic.
4. Diphtheritic conjunctivitis—an acute inflam-
5. Follicular conjunctivitis—conjunctivitis associated with "follicles" upon the lower lid.

6. Gonorrhœal ophthalmia—purulent conjunctivitis, due to gonorrhœal infection.

7. Ophthalmia neonatorum—a gonorrhœal conjunctivitis occurring in the newborn. A very large per cent. of blindness is due to this cause.

8. Pinguecula—a thickening of the connective tissue of the conjunctiva at the inner and outer sides or the cornea.

9. Pterygium—a triangular-shaped vascular prominence of the conjunctiva with its apex extending on to the cornea.

10. Trachoma (or granular lids)—a form of conjunctivitis accompanied with hypertrophy of the conjunctiva and the formation of "granules" and subsequent cicatrices. The secretion is contagious.

The Cornea.¹—The principal diseases of the cornea are:

1. Keratitis—an inflammation of the cornea, which may be either suppurative, or non-suppurative.

2. Keratoconus—a non-inflammatory conical protrusion of the centre of the cornea.

3. Staphyloma—protrusion of the cornea, corneal tissue, and iris, accompanied by inflammation.

The Sclera.²—The principal diseases of the sclera are:

¹ The cornea is a transparent membrane in front of the iris.
² The sclera is a dense, white fibrous membrane which, together with the cornea, forms the outer tunic of the eyeball.
1. Episcleritis—an inflammation of the subconjunctival connective tissue.
2. Scleritis—an inflammation of the sclera.
3. Staphyloma—a thinning and bulging of the sclera.

**The Iris.**—The principal disease of the iris is iritis—an inflammation of the iris.

**The Uveal Tract.**—The principal diseases of the uveal tract are:
1. Panophthalmitis—a purulent inflammation of the entire uveal tract. The eyeball is filled with pus and its functions are completely destroyed.
2. Uveitis—inflammation of the uveal tract.

**Glaucoma.**—Glaucoma is a disease of the eye characterised by increased intraocular tension. There are three varieties: acute inflammatory, chronic, and simple. In the first, there are repeated attacks of inflammation accompanied by severe pain and increasing diminution of vision. The second variety resembles the first, but the attacks are less severe and more gradual in their onset. In the third class an absence of all extreme symptoms is often observed, but there is a gradual increase of intraocular tension resulting in loss of sight.

**The Lens.**—The principal disease of the lens is cataract—an opacity of the crystalline lens or its capsule. Cataracts are known as:

*a.* Partial when only part of the lens is involved.

*b.* Complete, when the whole lens is affected.

---

1. The iris is the curtain hanging in front of the lens in the centre of which is a small hole called the pupil.

2. The uveal tract is made up of the choroid, the iris, and the ciliary body.

3. The lens is a transparent body in the centre of the eye which directs the focusing of rays of light on the retina.
c. Stationary, when it does not spread.
d. Progressive, when it gradually increases in size.
Cataracts may be due to:
1. Faulty development—congenital.
2. Old age—senile.
4. Ocular disease.
5. Traumatism.

**The Retina.**—The principal disease of the retina is retinitis—inflammation of the retina. There are several varieties:

(a) Simple retinitis, a simple serous inflammation of the superficial layer of the retina.
(b) Albuminuric retinitis, which occurs in connection with nephritis.
(c) Diabetic retinitis, which occurs in connection with diabetes.
(d) Syphilitic retinitis, which occurs in connection with syphilis.
(e) Hæmorrhagic retinitis, in which there is hæmorrhage into the retina. This is generally associated with disease of the heart or blood-vessels.

(f) Purulent retinitis, which is due to the lodgment of septic emboli in the retinal arteries.

**The Optic Nerve.**—The principal diseases of the optic nerve are:

1. Hyperæmia—congestion of the optic disc. This is most commonly the result of eye-strain from hypermetropia, and astigmatism, over-use of the eyes or working with insufficient, or too strong a light.

---

1 The retina is a transparent membrane which lines the choroid and contains the nerve endings that receive the impressions of light and colour.
2. Optic neuritis—Inflammation of the optic nerve. There are two varieties:
   1. Papillitic, in which the head of the nerve is affected.
   2. Retrobulbar, which affects the nerve fibres behind the eyeball.

Disturbances of the Motility of the Eye.¹—The principal disturbances of the motility of the eye are:
   1. Diplopia—a failure of the visual lines of the two eyes to direct toward the same object.
   2. Heterophoria—a slight tending of the visual lines away from parallelism, which can generally be corrected by muscular effort.
   3. Strabismus (squint)—is an advanced heterophoria which the patient cannot overcome.
   4. Paralysis—a loss of motion of one or more of the ocular muscles.
   5. Paresis—a partial paralysis.

Nursing in Diseases of the Eye.—There is no other organ of the body in which disease will more quickly destroy its function. It is therefore imperative, especially in all suppurative processes, and more particularly in those due to gonorrhoeal infection, that treatment be started immediately. In such cases a delay of even a few hours may mean the loss of sight. The eye must be carefully irrigated, as already described in Chapter XV. In cases where there is much pus it may be necessary to do this as often as every twenty or thirty minutes; if pus is allowed to remain long in contact with the eyeball ulceration of the cornea may result. In cleansing the eye great care must be taken not to abrade the

¹ When objects are focussed correctly on the moclula of the eye, the vision is said to be binocular.
A Synopsis of Important Diseases

cornea; use a soft pledget of absorbent cotton (never gauze) wet in a mild antiseptic solution, and remove very gently all discharge that is not washed out by the irrigation. Never wipe toward the inner angle of the eye or the discharge may be washed into the lachyrmal sac and a serious inflammation result. When the lids are so swollen that the eye cannot be properly cleansed, the surgeon generally performs a canthotomy (cutting the outer angle of the eye). This not only allows of the eye being more readily cleansed, but also relieves the pressure on the eyeball. With proper care the resulting wound should heal in a few days.

The method of putting medicine in the eye is described in Chapter XV. Applications are generally best made to the lids with an applicator made by wrapping absorbent cotton around a thin wooden stick. The cotton is moistened in the prescribed solution, the lids everted (as described in Chapter XV.), and the moistened swab rubbed over their inner surface. Nitrate of silver, argyrol, and protargol are the germicides most frequently used in acute contagious diseases of the eye. Boric acid 2% is the antiseptic solution most frequently used for irrigation; when bichloride of mercury is used, it must not be stronger than 1:5000 as a stronger solution would be very irritating to the eye.

Either hot or cold compresses are frequently ordered, especially in the early stages of inflammation. The latter should, however, never be applied without a doctor’s order: heat encourages suppuration; there are therefore many instances in which it is injurious. Cold depresses the circulation, so its use must not be too long continued, and under certain conditions, such
as ulceration of the cornea, its use is contra-indicated.

As has been already stated in Chapter X., the compresses must be of light material, absorbent cotton being about the best. When there is suppuration, the same compress must never be used twice, and when both eyes are affected, separate compresses should be used for each eye. The compresses should be changed at least every two minutes, and cold ones kept on the ice till required.

When only one eye is affected or when the inflammation is more virulent in one eye than the other, the well eye is sealed by covering with a "Buller's shield." This consists of an ordinary watch crystal $\frac{1}{2}$ inches in diameter, and two pieces of adhesive plaster, one $2\frac{1}{2}$ and the other 2 inches square, with a hole one inch square in the centre of each. The smaller piece of plaster is stuck to the concave side of the crystal, and the larger to its convex surface; being larger this extends beyond the other piece, and when the glass is placed—concave side down—over the eye, it is fastened to the face above and below the eye and on the nose; it is left free on the temporal side to give ventilation.

As it would not be safe to put glass over the eye of a small child or a very restless patient, a gauze pad held in place with a bandage is used in such cases. The bandage should be removed twice a day and the eye well washed; a 2% solution of boric acid is generally used for this purpose. When the patient is a child it is often well to secure its arms before treatment by wrapping it in a sheet.

All dressing used in contagious diseases of the eye should be burnt immediately after removal; they should be handled as little as possible, and the danger
of infecting one's own eyes constantly remembered and guarded against.

The patient's room should be uncarpeted and the floor mopped daily but never swept; in the majority of cases the room is kept at least moderately dark.

The patient's general health must receive attention; a light nutritious diet is required, and the bowels should be kept freely open.
CHAPTER XXIV

FOOD


The food we eat being the chief factor in maintaining life, improper food, being a predisposing cause of disease, and diet being nowadays more and more considered in the treatment of disease, it is very important that nurses should have some knowledge of the chemical constituents of food, of the action of the different food materials on the body, and of the food suitable to be given under certain conditions and in disease. In a book of this kind it would be impossible to go very thoroughly into the subject but the following synopsis contains a collection of notes which it is particularly important to remember.

The principal primary elements of food are oxygen, carbon, hydrogen, nitrogen, sulphur, phosphorus, potassium, sodium, calcium, magnesium, and iron. Food is divided into classes, nitrogenous and non-nitrogenous, according to the amount and combination of these elements. The first class comprises all proteid food; the second, carbohydrates, fats, minerals, and water.

The chief uses of food are: (a) to form the body tissues; (b) to repair their waste; (c) to yield heat,
Food

for the purpose of keeping the body warm and generating energy for the work it has to accomplish.

The heat and energy are developed as the food is digested and absorbed in the body. The calorie is the unit used in estimating the amount of heat thus generated. One calorie represents the amount of heat required to raise the temperature of a pound of water 4° F.

Each class of food generates a different degree of heat, thus:

<table>
<thead>
<tr>
<th></th>
<th>Proteid</th>
<th>Fat</th>
<th>Carbohydrates</th>
<th>Calories</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 lb. of proteid</td>
<td>. . .</td>
<td>1.820</td>
<td>. . .</td>
<td>4.040</td>
</tr>
<tr>
<td>1 lb. of fat</td>
<td>. . .</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 lb. of carbohyd.</td>
<td>. . .</td>
<td>1.820</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The amount of each variety of foodstuff required to keep the body in health varies under certain conditions, such as sex, age, mode of life, and climate.

Atwater gives the following standard for a man doing hard labour:

<table>
<thead>
<tr>
<th>Proteid</th>
<th>Fat</th>
<th>Carbohydrates</th>
<th>Calories</th>
</tr>
</thead>
<tbody>
<tr>
<td>150 grms.</td>
<td>150 grms.</td>
<td>500 grms.</td>
<td>4060</td>
</tr>
</tbody>
</table>

and for a man doing moderate work:

<table>
<thead>
<tr>
<th>Proteid</th>
<th>Fat</th>
<th>Carbohydrates</th>
<th>Calories</th>
</tr>
</thead>
<tbody>
<tr>
<td>125 grms.</td>
<td>125 grms.</td>
<td>450 grms.</td>
<td>3520</td>
</tr>
</tbody>
</table>

A woman requires four-fifths of a man's rations. A child between the ages of 14 and 16 requires nine-tenths of the adult ration, and one-tenth should be subtracted for each two years less of life.

More fat is required in cold countries, and less in tropical, carbohydrate food replacing the fat.

**Nitrogenous Foods**

Nitrogenous foods are the tissue builders. They make the flesh of the body, they improve the condition of the muscles; they build up and repair the
albuminoids of the blood, milk, and other liquids; they also liberate a small amount of energy by oxidation.

Nitrogenous foods consist principally of nitrogen, carbon, oxygen, hydrogen, and sulphur. Under this head are classed: all parts of animal food, except fats and glycogen; milk, eggs, and the nitrogenous constituents of vegetables and cereals. The principal nitrogenous or proteid substances of meat are: myosin, which is the basis of muscle; fibrin, found both in the muscles and blood; and albumin, found in the blood and juices. The nitrogenous constituents of fish are chiefly gelatine and albumin. The proteids of milk are lact-albumin and casein; of the yolk of egg, vitellin; of the white of egg, albumen; of vegetables, legumin; and of cereals, gluten.

Meat.—The value of meat varies greatly with the part of the animal from which it is taken. The parts which have done the most work in life, e.g. the neck and legs, are the toughest, but at the same time the most juicy. Hence they are used for soups and broths. The parts which have done the least work, e.g. the upper portion of the hind quarter, are the most tender, but the least juicy. They make the best roasts and steaks. The intermediary portions are used for stews and pot roasts.

Meat from young animals is more tender but less nutritious than that from older ones.

Veal, owing to a lack of salts, is lacking in flavour and is not as digestive as beef. When too young—under six weeks,—it is very indigestible.

Mutton, being fatter than beef and this fat being largely stearin, is considered by some authorities less digestible than beef.
Lamb contains a large per cent. of fat. Therefore something acid (such as pickles, mint sauce, etc.) is served with it to counteract the effect of the fat.

Pork, owing to a large per cent. of fat, is the least digestible of all meats.

Ham and bacon are much more easily digested than pork, especially bacon when it is sliced and cooked crisp.

Fowl, chicken, and pigeon are very easily digested. Ducks and geese are less easily digested, owing to a larger per cent. of fat.

Game is easily digested, but it is too highly seasoned for general invalid diet.

Extractives or Meat Bases.—Extractives are so called because they are easily dissolved out or extracted from the meat. They consist largely of substances called creatin and creatinin, xanthin and hypoxanthin. Their action somewhat resembles that of thein and caffein, the active principles of tea and coffee. They have little nutritive value, but they are slightly stimulating and give meats their flavour.

Gelatin.—Gelatin is easily oxidised. It is therefore, under certain conditions, of value, as it serves to economise the albuminoids. Owing to its mucilaginous nature, it is useful in many disorders of the stomach; but, as it is almost entirely digested in the intestines, its use is counterindicated in disease of the same. It has very little nutrient value.

Fish.—Fish contains less nutrient than meat, but is quicker and more easily digested. It is therefore particularly suitable for people whose digestive powers are impaired, and those of sedentary habits. Dark fish contains a larger per cent. of fat than white, and is therefore less easy of digestion.
Eggs.—Eggs contain all the food principles except carbohydrates. Owing to their containing a comparatively large amount of iron, they are particularly valuable in cases of anæmia, and the presence of sulphur renders them unfit, in many instances, for persons of weak digestion, because, if absorption from the intestine is delayed, decomposition ensues, and sulphuretted hydrogen and ammonia are produced. This is particularly true of the yolk. The white can be used in many cases where the yolk might be productive of serious gastro-enteric disorder.

The decomposition of eggs is due to the entrance of bacteria through their shells. They should be kept in a cool, clean place therefore, to prevent the entrance and development of bacteria.

Milk.—Milk is the most easily digested form of proteid food. It contains all the ingredients necessary to maintain life.

In diseases in which a large amount of nourishment is not required, sufficient can be obtained from milk alone; but, owing to the excess of water in its composition, it would have to be taken in too large quantities by those leading an active life. When milk is skimmed, the proportion of fat is, of course, greatly reduced, but the protein remains about the same. Casein is the most indigestible constituent of the milk. When curds are present in the stools, it shows that the casein is not being properly digested. It is then often removed by clotting milk with rennet and straining off the whey. The whey contains the lactalbumin and salts. At other times, lime water, barley water, or aerated waters are added to the milk. The first works by rendering the reaction of the milk so intensely alkaline that it is not easily curdled; the
last two prevent this hard curdling by separating the particles of casein.

Non-Nitrogenous Foods

The non-nitrogenous foods are: Carbohydrates, fats, minerals, water.

Carbohydrates.—Carbohydrates consist of carbon, hydrogen, and oxygen. They liberate heat and muscular strength, and, being easily oxydised, they save the tissue from consumption.

There are three classes of carbohydrates: amyloses, glucoses, and sucroses. The amyloses include starch, dextrine, cellulose, gums, and glycogen; the glucoses, dextrose and levulose; the sucroses, cane sugar, lactose, and maltose.

Food plants are classed under four heads: (1) cereals, of which the seeds are used—rice, wheat, rye, and barley; (2) legumins, or pod plants—peas, beans, and lentils; (3) roots and tubers—potatoes, arrow-root, sago, etc.; (4) green vegetables—lettuce, spinach, etc.

The legumins contain the most protein of any of the vegetables. They also contain a fair amount of starch and are richer in salt than cereals, but a large proportion of cellulose renders them indigestible, and as they contain sulphur their use in excess will cause flatulence.

Roots and tubers are chiefly valuable for their starch and salts. They also contain sugar, pectine (or vegetable jelly), and vegetable acids.

Green vegetables hold very little nutrient, but are valuable for their salts.

The value of fruit as a food lies in its sugar, free acids, and salts.
Nuts contain a large per cent. of fats. This and a large amount of cellulose render them hard to digest.

Sugar.—The use of sugar must be limited, for it is very rapidly absorbed, and an excess causes an overloading of the system that may result in indigestion or derangement of the excretory organs. Cane sugar, especially, delays digestion and is irritating to the mucous membrane. Used in small quantities, however, sugar may take the place, weight for weight, of starch, as a generator of heat and muscular force; and as it is more quickly digested, it is to be preferred during unusually hard work. Its action is, however, more effervescent. Sugar is very valuable in tropical dietaries, where fat cannot be taken in any quantity.

Sugar is changed by the gastric juice into glucose and lactic acid. In disease, when the absorptive power of the stomach is diminished, sugar should only be taken in very limited quantities, since it is liable, if not quickly absorbed, to ferment in the intestines.

Fat.—Fat is the chief fuel ingredient of food, a pound of fat being more than the equivalent of two pounds of proteid or carbohydrate. It forms fatty tissue, but not muscular. The amount of fat required in the diet depends upon the amount of heat and energy required. Thus people in cold countries and those who do hard labour will digest and assimilate a larger amount of fat than people living in warm climates or those doing work that does not require the output of a large amount of energy.

Minerals.—When food is burnt, a varying amount of ash is left behind; this is the mineral matter or salts. These salts are very necessary for the well-
being of the body, since salts enter largely into the composition of all muscular and osseous tissue and are a very important constituent of the blood and other liquids. A lack of lime salts may result in rickets and malformation of the bones. A lack of iron may impoverish the colouring matter of the red blood corpuscles on which depends their power of carrying oxygen to the tissues, and this impoverishment may cause anæmia or other disorder of deficient oxydation. A lack of potash salts predisposes to scurvy, and a diminished supply of sodium chloride interferes with the process of digestion by changing the reaction and density of the gastric secretions.

These salts leave the body in large quantities in the excreta, and this daily loss must be made good by the food. When a deficiency of any one salt is obvious, food containing a large amount of the same should be given. Thus rare beef should be furnished in anæmia, because beef contains a larger amount of iron than any other foodstuff; potatoes in scurvy, because potatoes are rich in salts of potash; and similarly green vegetables and fruit are beneficial in the majority of blood diseases. The phosphates, which are chiefly needed for the solids of the body, are obtained from vegetable food, and the sodas and chlorides, which are principally required for the liquids of the body, from animal food.

**Water.**—A certain amount of water is necessary to proper digestion and metabolism. It acts as a solvent for food and accelerates tissue change. People who do not drink sufficient water are liable to have an accumulation of waste products continually in the system. The amount of water taken under ordinary circumstances, counting that of both solid
and liquid food, averages about four pints daily, while the average amount removed from the body by the kidneys, bowels, skin, and lungs, averages about four and one-half pints. The excess is formed within the system during the process of oxydation.

**Spices and Condiments**

Spices and condiments are very necessary food adjuncts. They stimulate, by their action on the mucous membrane of the stomach and on the organs of taste and smell, the secretion of gastric juice, and by improving the flavour, increase the appetite. Excessive use of condiments causes indigestion by over-irritation and stimulation of the secretory organs of the stomach.

The addition of sodium chloride is of particular importance, as it is from it that the stomach manufactures hydrochloric acid.

Flavouring extracts are volatile oils. They must therefore be kept tightly corked and, when possible, be added only at the completion of cooking.

**Beverages**

**Cocoa and Chocolate.**—Cocoa and chocolate, unlike coffee and tea, have a decided food value. Though stimulants, owing to the presence of theobromine, they are less apt to induce nervous symptoms than tea and coffee; but a large proportion of fat (cocoa contains about 28%, chocolate, 48-50%) renders them unsuitable for people with weak digestions. They are both made from the seeds of the cacao fruit. Chocolate is prepared by adding starch, sugar, and a flavouring extract to cocoa.
Coffee.—Coffee has a stimulant effect upon the system owing to the presence of caffein. Like tea, it contains tannin, though in a smaller quantity. If allowed to stand too long on the grounds, or if taken in excess, it will cause indigestion, and, in some people, insomnia and nervousness; otherwise, when properly made and taken in moderation, its action is rather beneficial.

A combination of one part Mocha to four of Java is about the most popular combination.

Tea.—Tea is made from a plant which grows chiefly in China, Japan, and India. There are two classes, black and green. There are many varieties of both black and green tea, all of which are obtained from the same plant, the finer and better teas being made from the small leaves and the coarser teas from the large ones. Black teas are fermented before drying, and green teas are not. As fermentation makes tannin less soluble, an infusion of black tea will contain less tannin than one of green.

Tea, owing to its active principle theine, is stimulating and refreshing, and by reason of the astringent action of the tannin on the tissues of the digestive organs it retards waste and digestion. It is therefore, when properly made, good for old people and for persons doing hard work, but it is bad for young children and for persons with weak digestion or nerves. As it retards digestion, tea should not be taken with, or soon after, a heavy meal.

The Digestion of Food

All food must undergo certain changes before it is ready for assimilation. This preparation is known as digestion; and digestion together with the assimila-
tion of the digested food, the consequent formation of new tissue, and the breaking down of old tissue is known as metabolism.

There are two processes of digestion, mechanical and chemical. The former consists of mastication, swallowing, the churning motion of the stomach, and the peristaltic action of the intestine.

Chemical digestion is due to the enzymes or ferments contained in the digestive juices of the body. The action of these ferments on the different food-stuffs is shown in the following table:

<table>
<thead>
<tr>
<th>Fluid</th>
<th>Ferment</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Saliva</td>
<td>Ptyalin</td>
<td>Turns starch to sugar.</td>
</tr>
<tr>
<td>Gastric juice</td>
<td>Rennet</td>
<td>Solidifies fluid proteid.</td>
</tr>
<tr>
<td></td>
<td>Pepsin</td>
<td>Turns proteids into peptones.</td>
</tr>
<tr>
<td></td>
<td>Invertine</td>
<td>Inverts cane sugar.</td>
</tr>
<tr>
<td>Pancreatic juice</td>
<td>Amylopsin</td>
<td>Like ptyalin.</td>
</tr>
<tr>
<td></td>
<td>Trypsin</td>
<td>Like pepsin in an alkaline medium; it transforms the peptones into leucin and trypsin.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ptyalin or Steapsin</td>
</tr>
<tr>
<td>Intestinal juice</td>
<td>Invertine</td>
<td>Inverts sucroses.</td>
</tr>
<tr>
<td></td>
<td>Proteolytic</td>
<td>Like pepsin and tyrosin.</td>
</tr>
<tr>
<td>Bile</td>
<td>Diastatic</td>
<td>Like ptyalin. Bile also emulsifies fats, acts as a disinfectant, and lubricates the intestinal walls.</td>
</tr>
</tbody>
</table>

The reaction of the saliva and pancreatic juice is alkaline; that of the gastric juice, acid. This acidity is due to the presence of hydrochloric acid, which is manufactured by the stomach from the sodium chloride eaten with the food.
Babies under eight months have very little ptyalin in their saliva; therefore starch must never be given them unless fully dextrinised.

To test for starch. Pour a little tincture of iodine on the substance to be tested; if the tincture turns blue, starch is present.

The absorption of food takes place mainly in the small intestines. The nutritive value of food is estimated by its degree of absorbability. The following table, taken from Bulletin No. 142 U. S. Dept. Agriculture, shows the average degree of the absorbability of the different foodstuffs.

<table>
<thead>
<tr>
<th>Food</th>
<th>Protein</th>
<th>Fat</th>
<th>Carbohydrates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meat and fish</td>
<td>97%</td>
<td>95%</td>
<td>98%</td>
</tr>
<tr>
<td>Eggs</td>
<td>97%</td>
<td>95%</td>
<td>98%</td>
</tr>
<tr>
<td>Dairy products</td>
<td>97%</td>
<td>95%</td>
<td>98%</td>
</tr>
<tr>
<td>Mixed diet:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Animal food</td>
<td>97%</td>
<td>95%</td>
<td>98%</td>
</tr>
<tr>
<td>Cereals</td>
<td>85%</td>
<td>90%</td>
<td>98%</td>
</tr>
<tr>
<td>Legumes (dried)</td>
<td>78%</td>
<td>90%</td>
<td>97%</td>
</tr>
<tr>
<td>Sugar</td>
<td></td>
<td></td>
<td>98%</td>
</tr>
<tr>
<td>Starches</td>
<td></td>
<td></td>
<td>98%</td>
</tr>
<tr>
<td>Vegetables</td>
<td>83%</td>
<td>90%</td>
<td>95%</td>
</tr>
<tr>
<td>Vegetable foods in</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>mixed diet</td>
<td>84%</td>
<td>90%</td>
<td>95%</td>
</tr>
<tr>
<td>Fruits</td>
<td>85%</td>
<td>90%</td>
<td>99%</td>
</tr>
<tr>
<td>Total food of mixed</td>
<td>92%</td>
<td>95%</td>
<td>97%</td>
</tr>
</tbody>
</table>

When the functions of the digestive organs are impaired, it is often necessary to predigest the food before it is eaten—i.e., to cause changes in it similar to those caused by the digestive ferments. These changes are obtained by heat and by chemically prepared ferments which have the same action as those of the digestive juice. Thus the casein of milk is coagulated by the action of rennet, a ferment ob-
tained from the stomach of calves; milk is peptonised by the use of pancreatin; cereals are dextrinised by the use of long-continued heat, by ferment, etc.

In using ferments, it is imperative to follow implicitly the directions given for their use. They will only act at certain temperatures; and if their action is not arrested at the right time (by raising the temperature of the food or by putting it on ice), the food will become too fully digested and so be rendered bitter.

It has been found by scientific research, that the various ferments of the body are not supplied in an unlimited degree. Therefore, if the body is to be properly nourished and all the food which is eaten is to be utilised, the proportions of the constituents—i.e., the protein, fat, and carbohydrates—must be properly balanced. (see page 473).

Bulletin No. 28 of the U. S. Dept. of Agriculture (which can be obtained by application to the Secretary of the U.S. Dept. of Agriculture) gives the relative per cent. of the protein, fats, carbohydrates and minerals in different foods, and the food value of the more important foodstuffs. There are also several charts and dietary computers on the market which give these quantities in grammes. With the aid of these, it is an easy matter to make out properly balanced menus.

**Rules Governing the Cooking of Food**

Many of the nutrient and digestible qualities of food are lost by improper cooking. In illness, both its digestion and absorption are liable to be retarded and imperfect. It is therefore very important, first, to avoid all possible loss of the nutrient con-
Food

stituents of any food, that the required amount of nourishment may be given in little bulk; and, secondly, to do everything to render it as nearly as possible ready for assimilation, that the digestive organs may be spared all unnecessary labour.

**Facts Regarding the Action of Heat, etc.—**
To fulfil these requirements, it is necessary to remember the following facts regarding the action of heat, acids, alkalies, etc. on the more common food-stuffs.

1. Albumen. Albumen is coagulated by heat (150°–170° F.), alcohol, and mineral acids. It is soluble in vegetable acids and cold water.

2. Casein. Casein is coagulated by all acids, by rennet, and, to a slight extent, by heat.

3. Legumin. Legumin is coagulated and hardened by salt.

4. Starch. Starch is dextrinised by heat and by certain ferments. It is soluble in water.

5. Sugar is inverted into glucose by heat and acids. Glucose is only half as sweet as sugar.

**Practical Application of Facts Regarding the Action of Heat, etc.—**
1. Albumen and albuminoids of a like nature are coagulated by heat, alcohol, and mineral acids. Albumen is soluble in cold water.

   *(a)* Milk. If milk is heated above 150° F., the lact-albumin (the most easily digested proteid substance of the milk) coagulates and forms in an indigestible scum on top of the milk. Much of the natural salts of the milk is collected in the forming scum and is thus also lost. It is the loss of these salts that renders sterilised and improperly Pasteurised milk objectionable for infant feeding. *(b)* Eggs. Egg albumen coagulates at a temperature of 170° F.
If the heat exceeds this to any great extent, the albumen is hardened and so rendered indigestible. Therefore, cook eggs slowly, do not boil them. (c) If meat is exposed to a high degree of heat for a few minutes, the albumin will coagulate and form a crust which will keep in the extractives, but, if the high degree of heat is maintained too long, the albumin will be hardened and the meat rendered tough. Therefore in boiling or roasting meat, expose it to a high degree of heat for a few minutes—eight to ten—to prevent the loss of extractives and consequent loss of flavour, and then lower the temperature to prevent the meat from becoming tough. In making stews or soups, never allow the heat to exceed 180° F., or the coagulation of the albumin will prevent the escape of the juice which is wanted in the soup and gravy of the stew. (d) Put cereals and vegetables into boiling salted water, while it boils, that the proteid may be coagulated and that consequent loss of it and of the salts may be prevented. As a further preventive, it is better to cook potatoes before peeling them. (e) Be careful when adding alcohol and mineral acids to eggs and milk or they will curdle. (f) Never let meat stand in water unless you wish to draw out the extractives, as in soups and stews. To wash meat, rub with a damp towel.

2. Casein is coagulated by acids and rennet.

Casein of milk is not always easily digested. The casein can be coagulated by the addition of acids or rennet, preferably the latter, and the whey strained from it. The whey contains the lact-albumin, salts, and water. It is necessary to remove the fat by skimming before putting in the rennet, as it interferes with the curdling of the casein.
3. Legumin is coagulated by salt.
When cooking peas, beans, and lentils, do not put salt into the water until they are soft. If the water is hard, neutralise by adding bichloride of soda.

4. Starch is dextrinised by heat and by ferments. It is soluble in water.

(a) Do not cook potatoes, which are rich in starch, too long or they will be waxy, owing to the conversion of the starch to dextrine. (b) Cereals should be partially dextrinised before being eaten. Therefore they should be cooked for a long time, especially for children, or the cooking should be replaced by the addition of some dextrinising ferment, such as diastase of malt. (c) Do not soak new vegetables in water, or there will be a loss of starch and salts. Old vegetables, having lost their water, will not lose their starch until a certain amount of water has been absorbed, and they are improved by soaking for from one to one and a half hours.

5. Sugar is inverted into glucose by heat. Glucose is only half as sweet as sugar.
As glucose is only half as sweet as sugar, the sugar is wasted if it is added to mixtures until they have nearly finished cooking. Of course, in many instances—as in baked puddings—this cannot be helped, but when possible add sugar only shortly before removing the substances from the stove.

Effect of Cooking.—1. Meat. Its connective tissue is softened, its flavour is improved, and the meat is rendered more palatable by the coagulation of the blood, etc. Germs are killed, and the nutriment is rendered more concentrated by the loss of a certain per cent. of water. A certain amount of fat and extractives are also lost, but a too great loss of the
latter will be prevented by proper cooking. 2. Vegetables and cereals. The cellulose envelopes surrounding the starch granules are softened and ruptured and the starch granules swell, forming, if properly cooked, a mealy paste. Cellulose in its natural state is too hard to be acted upon properly by the digestive organs of the body.

**Infant Feeding**

**Modifications of Milk.**—The two first considerations in the preparation of milk for infants are the capacity of the stomach and the nature of the milk.

**Capacity of the Stomach:**

Third to seventh day .................. $1 \frac{1}{2} - 1 \frac{1}{2}$ oz.
Second to third week .................. $1 \frac{1}{2} - 2 \frac{1}{2}$ "
Fourth to fifth week .................. $2 \frac{1}{2} - 3$ "
Sixth week to third month ........... $3 - 4 \frac{1}{2}$ "
Third month to fifth month .......... $4 - 5 \frac{1}{2}$ "
Fifth month to ninth month .......... $5 \frac{1}{2} - 7$ "
Ninth month to twelfth month ...... $7 \frac{1}{2} - 9$ "

The smaller the amount of the feedings, the more frequently they must be given. Thus, from the third day to the end of the fifth week, they are given every two hours from 6 A.M. to 10 P.M., and every two and one-half hours during the night; from the sixth week to the third month, every two and a half hours during the day, but only once between 10 P.M. and 6 A.M.; from the third to the ninth month, every three hours during the day, but not at all after 10 P.M.; from the ninth to the twelfth month, every three and a half hours during the day, but not at all after 10 P.M.

**Nature of the Milk.**—The milk given infants must not only contain the same constituents, but must have these constituents in the same proportions
as human milk. The difference between the percentages of the constituents of human milk and cow's milk can be seen in the following table:

<table>
<thead>
<tr>
<th>Human Milk</th>
<th>“Certified Cow’s Milk”</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fat</td>
<td>4.00%</td>
</tr>
<tr>
<td>Sugar</td>
<td>7.00%</td>
</tr>
<tr>
<td>Protein</td>
<td>1.50%</td>
</tr>
<tr>
<td>Salts</td>
<td>0.20%</td>
</tr>
<tr>
<td>Water</td>
<td>87.00%</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Protein</td>
<td>4.00%</td>
</tr>
<tr>
<td>Salts</td>
<td>0.70%</td>
</tr>
<tr>
<td>Water</td>
<td>84.00%</td>
</tr>
</tbody>
</table>

Changing the proportions of the constituents of cow's milk to those of human milk, is called "modifying milk."

Human milk undergoes a slow but continual change during the months of lactation. Therefore in modifying milk the child's age is taken into consideration, and a corresponding change is made in modified milk thus:

<table>
<thead>
<tr>
<th></th>
<th>Fat</th>
<th>Sugar</th>
<th>Protein</th>
<th>Milk</th>
<th>Lime</th>
<th>Water</th>
<th>Milk</th>
<th>Sterile water q. s. to make</th>
</tr>
</thead>
<tbody>
<tr>
<td>3-7 days</td>
<td>2.0</td>
<td>6.0</td>
<td>0.60</td>
<td>1 oz.</td>
<td>1 oz.</td>
<td>4 oz. 10%</td>
<td>20 oz.</td>
<td></td>
</tr>
<tr>
<td>1-4 weeks</td>
<td>2.5</td>
<td>6.0</td>
<td>0.70</td>
<td>&quot;</td>
<td>&quot;</td>
<td>5</td>
<td>&quot;</td>
<td></td>
</tr>
<tr>
<td>1-3 months</td>
<td>3.0</td>
<td>6.0</td>
<td>1.00</td>
<td>&quot;</td>
<td>&quot;</td>
<td>6</td>
<td>&quot;</td>
<td></td>
</tr>
<tr>
<td>3-4</td>
<td>3.5</td>
<td>6.0</td>
<td>1.25</td>
<td>&quot;</td>
<td>&quot;</td>
<td>7</td>
<td>&quot;</td>
<td></td>
</tr>
<tr>
<td>4-6</td>
<td>4.0</td>
<td>6.0</td>
<td>1.50</td>
<td>&quot;</td>
<td>&quot;</td>
<td>8</td>
<td>&quot;</td>
<td></td>
</tr>
<tr>
<td>6-9</td>
<td>4.0</td>
<td>7.0</td>
<td>2.00</td>
<td>2 oz.</td>
<td>&quot;</td>
<td>11</td>
<td>7 &quot;</td>
<td></td>
</tr>
<tr>
<td>9-12</td>
<td>3.0</td>
<td>6.5</td>
<td>2.50</td>
<td>&quot;</td>
<td>15</td>
<td>4 &quot;</td>
<td>4 &quot;</td>
<td></td>
</tr>
</tbody>
</table>

1 Cow's milk varies considerably in the relative quantity of its constituents, especially in the proportion of fat. Certified milk, i. e., milk inspected according to law, calls for the above amount of fat and for not more than 40,000 non-pathogenic bacteria to the c. c. Certified milk should be used in the preparation of infant food.

2 To obtain 10% milk, take the upper 10 oz. off the regular quart bottle in which the certified milk is sold.

3 To obtain 7%, take the upper 16 oz.

4 To obtain 4%, use the whole milk as it comes. (Mix cream and milk thoroughly.) It is, of course, the fat or top milk which is used for the prescriptions.
The best way to remove the cream from the milk is to take off the first ounce with a teaspoon and the remainder with a Chapin milk dipper. These dippers are very inexpensive and can be bought at any drug store.

The reaction of the cow's milk is alkaline when first drawn, but it very quickly becomes acid, while human milk does not.

Lime water is used to counteract this acidity of the cow's milk.

Barley water is often used instead of the sterile water; it not only gives additional nourishment, but, owing to its mucilaginous nature, it keeps the casein from coagulating in hard curds. It must be dextrinised fully, before being added to the milk. To dextrinise pearl barley, it is necessary to boil it at least two hours; and prepared barley, such as "Robinson's Patent Barley" which is frequently used, from thirty to forty minutes. Many doctors advocate the addition of a dextrinising ferment.

The child's age is not always an accurate guide for its feeding. If the child loses in weight, vomits, has colic, or if its stools are in any way abnormal, the probabilities are that its food is not in right proportion.

If the child loses or does not gain in weight, the probabilities are that it is not getting sufficient sugar.

If it has colic, or green, acid, watery stools, that it is getting too much sugar.

If there are frequent vomitings and diarrhoea,
with small lumps of fat in the stools, that it is getting too much fat.

If it is troubled with constipation, that it is getting too little fat.

Curds in the stools, colic, diarrhoea, and vomiting indicate too much protein.

**To Prepare the Milk:**

Dissolve the milk sugar in the lime water, add the milk slowly, then add the sterile, or barley, water.

After mixing the milk, pour the quantity required for each feeding into a separate bottle, using a funnel. Plug the bottles with sterile non-absorbent cotton, and, unless the milk is Pasteurised, put them immediately in the ice-box.

To Pasteurise the milk when no regular apparatus is to be had: Place the bottles (having one extra one) in a wire or other basket, and put this in a saucepan of cold water with a saucer or piece of wood under it. Bring the water to such a temperature that the milk in the bottles is raised to 150°. Keep the milk at that temperature for thirty minutes. Always put the thermometer in the same bottle and throw the milk in that away.

Cool the milk rapidly\(^1\) by putting the bottles in lukewarm running water and reducing the temperature of this with ice, as quickly as possible without breaking the bottles. Keep it in the refrigerator. Warm the milk by putting the bottle in warm water to 100° F., before giving it to the child. See that he gets it and takes it while it is warm.

\(^1\) Pasteurising milk kills the germs but not the spores. If the milk remains warm for any length of time the latter will develop. The bottles should never be put immediately in the ice-chest, since the too sudden change of temperature changes the composition of the milk.
Practical Nursing

Pasteurised milk is not as frequently used as formerly, especially where it is possible to get "inspected milk."

When the milk is not to be Pasteurised, it is a wise precaution to sterilise the milk bottles before filling them; and the necessity of having the room in which the milk is prepared, and everything used in its preparation (including the worker's hands), absolutely clean and free from dust is increased tenfold.

After milk bottles have been used, rinse them immediately in cold water, and wash in soda or borax and hot water, using a bottle brush. Rinse the nipples in cold water, put them on the fingers, and scrub with soap and water. Then turn them inside out, and scrub the inside parts in like manner. The rest of the treatment of the nipples differs in different institutions.

The following are the most common methods of procedure:

1. Have an individual nipple for each child, and keep, between use, in a mug of boric acid.

2. After use, boil each nipple for three minutes in salt solution.

3. Have a sufficient number of nipples, to last twelve hours, dry them after washing, and keep them in a clean jar. Boil them all at the same time and either put them into a jar of boric acid, or dry them with sterile towel and keep in a dry, sterile, air-tight jar.

To determine whether the hole in the nipple is the proper size, hold the bottle upside down. If the nipple is in good order, the milk flows through, drop by drop. If the hole is too small, make it larger.
by puncturing with a sewing needle which has been heated until the point is red. Never use a nipple in which the hole is too large.

**The Serving of Food**

Some of the chief points to be considered in the serving of meals are:

1. To see that the dishes are clean, whole, in proper position on the tray, and that the latter is made to look as attractive as possible. A certain amount of appetite and excretion of the digestive juices are necessary for proper digestion and these can be excited, to some extent, by pleasant odours and by an attractive and appetising appearance in the food. On the other hand, badly served food will, by disgusting the patient, destroy his appetite, and interfere with the digestion of the meal.

2. Never serve too large an amount of food at one time, especially when the patient's appetite is poor. Not only does the sight of too much food often take away the little appetite he may have, but food served in small quantities and often, will be digested better, when the functions of the digestive organs are impaired than larger amounts taken at longer intervals.

3. Serve everything intended to be hot, hot, and cold things, cold. The serving rooms of the majority of modern hospitals are now equipped with steam tables, so that there is (in such, at any rate) no excuse for cold meals being served. Nurses, however, occasionally forget to turn on the steam, leave the windows open while preparing their trays, put the hot food on the trays before the cold, or use cold dishes. Such blunders are unpardonable. The food is often taken to the patient while he is receiving
treatment and is not given him till the treatment is finished. He may also be obliged to wait for his food until a helpless patient who must he helped to eat has been given his. Miscalculations of this sort are likewise unpardonable.

In feeding a patient, always fold a table napkin or towel under his chin. When giving liquids, raise his head slightly by slipping your arm under the pillow, but be careful not to throw his head forward on his chest, since this makes it difficult for him to swallow. Hollow glass tubes—drinking tubes—are superior, unless the patient is very weak, to the old-fashioned feeding cups for administering liquids. These tubes can easily be bent to any angle after they have been heated slightly. They should always be washed immediately after use. When a patient is delirious, it is often advisable to give him even his liquids with a teaspoon.

**Diet in Disease**

**Anaemia.**—In anaemia and other blood disorders, the diet should be particularly easy of digestion and rich in salts. Milk, eggs, rare beef, sweet fruit, and articles of a like nature should therefore be liberally supplied.

**Cardiac Disease.**—In cardiac disease, it is generally necessary (especially when there is œdema) to limit the liquids in the diet, an excess giving the heart extra work to do and providing more fluid to escape into the tissues. Fats and carbohydrates must also be limited, as, under the existing conditions, they have a tendency to produce flatulence. It is very essential that all food should have a high nutritious value. This is, of course, particularly imperative
when it becomes necessary to put the patient on a liquid diet. Some physicians then order the milk fortified with such substances as albumin plasmon, milk sugar, and meat extract.

**Constipation.**—In constipation, food likely to irritate and stimulate the intestinal tract should be given. Examples: oatmeal, wheaten grits, whole wheat bread, vegetables, and fruit. Plenty of water should be drunk. Fatty meats, pastry, eggs, and milk puddings should be avoided.

**Diabetes.**—In diabetes, owing to the incapacity of the system to assimilate sugar, all sugar and starch, as far as possible, must be withheld from the diet. Fats, however, being the other factor in the production of heat and energy should be given in larger amounts than usual, if the patient can digest them.

**Foods Allowed in Diabetes.**—The following foods are allowed in diabetes: meat soups and broths which are not thickened with any farinaceous substances; beef tea; all kinds of fish, meat, game, and poultry; eggs, gluten, almond and bran bread and cakes; string beans, green vegetables, tomatoes, mushrooms, oyster plant, radishes, pickles, and onions; custards, jellies, creams, walnuts, almonds, filberts, Brazil nuts, cocoanuts, pecans, cherries, currants, strawberries, lemons, tea and coffee. All sweetening must be done with saccharine.

**Foods to be Avoided in Diabetes.**—The following foods should be avoided: liver, sugar, starches of any kind, beets, potatoes, carrots, turnips, peas, all fruit and nuts except those mentioned above, pastry, puddings, and sweet or sparkling wines and cordials.

**Diarrhoea.**—Food that will be nearly, if not entirely digested in the stomach is required in the first stages
of dysentery and diarrhoea. Therefore all solid food is forbidden, and even beef tea and meat broths must be given sparingly, arrowroot, gruel, milk soups, barley water, and albumin water being preferable. As the symptoms abate, the diet can be slowly increased by the addition of farinaceous foodstuffs, scraped beef, broiled steaks, etc., but all rich foods and foods likely to irritate the intestinal tract, such as are purposely given in constipation, should be avoided.

Dyspepsia.—The most common causes of dyspepsia are: other diseases; food taken in large quantities, in improper proportions, at too frequent intervals, or too hastily swallowed; food that is in itself indigestible, or that has been rendered so by improper cooking or by being too highly seasoned. These errors must of course be guarded against in the treatment. Food must be taken in small quantities, at regular hours; it must be well masticated, before being swallowed, and only such as can be easily digested must be allowed. All rich or highly seasoned dishes, fat meats (such as pork, goose, duck), all "cooked over" meats, or pickled meats and fish, fried food, game, crabs, lobsters, sausages, candies, and articles of a like nature are to be avoided.

The following table of the comparative digestibility of food is given by several writers. The articles are mentioned in the order of their digestibility, beginning with that which is most so.

1. Oysters.
2. Toast.
4. Bread cereals and milk pudding.
5. Sweetbreads.
Food

6. Whitefish, broiled or boiled.
7. Chicken, boiled or broiled.
8. Lean roast beef or steak.
9. Eggs scrambled or omelet.
10. Mutton, roasted or boiled.
11. Squab, partridge, bacon.
12. Roast chicken, capon, turkey.
13. Tripe, brains, liver.
15. Chops, mutton or lamb.
17. Veal.
18. Ham.
19. Duck, snipe, venison.
20. Rabbit.
22. Herring.
23. Roast goose.
24. Lobsters, crabs.
25. Smoked, dried, or pickled fish and meat.

Fever.—Fever is characterised by excessive tissue waste, diminished secretion of hydrochloric acid, and lessened peristaltic action. The dietetic treatment therefore must aim at supplying sufficient nourishment to save too great tissue-waste; but in a form that will be digested easily and quickly, and absorbed as completely as possible. There should be a certain percent. of nitrogen in the diet and an abundance of liquid, that the thirst may be relieved, and the kidneys may be flushed of the excessive waste matter produced by increased metabolism. Milk answers these requirements better than any other food, and should, therefore form the bulk of feeding in fever. Meat extracts and broths may, in most cases, be given
occasionally, when variety is desired; but, as has been already stated, they contain little nourishment. Tea and coffee may be given sometimes, but should be avoided when there is restlessness or insomnia. The use of tea is particularly counterindicated when there is any tendency to indigestion.

In convalescence, solid food must only be resumed gradually. This is especially true of typhoid fever, since in this disease the intestinal tract, even for some time after the temperature has reached normal, is the seat of a slowly healing ulcerative and inflammatory process, which food that has escaped gastric digestion may irritate. Oysters, eggs, and well cooked farinaceous food are the first solids allowed. When meat is first given, it should be shredded, as it is thus rendered easier to digest.

**Nephritis.**—Nitrogenous waste being eliminated by the kidneys, proteid food should be limited in nephritis. Meats must at all times be given sparingly, and during acute attacks they should be entirely withheld. Otherwise, not only will the kidneys be given extra work, but their failure to perform that which has been given them to do will cause a clogging of the system with the waste product of nitrogen—urea. To avoid this, a milk diet is generally given during the height of an acute attack, and during convalescence and in chronic cases, such articles as are contained in the following list:

Vegetable, farinaceous, and fish soups; boiled or broiled fresh fish, raw oysters, clams, chicken, game, fat bacon, cereals of all kinds, cereal and milk puddings, stewed and raw ripe fruits. Tea and coffee are allowed, if taken in small quantities and weak.

**Phthisis.**—Rich, but easily digested and not too
highly seasoned, food should be given in all forms of tuberculosis. If there are pronounced dyspeptic or febrile symptoms, the diet must consist of milk, or milk and raw eggs. At other times, cream, fresh butter, oil salad dressings, bacon, custards, milk puddings, cocoa, chocolate, rare beef steak, potatoes, and green vegetables are all valuable articles of diet.

RHEUMATISM.—Owing to the excess of acid in the system in this disease, those foods likely to generate acid in the course of their digestion, must be avoided. Of this class are the sugars and the red meats. All rich or highly seasoned food must also be withheld from the diet.

The following diet is allowed in rheumatism: mutton and chicken broth and beef tea, in small quantities; raw clams, oysters, boiled fresh fish, chicken sweetbread, broiled bacon; whole wheat, corn or brown bread, toast, arrowroot, rice, green vegetables, fruits—except strawberries and bananas. All sweetening should be done with saccharine.

RICKETS.—Rickets being due to a lack of fat and proteid food, starchy foods should be avoided. To young babies who are bottle-fed, give properly prepared milk. Avoid condensed milks and patented foods. To older children, give beef tea, mutton broth, eggs, milk, and fresh fruit juice, especially orange juice. If the child is old enough to have meat, give rare meat and vegetables.

SCURVY.—Scurvy is due to a lack of salts in the food. Therefore give fruit juices, especially lemon and orange fruit, fresh vegetables, and meat.
CHAPTER XXV

MASSAGE

The "Swedish movement cure" was introduced into Sweden, in 1813, by Peter Henrik Ling, and was revised, in 1860, by Mezger of Amsterdam. The movements which they practised and taught were not original. Their fundamental principles were the same as those described in Chinese writings three thousand years earlier; the same as those used by the Brahmins of India, by the Egyptian priests, by Hippocrates, Galen, Rufus of Ephesus, and other physicians of ancient Rome and Greece, and by Hoffman and other noted physicians of the Middle Ages.

To be an expert masseuse requires a thorough knowledge of anatomy, and constant practice. The limited number of lessons in massage generally included in the curriculum of a nurse's course does not fit her to undertake the treatment of severe cases. The object of these lessons is simply to teach those elementary movements of massage which enter largely into the treatment of nervous diseases and of diseases requiring stimulation of the circulation, and which are employed where ankylosis of the joints is liable to complicate accident or disease.

Before taking up the study of massage, it is neces-
sary to have a general idea of the anatomy of the body, to know the position of the bones, the origin and insertion of the principal muscles, and the location of the larger arteries, veins, and nerves, and their functions.

Medical gymnastics, known variously as "Swedish movements," "movement cure," etc., is "a systematic exercise of the muscles and other tissues of the body for therapeutic purposes."

Some authors make a distinction between Swedish movements and massage, including under the former class the active movements, and under the latter the five primary passive movements. Others class all movements, both active and passive, under the heading of "medical gymnastics," thus:

**Medical Gymnastics**

**Passive Movements.**

1. Effleurage or stroking
2. Friction or rubbing
3. Petrissage or kneading
4. Tapotement or percussion
5. Pressure

**Passive Movements.**

6. Vibration
7. Circumduction
8. Rotation
9. Flexion
10. Extension

**Active Movements.**

1. Assistive
2. Single
3. Resistive

Points to be Remembered

Massage must never be given without a doctor's order. Its use is counterindicated in all inflammatory conditions associated with pus, in skin diseases, diseases accompanied with a rash, or parasitic diseases.
Before beginning a treatment, place the patient in a comfortable position, and sit in a comfortable position yourself, neither too far away from him nor too near him.

Always wash your hands before and after a treatment.

Lubricants may be used if desired, but, unless ordered for therapeutic purposes, are not necessary unless the skin is very dry. If the skin is moist it is often desirable to employ talcum powder.

In beginning a manipulation, use moderate force, increase the force gradually, and then, toward the end of the movement, decrease it as gradually.

Begin and end all treatment with effleurage.

Local treatment is given for from ten to twenty minutes.

General treatment is given for from half an hour to one hour.

Before giving local massage, loosen all bands around the part to be manipulated, and give effleurage and petrissage to the adjacent parts between it and the heart.

Always give effleurage, petrissage, and friction directly on the skin.

In general massage, the patient should wear a loose gown.

Never expose your patient.

Carry out a general treatment in the following order: feet, legs, arms, chest, abdomen, back.

Effleurage.—Effleurage is given from the periphery toward the heart. It may be given with the palms of one or both hands, or with the cushions of the fingers or thumbs.
The superficial circulation is improved.
Exudations are pushed along in the capillaries.

**Effects.**
The cutaneous nerves are soothed by light effleurage given for a short time, but are irritated by prolonged treatment.

Effleurage is given at the beginning and ending of all treatments.

**Friction.**—Friction is given with the heel of the hand, the cushion of the thumb, or the fingers. To give friction, make small successive circles over the prescribed area without moving the skin, exerting considerable pressure when not too painful. Always follow friction with effleurage.

The inflammatory products are broken up and moved on into the veins and lymphatics, thus hastening absorption.

**Effects.**
Local circulation is stimulated.

**Petrissage.**—Petrissage, or kneading, can be done with one hand or both hands, with the cushions of the fingers or of the thumb. The muscles are stretched away from the bone in the direction of the venous current, and the blood-vessels are alternately emptied and refilled by the alternate pressure and relaxation of the operator's hand while performing the movement.

In giving petrissage begin above and work downward.

Never allow the hand to move on the skin. When one grasp of the muscle is thoroughly kneaded, relax the hand and take a new grasp, including a portion of the former one.

Use both hands whenever possible,
Make the greatest pressure while moving the muscle in the direction of the venous current.

**Effects.**
- The circulation is improved.
- Blood pressure is diminished.
- Mental activity is lessened.
- The absorption of waste products is hastened.
- Nerves and muscles are strengthened.
- Swellings and effusions are reduced.
- Gentle petrissage stimulates tissue growth.
- Hard petrissage lessens tissue growth.

**Tapotement.**—Tapotement, or percussion, may be given with the ulnar edge of the hand, the palm of the hand, the tips of the fingers, or the closed hand. It is known, according to the method employed, as ulnar, palmar, digital, or fistic percussion. It may be given with one hand or both hands, and the application of the latter may be alternated or simultaneous.

- Ulnar percussion is generally used upon the back.
- Palmar (simultaneous), on the extremities.
- Fistic (either alternate or simultaneous), on the glutei.
- Digital (either alternate or simultaneous), on the head.
- Moderate percussion causes contraction of the blood-vessels.
- Moderate percussion increases the irritability of the nerves.
- Moderate percussion applied across muscles increases their contractibility.

**Effects.**
- Prolonged percussion causes the dilatation of the blood-vessels.
- Prolonged percussion causes temporary paralysis of the nerves.
- Prolonged percussion applied across muscles will loosen contraction.

**Pressure.**—Pressure is given with the cushion of
the fingers or with the knuckles, and usually follows the course of nerves or vessels.

**Effects.**

- Pressure is sedative in neuralgic pains.
- Pressure causes local paralysation of muscle.
- Pressure causes secondary increase of circulation.

Pressure should only be used by those thoroughly instructed in anatomy.

**Vibration.**—To give vibration, grasp the part to which vibration is to be given between the hands, fix your arms firmly and hold them stiffly, producing a tremor in them which will be transmitted to the part of the body between your hands.

**Effects.**

- Vibration produces stimulation in palsies.
- Vibration acts as a counter-irritant.
- Vibration produces changed nutrition.

**Circumduction.**—Circumduction may be either passive or active.

In circumduction, "some part of the body is made to describe with its longitudinal axis the surface of an imaginary cone." The circle is made as large as the joint permits. Large limbs are moved slowly, small ones more quickly.

**Effects.**

- Blood is drawn from the moving extremity.
- Absorption is increased.
- Tendons, etc., are made more pliable.
- Articular adhesions are broken up.

**Rotation, Flexion, etc.**—The names describe the movements. The effects are those of assistive or resistive movements in a less marked degree.

**Active Movements.**—Active movements are either single, assistive, or resistive.

Single movements are those performed by the patient and constitute the movements of educational gymnastics.
In assistive movements the operator helps the patient.

In resistive movements the operator resists the patient.

These movements should be given slowly and evenly.

**Effects.**

- Co-ordination is increased.
- The circulation is improved.
- Absorption is hastened.
- Metabolism is improved.
- Nutrition is improved.
- Adipose tissue is lessened.
- Muscular tissue is hardened.
- Adhesions are broken up.
- Joints are made more pliable.
GLOSSARY

Abduct, to draw from the median line.
Abductor, a muscle that draws from the median line.
Abortion, the expulsion of an immature foetus.
Acme, the crisis or highest point of a disease.
Acne, a popular eruption due to the retention of secretion in the sebaceous glands.
Acoustic, pertaining to sound, hearing, or the ear.
Acute Disease, a disease of short duration.
Adduct, to draw toward the centre.
Adduction, movement toward the centre.
Adductor, a muscle that performs adduction.
Aden, a gland.
Adenitis, inflammation of a gland.
Adenoid, an adenoma or glandular tumour.
Adhesion, the adhering of two surfaces.
Adipose, fatty tissue.
Adiposis, fatty degeneration, corpulence.
Adnexa, appendages.
Adnexa Uteri, the Fallopian tubes and ovaries.
Adolescence, the period between puberty and full maturity.
Adrenal, near the kidney, the suprarenal capsule.
Ærobia, organisms which require air or oxygen to maintain life.
After-birth, the placenta and membranes.
Agar-agar, a gelatinous substance made from a seaweed found on the coast of China and Japan.
Agent, any power or substance that is capable of producing changes in the body.
Agglomerate, a mass.
Agglutination, the adhering or joining together, as of the edges of a wound.
Aggregate, formed in clusters.
Ague, malarial or similar fever.
Albumen, the white of egg.
Albumin, one of the most important proteid substances.
Aleukemia, a deficiency of the proportion of white corpuscles in the blood.
Alienation, mental derangement.
Alienist, a physician who is an expert in the treatment of mental diseases.
Aliment, food.
Alimentary, having the property of nourishing.
Alkali, substance which in combination with acids will form salts, and with fats, soaps.
Alkaline, having the reaction and properties of an alkali, (An alkaline substance will turn red litmus paper blue.)
Alkaloid, an alkaline base of vegetable origin.
Amoeoba, an embryonic cell.
Amenorrhoea, absence or irregularity of the menses.
Analgesia, loss of sensibility to pain.
Analogous, being similar in certain particulars.
Analysis, the separation of a body into its elements.
Anaemia, a deficiency in the amount of hemoglobin or of red blood corpuscles in the blood, or in the amount of blood.
Anaesthesia, loss of feeling or sensation.
Aneurysm, a sac formed in the walls of an artery by dilatation.
Angioma, a tumour composed of blood-vessels.
Ankylosis, abnormal union of the bones of a joint.
Aphasia, defect of the power to understand spoken or written language or to express thoughts by such means.
Aphonia, a loss of voice not due to a central lesion.
Arthritis, inflammation of a joint.
Ascites, an accumulation of serous fluid in the abdominal cavity.
Asepsis, free from septic matter.
**Glossary**

**Ataxia**, a lack of muscular coordination.
**Atony**, general debility.
**Atrophy**, the wasting of a part from defective nutrition.
**Auditory**, pertaining to the sense or organs of hearing.
**Aura**, a phenomenon that precedes epileptic attacks.
**Auricular**, pertaining to the ear.

**Base**, the fundamental part of any substance. The non-acid part of a salt.
**Beaker**, a wide-mouthed glass vessel.
**Benign**, not malignant, mild.
**Binocular**, pertaining to both eyes.
**Bougie**, an instrument used to dilate the urethra and other canals.
**Bubo**, an inflammatory swelling of a lymphatic gland.

**Calculus**, a stone-like concretion occurring in the body, usually composed of mineral salts.
**Callous**, hard, like callus.
**Callus**, the plastic exudate which occurs between the ends of a fractured bone.
**Camisole**, a jacket used for restraint.
**Cannula**, a needle-like tube used for aspirating.
**Capsule**, a soluble case in which medicine is enclosed, a fibrous or membranous envelope enclosing a part, as the kidney or spleen.
**Concentric**, having a common centre.
**Crepitus**, a grating, crackling sound.
**Crisis**, the turning point of a disease.
**Cuticle**, the epidermis or outer skin.
**Cutis**, the derma or true skin.
**Cyst**, a sac containing a liquid or semisolid.
**Cystalgia**, pain in the bladder.
**Cystitis**, inflammation of the bladder.

**Dermatitis**, inflammation of the derma.
**Diagnosis**, the distinguishing of one disease from another.
**Diaphoretic**, an agent that increases the perspiration.
**Diastase**, a ferment contained in malt, which converts starch into dextrose.
**Diathesis**, a predisposition to certain diseases.
**Dyspnæa**, difficult or laboured breathing.
Eccentric, peculiar, proceeding from a centre.
Ecchymosis, an extravasation of blood into the tissue.
Efferent, conveying impulses from a nerve centre, and blood, serum, etc., from a part.
Effusion, the escape of fluid into the tissues or cavities of the body.
Embolism, the plugging of an artery or vein by an embolus.
Embolus, a blood-clot or other plug brought by the blood-current from a distant vessel and obstructing the circulation.
Emetic, any agent that causes vomiting.
Emollient, an agent that softens or sooths.
Emphysema, swelling or inflation of the tissues by air or other gases.
Empyema, an accumulation of pus in the pleural cavity.
Endemic, peculiar to or prevalent in a certain locality.
Epithelioma, a malignant growth of the skin.
Epithelium, the outer covering of the skin and mucous membranes.
Erythema, a morbid redness of the skin.
Exacerbation, increased severity of a disease.
Extravasation, an escape, as of blood, from a vessel into the tissues.

Follicle, a small secretory or excretory sac or gland.
Fomes, any porous substance that absorbs contagion.

Gastric, pertaining to the stomach.
Genital, relating to the organs of generation.
Gravity, the property of possessing weight.

Hæmatoma, Hematoma, a tumour containing blood.
Hæmaturia, Hematuria, blood in the urine.
Hæmoglobin, Hemoglobin, the colouring matter of red corpuscles.
Hæmoptysis, Hemoptysis, the spitting of blood.
Hæmorrhoid, Hemorrhoid, a small vascular tumour at the anus.
Hæmostatic, Hemostatic, an agent that arrests hemorrhage.

Hepatic, relating to the liver.
Glossary

Hyperbiophy, the abnormal enlargement of an organ or part.

Hypnotic, an agent that causes sleep.

Impacted, driven firmly in.

Incipient, the beginning.

Induration, the abnormal hardening of a tissue or part.

Inertia, inactivity, sluggishness.

Infarct, an obstruction.

Infiltrate, the accumulation of abnormal substances in a tissue.

Inflation, distention.

Inhibit, to restrain.

Innoxious, harmless.

Inoculation, the insertion of a virus into the system.

Insolation, treatment by exposure to the sun. Sunstroke.

Interstitial, situated in the interspaces of a tissue.

Lacerated, torn.

Lesion, change in the structure of the tissue as the result of injury or disease.

Lymph, a transparent liquid of alkaline reaction contained in the lymphatics.

Lymphatics, small tubes which permeate the body and convey lymph.

Malignant, virulent, fatal.

Malaise, a feeling of indisposition.

Metabolism, the changes, constructive and destructive, that take place in the cells composing the tissues of the body.

Miasma, a noxious exhalation or emanation.

Monoplegia, paralysis of a single part.

Morbid, diseased.

Motile, having a spontaneous but not conscious movement.

Mucous, having the nature of mucus.

Mucous Membrane, the membrane that lines the cavities and canals of the body which connect with the open air.

Mucus, the viscid watery secretion of the mucous glands.

Myelitis, inflammation of the spinal cord.

Myositis, inflammation of a muscle.
Narcotic, a drug that will both produce sleep and allay pain.
Necrosis, death of a tissue, especially bone.
Neural, pertaining to the nerves.
Oclusion, the state of being closed.
Œdema or Edema, accumulation of watery liquid in the cellular tissue.
Osteitis, inflammation of the bone.
Osteomyelitis, inflammation of the bone-marrow.
Periostitis, inflammation of the periosteum.
Peritonitis, inflammation of the peritoneum.
Petechia, a small spot under the skin caused by the effusion of blood.
Phlebitis, inflammation of a vein.
Pigment, colouring matter.
Plasma, the fluid portion of the blood and lymph.
Pledget, a small compress of lint or other soft substance.
Prognosis, the prediction of the course and termination of a disease.
Pruritis, intense itching.
Remittent, a fever characterised by periods of abatement and exacerbation.
Rhinitis, inflammation of the mucous membrane lining the nose.
Sarcolemma, a delicate membrane which invests muscle fibre.
Segment, a small piece.
Septic, due to putrefaction.
Serum, the fluid constituent of any animal liquid.
Sinus, a cavity or space.
Spasm, a sudden rigid muscular contraction.
Specific, peculiar to, special.
Stasis, a stoppage of the blood-current in any part.
Stenosis, a narrowing or constriction of a duct or canal.
Stricture, the narrowing of a duct or tube.
Stridulous, a harsh grating sound.
Styptic, any astringent drug that will check hæmorrhage.
Sublimate, the product of vapourisation and recondensation.
Sudor, sweat.

Thrombus, a plug or clot in a vessel which remains at the point of formation.

Tinnitus, a ringing in the ears.

Torsion, twisting.

Torticollis, a contracted condition of the cervical muscles.

Traction, drawing or pulling.

Tremor, an involuntary trembling of the body.

Tympanites, a distention of the abdomen due to the presence of gas or air in the intestines or peritoneal cavity.

Ulcer, an open sore.

Urticaria, hives or other skin eruption of a like nature.

Vascular, pertaining to or well supplied with vessels.

Venesection, opening a vein.

Vesicle, a small blister.

Virus, an animal poison.

Viscid, glutinous.

Vitellin, a proteid substance contained in the yolk of eggs.
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