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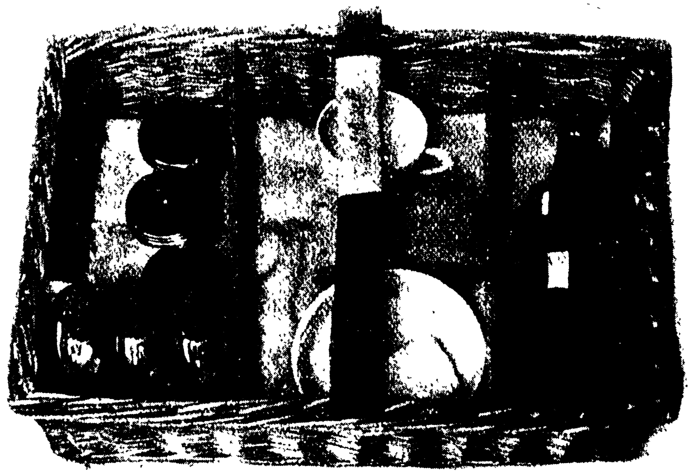

NURSES' TOILET-BASKET FOR PATIENTS.

NURSING:

ITS PRINCIPLES AND PRACTICE.

FOR HOSPITAL AND PRIVATE USE.

BY

ISABEL ADAMS HAMPTON,

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DEDICATED

TO MY PUPILS

OF THE

ILLINOIS TRAINING SCHOOL FOR NURSES,

CHICAGO,

AND OF

THE JOHNS HOPKINS HOSPITAL TRAINING SCHOOL,

BALTIMORE.

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Tact is a gift; it is likewise a grace. As a gift it may or may not have fallen to our share; as a grace we are bound either to possess or to acquire it.

CHRISTINA ROSSETTI.

A motive that gives a sublime rhythm to a woman's life, and exalts habit into partnership with the world's highest needs, is not to be had where and how she wills; to know that high initiation, she must often tread where it is hard to tread, and feel the chill air, and watch through darkness. It is not true that love makes all things easy; it makes us choose what is difficult.

GEORGE ELIOT.

NURSING:

ITS PRINCIPLES AND PRACTICE.

CHAPTER I.

TRAINING-SCHOOL ORGANIZATION AND MANAGEMENT.—REFERENCE LIBRARY.—METHOD AND OUTLINE OF COURSE OF THEORETICAL TEACHING FOR THE TWO YEARS.—CLASSES AND LECTURES FOR (*a*) FIRST-YEAR STUDENTS; (*b*) SECOND-YEAR STUDENTS.—EXAMINATIONS.

As a system of post-graduate work has not yet been developed, by which graduate nurses who wish to continue hospital work may receive instruction in the details of the organization and management of training-schools and hospitals, it is proposed for the benefit of such women to devote the first chapters of this book to the discussion of these problems. Such instruction also cannot fail to be of value in impressing upon pupil nurses that the work is not done haphazard: system and method prevail throughout, and are to be cultivated as a part of their training. The superintendent of a training-school is under a threefold obligation: first, to the hospital in which she works; secondly, to the patients who are entrusted to her care; and thirdly, to the women for whose education as nurses she is responsible. The hospital and patients should always be first considered, but not to the exclusion of what is just and right toward the pupil nurses. All connected with the hospital should resolve that they will work harmoniously together and with the exercise of judgment and due consideration on the part of the heads of the different departments justice may be done to all.

Division of Time.—As two years is the prescribed length of time for study in all the best schools, we will first consider the division of the twenty-four working months, the probation month not being counted.

These months should be divided according to the number of departments in the hospital, the longest time being given to the most important branches, such as the work in the medical and surgical wards. Each nurse in turn should be afforded the advantages of each department for about the same length of time; for instance, in a hospital with medical, surgical, gynæcological, and private wards, operating-room and dispensary services, the two years may be divided by allowing five months for each of the first four divisions, two for experience in operating-room work, one for the dispensary, and one for special work. It is advisable to keep a record sheet to be made up from the day-book at the end of each month, on which can be seen at a glance how much time any one nurse has spent in any one department. The specimen extract from such a record on the opposite page explains itself.

Besides the general reception-room and library in a training-school for nurses, there should be a room to be used exclusively as a study, lecture-room, and class-room. Among the necessary fittings should be included a disarticulated skeleton upon which to begin

FORM OF RECORD FOR THE TWO YEARS' WORK.

NAME.	Medical, 5 months.	Surgical, 5 months.	Gynæcological, 5 months.	Children, 2 months.	Operating-Room, 2 months.	Private Ward, 2 months.	Special Duty, 1 month.	Dispensary, 1 month.	Cooking School, 1 month.	Night Duty.	Vacations.

Of course this time should be modified according to the demands and work in each hospital.

the study and classification of the bones, also an articulated one to teach the relation of the bones to one another and to the skeleton as a whole. For the purpose of teaching visceral anatomy, the position of the organs, and their relation to each other, a mannikin that can be taken apart will be found useful. The shelves should contain a full set of various kinds of pads, which may be used as models for making similar ones and for demonstrating their uses and the methods of applying them. The room should also contain various charts, specimens, pictures, etc.—in fact, all the things necessary for class or individual teaching; and last, but not least, as complete a set of books of reference as circumstances will allow. All these are things which will gradually find their way to such a room. Object-teaching should be the method of instruction in every subject, wherever this is possible, and in this direction valuable aid may often be rendered by the physicians, who are always willing to aid in procuring anything needed for demonstrations.

A good reference library can be made up from the following works: Gray's *Anatomy; Human Physiology*, Austin Flint, M. D.; *Principles and Practice of Medicine*, Wm. Osler, M. D.; *Materia Medica and Therapeutics*, Bartholow; *Text-book of General Therapeutics*, Hale White; *Diseases of Children*, Eustace Smith, M. D.; Taylor on *Poisons; Practical Examination of Urine*, James Tyson, M. D.; *Nursing and the Care of the Nervous and Insane*, Charles E. Mills, M.D.; *An American Text-Book of Surgery*, edited by Keen and White; *Manual of Gynæcology*, Hart and Barbour; Skene's *Gynæcology; Obstetrical Nursing*, Parvin;

Puerperal Convalescence and Diseases of the Puerperal Period, Kucher; *Massage and the Swedish Movements*, Ostrom; *Drainage and Sewerage of Dwellings*, Paul Gerhard; Parkes' *Practical Hygiene; Hospital Construction*, J. S. Billings, M. D.; *Notes on Nursing*, Florence Nightingale; *Guide to District Nursing*, Mrs. Dacre Craven (Florence Lees); *Text-Book of Nursing*, Clara Weeks; *Duties of Hospital Sisters*, Eva Lückes.

A list of text-books for class-teaching can be made up of the following: *The Human Body*, Martin; *Essentials of Anatomy*, Charles B. Nancrede, M. D.; *Materia Medica for Nurses*, L. L. Dock; *A Hand-book of Invalid Cooking*, Mary A. Boland.

These text-books must be supplemented and their study facilitated by oral instruction. Thus, for instance, before beginning the study of the nervous system the students should be given a general talk upon the subject, and should be prepared in some measure for what they will find in their books. Many valuable notes may be selected for them from Prof. Martin's work, and a careful study of the plates in Gray will be found of great assistance, though nothing at all in the text should be attempted.

In order that class-work and lectures may be of any practical value to the student nurse, it is imperative that they should be systematic and regularly attended. To accomplish this, in a school for nurses attached to a general hospital the pupils should be admitted at stated intervals, and the term of theoretical instruction regulated as it is for the ordinary school or college year. It will be found practicable in schools with from sixty to eighty pupils, for entrance purposes to divide the year into two terms, a spring and an autumn session, and to accept pupils only during one of these. The spring term should extend from the beginning of March to the end of May, and the autumn term from the latter part of August to October. In making up a class of thirty, half may be accepted for the spring term and half for the autumn, the number being divided up through the months of March, April, and May, so that when the two years are completed all the members of the class will not finish at once, and new pupils may be worked in again gradually, without the nursing staff feeling the change too markedly. Classes and lecture courses can then be arranged, beginning the first week in October, and continue without interruption until the first week in June, when formal graduating exercises may take place and vacations begin. This plan allows eight consecutive months of theoretical study during the cooler part of the year, and four months of purely practical nursing in the summer, when nurses may be sent off in relays for vacations, and thus lose nothing in the way of valuable instruction while absent. Classes of twenty or more can be subdivided into two sections, and held on different days from 3 to 4 P. M., when the students are usually off duty in the wards.

As it is impossible to have all the students together at one time, the formation of senior and junior, or first- and second-year, classes is necessary. In this way subjects can be taken up in order, the more difficult ones being reserved for the senior year.

Notes should be taken during lectures, and afterward written out neatly in ink and handed in for correction.

Nurses will find such notes of much value for future reference, since they can thus readily review the essential points of a subject when text-books are not always at hand.

FIRST-YEAR OR JUNIOR CLASS WORK.

As nearly as possible the same subjects should be taught in class by the principal of the school as those taken up at the same time by the physician in his lectures. In this way the mind is kept in the same train of thought until the subject is finished, and confusion is avoided.

From October 1st until June 1st there will be about thirty-six teaching weeks. Class subjects may be divided for that time in the following manner:

The first three months should be devoted entirely to human anatomy and physiology, together with practical talks on nursing. We have given here an outline of the different lessons, each of which will occupy one or more hours according to circumstances:

SUBJECTS FOR OCTOBER.

First Week.

Anatomy.

Outline of Human Anatomy.
Talks on the Skeleton as a Whole.
The Bones and their Functions:
  Structure.
  Composition.
  Nutrition.
  Periosteal Covering.
  Division and Numbers.

Practical Nursing.

The Hospital Ward.
  Its Staff and Division of Labor.
Hospital Etiquette, Ward Discipline.
Hours of Duty.
Study, Recreation.
Night Nursing.

Second Week.

Anatomy.	*Practical Nursing.*
Bones of the Cranium: Principal Sutures. Bones of the Face. The Skull as a Whole. The Hyoid Bone.	Ward Supplies; Nurses' Toilet-Basket. Ward Work: Daily Care of the Ward; Special Care of the Ward; Daily Dusting; Weekly Cleaning. Cleanliness of the Bed and Blankets. Care of Ward Utensils.

Third Week.

The Vertebral Column: General Characteristics. Its Divisions, and their Names. Its Relation to the Skull. The Ribs and Sternum. The Pelvis.	Bed-making: For Bed Patients; for Convalescents. Preparation of Bed for an Operation Patient. Fracture Beds. Mechanical Appliances for the Relief of Patients: Pads, Head-rests, Lifting, Moving.

Fourth Week.

Bones of the Upper Extremity: Their Divisions. Bones of the Shoulder-Girdle. The Arm, the Forearm, the Hand. Division of Bones of the Lower Extremity: The Thigh, the Leg, the Foot, with Names of Bones in each.	Hygiene of the Sick-room and Ward: Ventilation. Method of Ventilating. Ward Temperatures. Bed-room Air. Disposal of Excreta. Soiled Dressings and Soiled Linen.

Fifth Week.

Review of the Skeleton and of the Chapters on Nursing.

NOVEMBER.

First Week.

Anatomy.

Introductory Notes on Articulations:
- Cartilage, Ligaments, Synovial Membranes, Bursæ.
- Joints, Variety, Divisions, and Movements of Principal Articulations.

Practical Nursing.

Care of New Patients.
Care of Bed Patients.
Care of Convalescents.

Second Week.

Introductory Notes on the Muscles:
- General Anatomy, Varieties, Functions, Modes of Attachment.
- Origin and Insertion.
- Tendons, Fasciæ.
- Forms of Muscles.

Baths:
- Classification and Temperature.
- Baths for Cleanliness: Tub-baths, Bed-baths, Foot-tubs.
- Baths as Therapeutic Agents: Mustard Baths, Salt Baths, Hot-air, Steam, or Vapor Baths.
- Sponge- and Tub-baths in Typhoid Fever; the Cold Pack.

Third Week.

Principal Muscles of the Head, Neck, Back, Abdomen, and Thorax, with Origin, Insertion, and Action.

Disinfectant Solutions, Deodorizers.
The Metric System.

Fourth Week.

Principal Muscles of the Upper and Lower Limbs.

Bacteriological Notes.
Disinfection of Rooms, Ward, Furniture, Clothing, Excreta, Sputum, and Vessels.

DECEMBER.

First Week.

Visceral Anatomy.
General Talk on Lungs, Heart, Stomach, and Organs of the

Enemata:
- Kinds, Preparation, Method, and Frequency of Administration.

Anatomy.

Abdominal Cavity, with a Short Description of Each.
Relation of One Organ to Another.
Their Functions.

Practical Nursing.

Care of Appliances.
Douches, Catheterization.

Second Week.

The Vascular System:
Description of the Heart, Arteries, Veins, and Capillaries; their Functions.

Temperature, Pulse, Respiration.
Care of the Thermometer.
Charting.
Recording Notes.

Third Week.

Review of Quarter's Lessons. Examination.

In January, in addition to the Anatomy and Practical Talks on Nursing, Materia Medica will be taken up.

JANUARY.

First Week.

The Principal Arteries of the Head and Trunk, their Course and Distribution.

External and Local Applications:
Dry Heat, Hot-Water Bags and Cans, Hot Bottles, Flannels, Salt-bags. Moist Heat, Fomentations, Poultices, Lotions.
Application of Cold (Ice, Cold Water).

Second Week.

Principal Arteries of the Upper and Lower Limbs.
Course and Distribution.

Counter-irritants: Cups, Mustard Plasters and Leaves, Cantharides, Liniments, the Cautery.

Third Week.

Classification of Veins.
Course of Principal Veins in each System.

Medicines: Methods of Administration, Dosage, Weights and Measures, Symbols and Abbreviations.
Medicine-Closet and Medicine-Lists.

Fourth Week.

Anatomy.	*Practical Nursing.*
Review of Vascular System.	Review of Chapters on Nursing.

FEBRUARY.

First Week.

Respiratory System.

Organs of Voice and Respiration, with description of the Larynx, Trachea, and Bronchi.

Surgical Nursing, Antiseptic and Aseptic Surgery; Preparation of Patient for Operation.

Materia Medica: Terms. Preparations of Drugs. (See *Materia Medica.*)

Second Week.

Function of the Lungs and Pleuræ.

Care of Patient after Operation.

Inflammation; Wounds.

Method of Healing. Surgical Rounds.

Opium.

Third Week.

The Digestive Organs.

The Alimentary Canal.

Description and Function of each Portion.

Half chapter on Gynæcology.

General and Special Care of Gynæcological Patients. Preparation for Examination.

Positions, Instruments, and Dressings.

Morphine and Chloral.

Fourth Week.

Glands and their Functions.

Liver, Spleen, Pancreas.

Thyroid, Thymus, Suprarenals.

The Lymphatics.

Second half of chapter on Gynæcology.

Care of Patient after Abdominal Section and Minor Operations.

Gynæcological Terms and Definitions.

MARCH.

First Week.

Anatomy.	*Practical Nursing.*
The Urinary Organs: Description.	Surgical Operating-rooms—Nurses' Technique: How to Prepare for Operations in Private Houses. Cathartics: Laxatives, Simple Purgatives, Drastics, Cholagogues.

Second Week.

Organs of Generation: Divisions. The Peritoneum. The Mammary Glands.	Hæmorrhages. Mercury, Alcohol, Brandy, Whiskey: Action and Dose.

Third Week.

A Talk on the Nervous System: Divisions, Structure.	Practical Demonstrations of Methods for Controlling Hæmorrhage. Tonics: Iron, Arsenic, Cinchona.

Fourth Week.

The Brain.	Bandages. Nux Vomica, Gentian.

Fifth Week.

The Spinal Cord.	Shock. Fractures: Kinds, Treatment. Nervines: Valerian, Asafœtida, Stramonium.

APRIL.

First Week.

Review and Examination for Quarter as far as the Nervous System.	Review of chapters on Nursing.

Second Week.

Anatomy.	*Practical Nursing.*
Review of the Nervous System.	Dislocations and Sprains. Veratrum Viride. Belladonna. Hyoscyamus.

Third Week.

Anatomy of the Skin: Description and Functions.	Surgical Emergencies concluded. Minor Surgery. Ammonium, Digitalis, Strophanthus.

Fourth Week.

Organs of Taste and Smell: Anatomy.	Medical Emergencies. Poisons. Artificial Respiration. Drowning. Aconite, Iodine.

MAY.

First Week.

Description of the Eye: Anatomy. The Humors and Appendages of the Eye.	Second half of chapter on Medical Emergencies. Bismuth, Ergot, Alum, Zinc.

Second Week.

Anatomy of the Ear: The External and Middle Ear. The Internal Ear.	Diet. Acids, Oils.

Third Week.

Review of the Special Senses.	Administration of Anæsthetics. Emetics.

Fourth Week.

Review of the First Half of the Year's Work.	How to Observe, Report, and Record Symptoms.

Fifth Week.

General Review of the Second Half of the Year's Work.

SCHEDULE FOR JUNIOR LECTURES.

FRIDAYS.

Hygiene.

Oct. 7, 14, 21, 28; Nov. 4, 11. Dr. ——.

1. Air: Chemistry of the atmosphere—The influence of its various constituents on the animal body.—The alterations produced on the surrounding atmosphere through respiration.—Pollution of air from various sources.—Ready method of testing the quality of air.—Ventilation and heating.

2. Water: Injurious organic and inorganic constituents to be found in water.—Purification of water.

3. Prevention and limitation of certain diseases: The rôle played by bacteria.—An outline of bacteriological methods.—Wound-infection.—Sterilization and disinfection of clothing, apartments, excreta.—Disposal of excreta.

4. Food preservation.

Pathological Anatomy, with Demonstrations.

Nov. 18, 25; Dec. 2. Dr. ——.

1. The circulatory system and its structure.—Demonstration of the circulation.

2. The normal anatomy of the lungs and kidneys.—Certain pathological changes in these organs.—Demonstration.

3. The alimentary tract; the pathological changes in typhoid fever.—Demonstration.

Medical Lectures.

Dec. 9, 16, 23; Jan. 6, 13, 20, 27. Dr. ——.

1. The general care and observation of patients.

2. The recording of observations of temperature, pulse, and respiration.

3. Nursing in febrile diseases, including the use of the cold-water bath.

4. The blood.

5. Nursing in contagious diseases.

6. Diet.

7. Medical appliances, emergencies, and common poisons with their antidotes.

Surgical Lectures.

Feb. 3, 10, 17, 24; March 3, 10, 17, 24. Dr. ——.

1. Cell-life: Healing of wounds; inflammation.

2. Principles of aseptic and antiseptic surgery: Dressings and disinfectants; their preparation and use.

3. Anæsthetics and their administration: Care of patients before, during, and after operation.—Shock and emergencies.

4. Some special operations.—Surgical diseases, tumors, etc.

5. Hæmorrhage and its treatment.—Wounds and their treatment.

6. Fractures, dislocations, contusions, and sprains: Diagnosis and treatment.—Prompt aid to the injured.

7. Wounds, accidents, suppuration, abscess, erysipelas, septicæmia, tetanus, etc.

8. Principles of bandaging.

Gynæcology.

March 31; April 7, 14, 21. Dr. ——.

1. Special anatomy of the pelvis.—Diseases of women.—Gynæcological instruments.

2. Abdominal surgery: Technique to be observed by the nurse.

3. Post-operative care of abdominal cases. Vomiting, pain, tympanites, catheterization, position of patient, dressings, enemata, hypodermic injections.

4. Peritonitis and wound-infection.—Modes of infection, and how to prevent it. General gynæcological operations.—Preparation for operation, and the after-care of the patient.

Diseases of the Eye and Ear.

April 28; May 5, 12. Dr. ——.

1. The anatomy of the eye: Care in health and disease.

2. Care of the eyes after operations.

3. Anatomy of the ear: Care in health and disease.

Diseases of the Throat and Nose.

May 16, 26. Dr. ——.

1. Diseases of the throat and nose.

2. Treatment and nursing of diseases of throat and nose.

SENIOR OR SECOND YEAR'S WORK.

Before beginning the subjects of the second year, the first week in October should be set apart for examinations on the first year's work. The examinations in medical and surgical nursing should be conducted by a physician and a surgeon respectively, and practical tests in nursing should be given to the student by the superintendent of the school. An examination-paper usually contains ten questions—five to be answered orally, five in writing. The class-standing for the second year is based upon the results of this examination, and, moreover, any one failing to pass it should be considered unqualified to become a head nurse at the end of her second year.

Frequent opportunities of expressing herself in writing should be given to the nurse in the second year's work. Of the class-hour, from ten to fifteen minutes should be devoted to the answering of questions in writing, and these may be corrected and criticised at once. Words and definitions relating to the subject should be dictated and written as part of the work. At the end of each subject a written examination should be given, consisting of five questions bearing on the principal points, and the papers examined by the teacher before the next meeting of the class.

In the first year's work the study was restricted to the normal conditions of the various systems of the body. The teaching of the second year will refer more particularly to the changes which take place in these systems when invaded by disease, to the signs by which they may be recognized, and to the duties of the nurse in regard to them. In addition to this there should be notes taken and quizzes held on some special subjects, as Obstetrics, Urine, Anæsthesia, etc. When at all practicable the same idea of object-teaching should be carried out as recommended in the first year's work. In addition to this teaching, the previous chapters on nursing, the application of medicines, and the doses used in the various diseases should be reviewed.

As they will have already gone over their materia medica, it is a good plan to let the students write out a list of the medicines given in certain diseases and their doses, as a part of their next week's lesson, and then quiz upon them in class. From time to time they should also prepare papers on some of the more important drugs and groups of drugs, such as Opium, Digitalis, Hydrargyrum, Cathartics. The principal points in nursing (*e. g.* a nurse's observation of symptoms and the treatment in emergencies) form suitable subjects for other papers.

The plan of study can be arranged something after the following schedule:

OCTOBER.

First Week.

Examination and assignment of class-standing.

Second Week.

Obstetrics: Anatomy of the organs of generation, with illustrations.—Description of their functions.

Third Week.

Pregnancy: Symptoms and physical signs.—Obstetrical terms and definitions.

Fourth Week.

Development of the fœtus.—Abortion.—Miscarriage.—Premature labor.—Terms and definitions.

Fifth Week.

Fœtal circulation.—Terms and definitions.

November.

First Week.

Care of patient before, during, and after labor.—Terms and definitions.

Second Week.

Care of the breasts.—Care of the child.—Care of the eyes.—Infant-feeding.—Terms and definitions.

Third Week.

The puerperal state.—Terms and definitions.

Fourth Week.

Review and Examination in Obstetrics.

December.

First Week.

The care of infants.—Terms and definitions.

Second Week.

Conditions peculiar to children: Thrush, Cholera infantum, Convulsions, Infantile paralysis, Chorea, Rickets, Croup, Eczema.—The infectious diseases of childhood.

Third Week.

Review and Examination.

January.

First Week.

The urinary organs: Their location and functions.—Normal urine.—Composition.—Specific gravity.—Physical properties.

Second Week.

Preparation of a specimen of urine for examination.—Reaction.—Color.—Sediment.—Increase and decrease in quantity.—Specimens.—Terms and definitions.

Third Week.

Tests for albumen, sugar, bile, carbolic acid, and iodoform in urine.—Terms and definitions.

Fourth Week.

Notes on disease of the kidneys.—Uræmia (acute and chronic).—Bright's disease (nephritis).—Cystitis.

FEBRUARY.

First Week.

Review and Examination on Urine.

Second Week.

Notes on the principal contagious and infectious diseases: Scarlet fever.—Typhoid and malarial fevers.—Terms and definitions.

Third Week.

Dysentery.—Asiatic cholera.—Small-pox.—Erysipelas.

Fourth Week.

Septicæmia.—Pyæmia.—Tetanus.—Diphtheria.—Phthisis.—Terms and definitions.

MARCH.

First Week.

Review and Examination on Contagious and Infectious Diseases.

Second Week.

Notes on diseases of the digestive system.

Third Week.

Notes on diseases of the respiratory system.—Medical terms and definitions.

Fourth Week.

Review of notes on the diseases of the digestive and respiratory organs, with examination.

APRIL.

First Week.

Notes on diseases of the nervous system.—Terms and definitions.

Second Week.

Notes on the diseases of the nervous system, continued.—Massage.—The "Rest Cure."—Terms and definitions.

Third Week.

Notes on diseases of the circulatory system.—Terms and definitions.

Fourth Week.

Terms and definitions.—Oral Review.

MAY.

Examinations.

First Week.

Hygiene; General Medicine; Materia Medica.

Second Week.

Surgery; Gynæcology; Obstetrics.

Third Week.

Analysis of urine; Children in health and disease.

Fourth Week.

Dietetics; Massage.

These test questions should be limited to five, and should be prepared by the lecturer on the subject, and the written papers afterward valued by him.

SCHEDULE FOR SENIOR LECTURES.

TUESDAYS.

Obstetrical Lectures.

Oct. 4, 11, 18, 25; Nov. 1, 8. Dr. ——.

1. Pregnancy: Organs of the body concerned in pregnancy and in parturition: (*a*) The bony canal, the false and the true pelvis; (*b*) The soft parts, uterus, vagina, and pelvic floor.

2. Impregnation: The ovum and its development.—The placenta.—The enlargement of the uterus.—The hygiene of the pregnant state.—The diet.—Care of the bowels.—Care of the breasts, etc.—The vomiting of pregnancy.—The diagnosis of pregnancy.—Quickening the fœtal heart-sounds, etc.—Table for calculating the probable duration of pregnancy.—Death of the fœtus *in utero*.

3. Physiology of pregnancy: Condition of the pelvic organs at term.—Changes in the entire organism.—The

mature fœtus.—Forces bringing about and resisting the birth of the child.

4. Natural labor: Preliminary preparations for stages of labor.—Position of fœtus, etc.—What to do in an emergency.—The birth of the placenta and its management.—Post-partum hæmorrhage.—Laceration of the perineum.

5. The puerperal state: Cleanliness.—Articles required.—Receiving, washing, and dressing the child. —The immediate care of the child.

6. The management of the puerperal state.—Dangers to be avoided.

Children.

Nov. 15, 22, 29; Dec. 6. Dr. ——.

1. Care of Infants: Condition of the child immediately after birth—(1) general appearance; (2) bony framework; (3) internal organs; (4) changes in the blood-circulation; (5) establishment of pulmonary respiration.

2. Infancy: (1) Growth and development of infants; (2) physiological peculiarities; (3) tendency to disease; (4) great mortality.

3. Care of Healthy Infants: (1) Handling; (2) bathing; (3) clothing; (4) sleep; (5) exercise; (6) the nursery.

4. Infant-feeding: (1) In health; (2) in sickness.

Electro-Therapeutics.

Dec. 13, 20. Dr. ——.

Practical application of electricity.

The Urine.

Jan. 3, 10. Dr. ——.

1. Elementary analysis of the urine.
2. Tests with practical work in sections.

Massage.

Jan. 17, 24, 31; Feb. 7, 14, 21, 28; March 7. Miss ——.

1. History.—In the hands of the *masseuse.*—In the hands of the nurse.—Demonstrations on the hand and arm.
2. Effects on digestion.—Demonstrations on the chest and abdomen.
3. Demonstration on the foot and leg.
4. Thigh.—Passive movements.
5. Massage of head.—Soporific effect.—How obtained.
6. Demonstrations on the back.
7. Demonstration on the back and gluteal region.—Resistive movements.
8. Sprains, dislocations, indurations, paralysis.
9. Percussion, position, use of oils.

Contagion.

March 14. Dr. ——.

Some common modes of contagion, and how to guard against them.

General Medicine.

Marc[illegible] 28. Dr. ——.

1. Nervous system.
2. Heart and respiratory organs.

Insanity.

April 4, 11, 18. Dr. ——.

1. The care of the nervous and insane.
2. What to do for special forms of insanity.
3. Occupation for the invalid and convalescent.

Diseases of the Skin.

April 25; May 2. Dr. ——.

1. Anatomy and care of the skin.
2. Nursing in diseases of the skin.

Dietetics.

May 9, 16, 23. Miss ——.

1. Nutrition.—Some proofs that different methods of cooking produce different results in food as to its digestibility.

2. Processes of cooking.—Fire.—Effect of heat on food materials.—Relative merits of different ways of applying heat.

3. Flavors.—Temperature of foods.—Selection of dishes and colors.

Nursing.

May 30. Miss ——.

Ethics of nursing.—Private nursing.

May.—Final Examinations.
June 2.—Graduating Exercises.

CHAPTER II.

A Hospital Ward; Free and Private.—Its Staff and Division of Work.—Hospital Etiquette.—Ward Discipline.—Hours of Duty, Study, Recreation.—The Night Nurse.

With the increasing development in the science of medicine, and particularly in the field of bacteriology, and with the conviction, which is becoming recognized more and more, that thoroughly clean surroundings and pure air are conditions absolutely necessary to the recovery of patients, hospital construction, arrangements, and equipments have become subjects of serious consideration to both the medical and nursing professions. It becomes important and necessary that a trained nurse should understand something of the plans and arrangements of modern hospitals, for there is nothing in or about a ward or sick-room that does not directly or indirectly affect the welfare of the patients. Many of the rules that hold good in hospitals can be applied with some modifications to private dwellings. In private nursing the nurse may be the only one in the house who realizes that there may be something wrong in the sanitary arrangements which urgently needs to be corrected. To become familiar with hospital construction the nurse should read independently the writings of those who are authorities on the subject.

The greater portion of a general hospital is given up to the wards for free patients, but in a great many there are, besides, accommodations for a limited number of private patients. The average free ward ought to contain not more than twenty-five or thirty beds. The beds should be separated by a distance of at least three feet, and each patient should be allowed about sixteen hundred cubic feet of air-space. For a ward of this size there should be not less than one bath-room, two closets, and, if possible, one room set apart to contain nothing but the slop-hopper, racks for holding vessels, shelves for urine-jars, and catheter bottles. It is desirable to have a separate room for a linen closet, another for patients' clothes, a small ward kitchen, and at least two private rooms to be used for extremely ill and delirious or dying patients, so that they may be removed at once from the ward. The effect caused by the death of a patient in the midst of others is, to say the least, not encouraging. The necessary articles of furniture in such a ward are, besides a bedside table and a comfortable arm-chair between every two beds, three or more wheel-chairs for convalescent patients and two ward tables. If possible it is best to have a room opening out of the ward which can be used as a ward office, and in which the medicine-closet may be kept out of sight of the patients. Such an arrangement will also remove the temptation from any who might be inclined to help themselves to stimulants or poisons. The walls should be hard-finished and painted some pretty soft color; usually pale green, buff, or terra-cotta is chosen. If one room can be set apart as a day-room or sitting-room for convalescent patients, it should be fitted up with lounges, a bookcase filled with books, plenty of games, plants and flowers, and bright rugs: if such a room cannot be obtained, then the books and games must be kept in the ward.

As it is desirable for hygienic reasons to have as little furniture as possible, and that of the simplest kind, the appearance of a ward can be greatly improved by having potted plants placed in the windows or in groups. They are harmless, and are a source of great pleasure to the patients. They need not add much to the ward expense, for frequently both patients and friends are glad to contribute a plant to aid in making the room look bright.

The private ward is usually simply a hall or floor divided into a number of rooms. In a hospital, each of these rooms should be a model sick-room. It should be of ample size, away from noises, have plenty of light and sunshine, and be capable of being thoroughly cleaned. There should be not less than two windows in such a room, unless the sun has free access to it, when one large one will be sufficient. If there are wards or rooms in use above or below it, special care should be taken that the floor is deadened, so as not to convey sounds. The higher up the room is situated, the better it is for fresh air and ventilation. The walls and ceilings should always be hard-finished and painted, so as to allow of frequent washing; a hard-wood floor is also desirable. In most cases of acute illness it is better not to have anything in the shape of pictures, as they are simply dust-collectors. The arrangement of the furniture also requires consideration. The bed should be single and moderately high (the wire mattress being twenty-four inches from the floor), and placed so as to be accessible from all sides, away from the door, and in such a position that the light from the window may fall pleasantly upon it. The bedside stand should be on the side next the door, the wardrobe behind the door, the dressing-bureau on the side or in a corner where the patient cannot see into the mirror; the washstand on the other side of the room near the bed; two ordinary chairs, a cane or wooden easy-chair, a screen, and a lounge complete the furnishings. Everything should be in good taste and as dainty as possible, but must be of an absolutely simple character: intricate and elaborate carvings and finishings upon hospital furniture are to be condemned. Heavy woollen rugs or carpets, upholstered chairs, pictures, and bric-à-brac must not be permitted, though, unfortunately, rooms so furnished can still not infrequently be found in private hospitals and endowed rooms. This not only entails a useless expenditure, but is really harmful, and a nurse who understands the value of pure cleanliness will do all in her power to introduce a hygienic method of furnishing sick-rooms. A simple room such as we have described can be made to look exceedingly pretty and inviting by the addition of rugs and curtains. A bedside mat and one other rug, large enough to give an air of comfort and color to the room, and small enough to be easily taken up, shaken, and cleaned, are all that may be allowed: art rugs answer the purpose well, but when dealing with infectious or contagious diseases even these should be prohibited. Long white curtains of some soft washing material at the windows give an air of finish and cleanliness. All heavy articles of furniture should be on casters, so that they can be quietly and easily moved. In a private house an adjoining room should be set apart in which to keep everything in the way of utensils, medicines, etc., as everything disagreeably suggestive should be kept out of the sight of the patient.

The head nurse of a ward, besides being a thoroughly trained nurse, should be a woman of executive ability, economical, and with some practical knowledge of housekeeping. She is held responsible for every thing pertaining to the ward, and if the patients are only imperfectly cared for, the blame will not fall upon the assistant nurse so much as upon her. It is her duty to see that the furniture of the ward is kept in repair, that supplies are on hand, that the medicine-chest is replenished, that the linen is in good order, that patients are admitted and discharged properly, that the diet and medicine lists are revised, and that only what is absolutely necessary is ordered. She must visit the patients with the physicians, take down their orders in writing, and see that they are faithfully carried out. She is responsible to the superintendent for the teaching and training of the assistant nurses in her special branch of nursing. She must exercise a daily supervision over the work of the maid and of the orderly, and see that it is done properly. It is desirable that she herself should not do any of the work allotted to others, except when really necessary, as this would point rather to a lack of executive ability on her part. While these duties may seem multitudinous and sound very difficult, they are in reality not so formidable if the head nurse knows how to plan out her work and manage her subordinates, and if she is really interested in what she is doing. Just in proportion to the interest which the head nurse takes in her ward will be the interest shown by those who work with her; and if she is not systematic and orderly, and does not always require that others shall be the same, her patients and ward will soon show the deficiency. Her standard should be such that those who work with her shall know that nothing but their best efforts are expected. She should be careful that no detail of nursing-work is slurred over by any of the assistant nurses or left by them to either the maid or orderly. She should arrange and manage her ward as a part of a whole system, so that a nurse when changed from one ward to another will find everywhere the same order existing. This is absolutely necessary if the whole institution is to work in harmony.

The assistant nurses, appreciating the responsibility which rests upon their head nurse, should do all in their power to assist her by doing their work in the most thorough manner. They should understand that she must look to them for many of the minor reports and details of what is taking place in the ward. They should therefore be careful to report to her even what might seem to them unimportant symptoms or circumstances. The head nurse should know everything that happens in her ward. The accomplishment of this should not be difficult, as each nurse has special work allotted to her, and her share of the responsibility is strictly defined.

A nurse in training should begin at the very commencement of her work to school herself in habits of observation: she may do this best at first by noticing the condition of the ward, whether it is orderly or disorderly, and what she can do to put things to rights. She should never pass up or down a ward without training her eyes to observe the condition of patients, beds, tables, chairs, and window-sills. This may be done by looking at one side going up, and the other side coming down. If there is anything out of order which may be righted in a moment, she should not fail to attend to it; and if each nurse were trained to this habit, there would not be the least necessity for a ward ever to appear out of order. It is also imperative that whatever she uses should be put away in its proper place when the work is finished. If each woman as she enters the training-school would take this one precept to heart, it would save many unnecessary footsteps and much valuable time, not only to herself, but to all those who work with her. But, sad to say, in every training-school one is obliged to emphasize over and over again, to class after class, the importance of returning to their proper places things which have been used. For instance, if a blanket has been used, it should not be taken into the linen-room and thrown down on the table, but neatly folded and at once put on its proper shelf. If a sheet or towel or night-dress is needed, it is not necessary to pull down and leave in disorder a whole pile in order to get the one wanted. If a medicine-glass is used, it should be washed and put back in its proper place at once before going on to something else. If little details such as these are disregarded, but little time is saved at the moment, the work is increased instead of lessened, and after all at the end there must be a general tidying-up time without the satisfaction of always having an orderly ward.

So, then, we repeat that the two habits of order and observation are the most essential points to be cultivated in the beginning of a nurse's training.

It may be of some assistance to those who have wards to manage to give tables of the division of work for a ward containing, say, thirty patients, a head nurse, four assistants, an orderly, and a ward maid, such tables to be modified according to the requirements of the particular ward.

If there is an orderly in the ward, his duties should be carefully defined. He will be expected, in a male ward, to give patients their first baths in the tub if they are in a condition to be bathed, and to put them to bed; to carry all vessels to and from the patients; to give enemata to convalescent men; to collect the sputum-cups and keep them clean; to do the ward cleaning in a systematic manner; and to assist in any heavy lifting. He should have his regular hours on duty, and should not leave the ward without the knowledge of the head nurse.

The ward maid should be responsible to the head nurse from the time she comes on until the time she goes off duty. She should be taught punctuality in coming on duty, and should never leave the ward without permission: she should carry out her work according to written rules. Convalescent patients should not be allowed in the kitchen at any time to assist her with her work.

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The following arrangement may be found useful as a guide to the division of time and work:

ORDER OF WORK FOR NURSES.

The temperature nurse takes temperatures and charts them; gives medicines and keeps the medicine-closet in order; makes out and gives daily to the head nurse the list of medicines to be replenished; gives out meals and special nourishment; and is responsible for the appearance of the kitchen.

The nurse on the right side of the ward cares for the bed patients of that side, gets the convalescents up, makes the beds, does the dusting, and is responsible for the general good order of everything on that side. In addition, she keeps the linen-closet in order and folds the fresh linen.

The nurse on the left side of the ward has the same duties as the nurse on the right side, and in addition is responsible for the bath-room and lavatory.

The third nurse takes care of the special patients in the small rooms and looks after the dressing-carriage. She is also responsible for the preparation of patients for operation.

The probationer, or junior nurse, assists in making beds and doing dusting, carbolizes beds, cleans mackintoshes, lists soiled clothes for the laundry, lists and puts away new patients' clothes, and is responsible for the patients' clothes-closet. She also assists in giving out meals.

It is also an advantage to divide up the ward nursing, so that each nurse is detailed for a certain length of time to each branch; for instance, in a gynæcological ward, where a nurse spends three months, the time may be divided as follows:

Work for Three Months.

First Month.

Ordinary ward work (half a month on right side of ward and half a month on left side of ward) includes, besides bed-making, dusting, carbolizing beds, which will have been learned by her as probationer,

Bathing of patients;

Care of perineal and other minor operation patients;

Removal of packing; repacking;

Simple enemata; douches; passing catheter.

Second Month.

Temperatures, medicines, charts;

Care of medicine-closet;

" surgical carriage;

" kitchen, reporting amount of daily supplies;

Serving out meals, stimulants, nourishment;

Preparation of instruments and dressings;

" " gauzes;

" " solutions.

Special Work.

Third Month.

Includes the preparation of patients for abdominal section, and care of abdominal sections from operation to tenth day;

The giving of nutritive enemata;

Passing rectal tube;

Care of patients on special diet; observance and recording of all symptoms, with pulse and temperature for eight days.

SCHEDULE OF MAID'S WORK (WOMEN'S WARD).

Every Day.

6 A. M. Report on duty to night nurse; prepare for breakfast; set tables and trays; cut and toast bread.

6.30 A. M. Breakfast. Return at

7 A. M. Clear tables; carry out trays; sweep ward, corridor, linen-room, kitchen; dust.

8.30 A. M. Scrub stairs; wash dishes; scrub lavatories, closets, bath-room; finish cleaning kitchen and refrigerator.

12 M. Dinner. Return at

12.30 P. M. Assist in carrying trays to and from ward; clean tables; sweep dining-room; wash dishes; remove drain from sink and clean thoroughly.

4 P. M. One hour off duty. Return promptly at

5 P. M. Prepare for supper; set tables and trays; assist in carrying trays to and from ward.

6 P. M. Supper. Return at

6.30 P. M. Wash dishes, clean stove; leave kitchen in perfect order before going off duty.

Maid's Special Work.

Monday. Clean all fireplaces and mantels; scrub linen-room floor.

Tuesday. Clean basins of lavatories, closet, and bath-room, and woodwork of closet, bath-room, and lavatory.

Wednesday. Clean clothes-closet and sweep attic stairs.

Thursday. Afternoon off duty.

Friday. Scrub porches.

Saturday. Take refrigerator apart and scrub thoroughly; clean wood-work in kitchen, gas-stove, and dumb-waiter.

Directions for Cleaning.

Wash paint only with warm soapsuds; if very dirty, use a little ammonia—no Sapolio for paint; wash stove, porcelain, and iron with Sapolio; rub brasses with "Putz" polish; wash sink-drain with Sapolio, and let it stand to air for some time each day; use strong solution of washing soda to flush sinks and pipes.

SCHEDULE OF ORDERLY'S WORK (MEN'S WARD).

Every Day.

7 A. M. Come on duty; collect and wash urinals and sputum-cups; clean floors and brasses of closets.

7.30 A. M. Sweep and rub floor of ward; brush ventilators; sweep porches.

12 M. Dinner. Return at 12.30 P. M.

12.30 P. M. Brush floors of ward and hall.

5 " Light gas (when required).

7 " Off duty. Leave closets clean and in order before 7 o'clock.

Special Work.

First Week in Month.

Monday. Paraffine and rub floor in ward.

Tuesday. Paraffine and rub floors in corridors and rooms.

Wednesday. Clean windows on right side of ward.

Thursday. Clean windows on left side of ward.

Friday. Bathe convalescents.

Saturday. Finish bathing convalescents; clean chandeliers.

Second Week in Month.

Monday. Paraffine and rub floor in ward.

Tuesday. Paraffine and rub floors in corridors and rooms.

Wednesday. Clean windows at end of ward.

Thursday. Clean transoms in corridor.

Friday. Bathe convalescents.

Saturday. Finish bathing convalescents; clean chandeliers.

Third Week in Month.

Monday. Paraffine and rub floor of ward.

Tuesday. Paraffine and rub floors of rooms and corridors.

Wednesday. Clean windows in corridors and rooms.

Thursday. Clean windows in bath-room, lavatories, closets, and kitchen.

Friday. Bathe convalescents.

Saturday. Finish bathing convalescents; clean chandeliers.

Fourth Week in Month.

Monday. Paraffine and rub floor in ward.

Tuesday. Paraffine and rub floor in rooms and corridors.

Wednesday. Dust walls in corridors, ward, and rooms.

Thursday. Clean outside woodwork.

Friday. Bathe convalescents.

Saturday. Finish bathing convalescents; clean chandeliers.

Hospital Etiquette.

Relation of Nurses to Hospital Officers and Patients; to Patients' Friends; to Strangers; to One Another.— Here the head nurse is again responsible for the general tone of the ward, and she should see that due observance is paid to the etiquette and rules of the hospital by those about her. In no better way can she do this than by being particular in her own behavior, never allowing herself any license that she would not grant to her assistants. Hospital etiquette consists of nothing more than the continual and systematic observance of every-day courtesies. As a ward is, for the time being, a home for the head nurse, and her staff is, as it were, a family, it is only proper that to every one entering the ward any member of the staff happening to be present will extend the same courtesy that she would show to visitors in her own home, always being pleased to do the honors of the ward. As at home we should never dream of receiving a visitor seated, so a nurse should not remain seated when any one enters her ward. This applies particularly to the medical officers connected with the ward, the superintendent of the hospital, superintendent of nurses, and strangers. If they enter the ward in an official capacity with visitors, the nurse should receive them standing, and in an unobtrusive manner be on the alert to accompany them about the ward or ready to answer any questions which they may ask. When the head nurse is in the ward, this is her duty. If she is absent, then it falls to the lot of the nurse who has been left in charge. But some judgment must be exercised in regard to the observance of this form. For instance, members of the medical staff may come into the ward many times in the course of the day just for a moment or for something connected with their own particular duties: in these cases it is quite unnecessary for the nurse always to leave her work, unless she sees that she is really wanted; a movement to show her willingness to give her assistance whenever it is needed may be sufficient. An assistant nurse should never sit while receiving her orders from the head nurse. It is exceedingly bad form to sit while a superior officer is standing and giving instructions.

A nurse's manner toward her patient should be characterized always by a gentle dignity. She should be wisely sympathetic, and, while never familiar nor tolerant of the least familiarity, should always make the patients feel that they are her first consideration, and that to do anything for their comfort is her greatest pleasure. Never should she forget to be particularly attentive and kind to a new patient: the dread of entering a hospital is bad enough, but much of the gloom can be removed by the bright, cheerful greeting of the nurse, and the stranger may be made to feel at once that he has come among friends. One should never leave a patient to sit unnoticed and uncared for, even for ten minutes; for what seems but a few minutes to the nurse may seem to him to be hours, and leaves an unpleasant impression of neglect which much kindness afterward may be unable to erase. The friends of patients are often the greatest trials that a nurse has to contend with, but fortunately all are not alike trying, and their importunity is often merely the result of an ignorant prejudice against hospitals and every one connected with them, so that the quickest and best way to satisfy them is to assure them in a pleasant manner that their friends will be well cared for, and give them practical evidence of it. Dealing with such people also affords a good opportunity for the development of tact and patience. The nurse should not try to avoid them in any way, but should listen attentively to what they have to say, particularly if it has any bearing upon her patient's previous condition, and she should endeavor to obtain from them whatever information she may think of value to the physician. She should let both patient and friends feel that they are considered, and that they may rely upon her not to keep them in ignorance of anything which the doctor is willing they should know.

Very frequently strangers come, wishing to visit the hospital, and through some neglect at the door they may be allowed to wander off by themselves and appear in the ward unattended. To such the nurse should go at once, ask if there is anything she can do for them, and offer to show her own ward. One should never leave a stranger to the extremely uncomfortable sensation that he has unpardonably intruded in coming into the ward.

In order that the best work may be accomplished it is absolutely necessary that an *ésprit de corps* should prevail among the nurses. From the moment that personal jealousy, discord, and faultfinding appear, the standard of the work is lowered. It is more than likely that, during a two years' course of training, one will be expected to work in connection with some person with whom in every-day life one would have little in common, but it must be remembered that all belong to the same sisterhood and have an interest in the same work, and that for the time being the best must be made of the situation. Absolutely nothing in the way of personal feeling toward each other should be shown among the staff of nurses. It is equally objectionable to be on too friendly or familiar terms while on duty. A dignified and kindly attitude toward one another should prevail, and it is always best to select friends or companions among members of one's own class. For a senior to be obliged to seek the companionship of a junior or new-comer argues that she is deficient in some of the attributes that make people companionable, and she should try to find out her fault and overcome it. It is also bad for a junior to be suddenly promoted: it is best for her to make her position gradually, and not to aspire to a rank which is not rightfully hers so long as she is a junior. An intimate friendship between the head nurse and pupil nurse ought never to exist, if only for the sake of the patients. One is only a learner, the other a teacher. If a pupil makes a mistake in the care of her patient or is careless or negligent in the performance of her duties, it is almost impossible for that head nurse to insist upon her repeating her work until it is done properly without causing unpleasantness; and of course if she fail to do this, then the work must suffer.

A head nurse must never leave her ward for any length of time over five minutes without telling her senior nurse that she is going and saying where she may be found. It is very trying sometimes for the physician or superintendent to enter and look in vain for the head nurse of the ward, and find no member of the staff who is able to tell where she is. If she is to be away for the afternoon, she should mention it to the superintendent of the school. She should never leave her ward for any length of time without placing her senior or some other responsible nurse in charge. The head nurse and senior nurse should not be off duty at the same time, except with the knowledge and sanction of the superintendent, who will then take the responsibility of whatever may happen. The visiting of other head nurses while on duty should not be permitted. The head nurse should see that the senior nurse, or whoever is acting as senior, has an accurate knowledge of the entire ward and its patients, who they are, and what is being done for them, as questions and emergencies often arise that must be answered and met during the head nurse's absence. It is extremely awkward to find a nurse left in charge who does not know anything about the ward except her own work in it; but, on the other hand, this does not mean that the head nurse should leave any of the arrangements or details of work that are hers to be done by an assistant nurse: all reports, requisitions, and lists of supplies should be made up by herself. When the head nurse is on duty all questions should be left to her decision, and visitors should be referred to her.

There is nothing for a nurse to do but to go on steadily with her work: general conversation between nurses while in the ward is strictly forbidden; an occasional question regarding the work is all that is permissible. The same remarks apply to the nurse's relation to the hospital physicians. The ward is not the place, and "on duty" not the time, for indulging in social talk: the time belongs to the patients, and a right-minded, conscientious nurse will never permit her patients to be deprived of what is justly theirs. To have friends to visit one in the ward is quite out of place. If possible, a time should be appointed when the nurse knows she will be off duty, else there will inevitably be the disappointment of not being able to see friends when they come. In caring for private patients nurses must also be watchful that they do not become drawn into a lengthy conversation, so that the time that should be spent on two patients is given to one.

It is the head nurse's duty to arrange the "off-duty" hours of her assistants. The schedule should be made out some time in the morning, and pinned up where the nurses can see for themselves when they are expected to go: when the hour arrives the assistant will simply report to the head nurse that she is going, and not wait to be told to go, for the head nurse may be too busy at that hour to give her a thought. These hours should be given, as a rule, in the afternoon. To thoroughly care for the patients, make rounds with the physicians, carry out any orders that may have been left, and put the ward in good condition for the day will require the full staff for the morning hours, but a head nurse should be particular in seeing that her assistants get their proper amount of leisure. If nine hours on duty represent the day's work, she should see that they are not kept over that time day after day: while she should insist that they come into the ward promptly on time, not five minutes or ten minutes early or late, but at the exact hour stated in the hospital regulations, it is only right that they should be sent off as punctually as they came on, except in cases of emergency or where the ward work is very heavy and there may be one nurse too few. Then, for the sake of the rest, any nurse should be expected to stay on over time. It is false economy, however, to deprive nurses of hours and afternoons that justly belong to them. It will be found, if such a course be pursued, that the work will drag, that it will not be done with the same energy, brightness, and freshness, and before long the patients will feel the bad effects.

A written statement of the hours each nurse has had off duty should be handed by every head nurse to the superintendent between eight and nine the next morning, when she makes her morning visit to the wards. It is not a head nurse's privilege to keep her nurses on duty over time without reporting when and why she has done so, and no assistant nurse may return to the ward before the hour specified by her head nurse. When the assistant nurse is off duty she may not go into the hospital to visit or, in fact, for any purpose without the permission of the superintendent of the training-school. When she is off duty she should plan out her time for study, rest, and recreation. The time of her two years' training should be very precious to her, and she should make the most of every opportunity afforded her. Remembering, however, that all extremes are bad, she should be careful neither to overtax her physical strength nor to allow her mental faculties to become dulled.

Some nurses carelessly get into such a rut that they know scarcely anything outside of nursing. At the end of the two years a nurse should be ready to go forth to her work strong in body, improved in intellect, and ready to adapt herself to social conditions. The study hours should be systematically arranged. An hour a day spent over lessons or lectures is not a great deal, but gossipy interruptions should not be tolerated. To lie down for half an hour and give perfect relaxation to muscles and nerves is very necessary. One should go out among friends or to dinner, a concert, or the theatre at least once a week. Such relaxation is very beneficial, and the change of atmosphere will invigorate one and keep one in touch with outside affairs. Once a week will be sufficient, otherwise it becomes detrimental instead of beneficial.

The night nurse and her duties must be specially considered, as her work differs from the day nurse's in that she is usually the only nurse in the ward at night, and so has more directly to do with the nursing of the patients. There should be definite rules laid down for her guidance. In hospitals where the nursing is done by means of nurses in training it is usual to have a graduate appointed as night head nurse for all the wards. She assumes the responsibilities that head nurses have during the day, and is indispensable, as very often the night-nursing staff is composed of a number of undergraduates who may be only in their junior year, but who are quite equal to their duties if they have some one upon whom they may call for advice or assistance when necessary. The head nurse should make her rounds through the entire hospital not less than three times during the night. She should vary the hours, and remain longest in the heaviest wards or where a nurse needs particular oversight. All reports to the doctors should go through her, unless in a case of sudden emergency where an attempt to find the head nurse would result in the loss of valuable time: in such a case the night nurse must act for herself and send for the physician on her own responsibility, notifying the head nurse at the same time. Night nurses are expected to report for duty to their head nurse at a given hour, and, as far as hospital etiquette is concerned, stand in the same relation to her as the assistants do to their head nurse in the day-time. Any deficiency in medicines or in supplies for night use must be reported to her on her first round through the wards, and it is for her to see that they are supplied, as a nurse should never leave her ward for any purpose. In case of a death she should be promptly notified. Every nurse is expected to leave all utensils used during the night in a clean condition and in their proper places. Medicine-closets must be kept locked, and bottles containing stimulants or opiates must never be left where there is the least danger of a patient getting them. Matters not strictly professional must not be discussed by night nurses on duty with physicians or private patients, nor must any eatables be offered unless with the sanction of the head nurse, as everything that is in the wards is supplied for the patients alone, and the nurse is responsible for seeing that no one else uses them.

A night nurse should so arrange her work that it may be finished by the time the day nurses come on duty: everything should be in order, and she should herself be ready and waiting to give her written statement of the condition of her patients to the head nurse. It is not in her province to see that convalescents' beds are made, but it is her duty to see that convalescents are wakened in time to prepare themselves for breakfast, that the faces, mouths, and hands of bed patients are bathed before breakfast, and to give out the breakfast with the assistance of the ward maid. She should be required, besides leaving everything in good order, to hand in a neatly-written night report. When off duty she is still under the supervision of the night head nurse, and must not be absent from her room during prescribed hours without her knowledge and permission.

CHAPTER III.

WARD SUPPLIES.—NURSES' TOILET-BASKETS.—WARD WORK.—DAILY CARE OF THE WARD.—SPECIAL CARE OF THE WARD.—CLEANLINESS OF THE BEDS AND BLANKETS.—CARE OF WARD UTENSILS.

IN addition to the furniture already mentioned as necessary in a ward, there are quite a number of desirable furnishings the presence or absence of which must depend upon the income of the hospital. One should try, at all events, to have a standard number of each thing, so as to be able to know just what one has on hand and what has to be accounted for: any other plan will lead only to confusion and extravagance. Just here, a word will not be amiss to nurses in general upon care and economy with regard to hospital supplies. With these the nurses have more to do than any one else; they are the stewards, and upon them lies the responsibility of seeing that nothing is wasted or used extravagantly. For instance, the laundry-work could often be greatly lessened if nurses were more careful when changing beds and using towels; the gas bill could be much reduced if they would remember to turn down or put out the gas when it is not needed or when half a flame would do instead of a full one; alcohol, drugs, milk, and food should be ordered only in such amounts as are necessary, and one should be economical, although not parsimonious, in their use. Two bandages should never be put on where one would answer. In all these ways the nurse may become a liberal contributor to charity in that through her efforts two patients can be cared for where otherwise only one could be supported.

With a limited number of some articles one can manage very well, but of such things as linen, toilet and dressing basins, and vessels of various kinds there should be a liberal supply. In the average ward of thirty patients the standard linen list may consist of the following articles:

Blankets (white),	72	Spreads,	48
" (gray),	12	Sheets (large),	144
Dresses (women's),	24	" (draw),	120
Nightingales,	12	Table-cloths,	6
Night-gowns,	144	Towels (patients'),	120
Pillow-cases,	144	" (tea),	12
Petticoats,	18	" (roller),	12
Rubbers (bed),	30	" (dressing),	48
" (long black),	3	" (doctors'),	24
" (dressing, med. ward),	2	Wrappers (flannel),	6
" (" surg. ward),	12	Vests (flannel),	24
Stockings, pairs,	48	Pillows (feather),	36
Slippers, "	24	" (hair),	36

With suitable modifications the same list will apply to the male or children's wards.

A general linen-book for all the wards is kept by the superintendent of the training-school; in it is entered a list of the linen originally given out to each ward. When a ward is once supplied with a full list of linen, no new articles should be sent in except by the system of exchange. Thus, for instance, a worn-out garment may be replaced by a new one, but the new one should never be given out until the old one has been returned. The day for exchange throughout the hospital should be the first of each month, and during the month each head nurse should lay aside whatever is worn out or needs mending: on the first of the month the superintendent looks these things over, and those condemned are listed and numbered. They are then sent to the hospital linen-room, the lists are verified, and the worn-out articles replaced by new; the other articles are repaired, and during the second week in the month are returned to the wards. For general ward supplies, such as dishes, soap, matches, brooms, brushes, etc., a requisition should be sent in once a week; a small book is kept in each ward for this purpose, and every Saturday morning the head nurse writes in it a list of new articles required, and adds her exchange list of worn-out or broken things. The superintendent also goes over this list carefully to see that economy is being practised, and finally hands it in to the general store-room. Each ward keeps its special basket, which is replenished according to the requisition-book, and returned to the ward on Monday morning. The head nurse should receive it herself, see that what has been sent corresponds with the list in the book, and if correct sign a receipt for the same. At the same time on Saturday morning lists of surgical supplies and hospital stationery needed for the week should be handed in to the superintendent.

For the patients' toilet each nurse should be supplied with her own toilet-basket. (See Plate I.) This should be made of strong wicker, 13 inches long, 9½ inches wide, and $4\frac{1}{4}$ inches deep. The requisite articles are a hair-brush; combs (fine and coarse); small mouth-wash cup; whisk broom; soap-dish; three small jars for boracic acid, oxide-of-zinc powder, and vaseline; three six-ounce bottles, one containing alcohol for rubbing the back and limbs, one ammonia for adding to the bathing water, and one listerine or some pleasant mouth-wash; besides these, there should be a rubber cloth $\frac{3}{4}$ of a yard square to be used for protecting pillows, sheets, etc. when a patient is being bathed. Nothing more is necessary, nor should anything else be allowed, as the baskets must be uniform, so that when inspection day arrives the contents of each will be found precisely the same. Each nurse is held responsible for the neatness of her basket. All necessary articles are in it when it is given her, and after this she must attend to keeping up the supply. Worn-out articles are put on the ward exchange list by the head nurse, and their place supplied by new ones, but anything lost must be replaced at the expense of the loser. Nothing in the way of ribbons or binding is needed. The baskets should be arranged in such a manner that they can be kept absolutely clean. Since each nurse is supplied with one, there is no chance for any nurse to complain that she is unable to leave her patients in proper condition owing to the general ward toilet articles being in use or because some of them cannot be found. The cost of so many baskets in the beginning is considerable, the price of a basket without the contents being about fifty cents, but they wear well, and if proper care is taken of them they can, at the end of the two years, be passed on to the next class. By having a proper number much time and trouble is saved and better work is ensured.

In the previous chapter the division of work in the ward was outlined. We will now consider how this work should be done.

The daily care of the ward must come first. The nurse is to go on duty promptly at the appointed hour in the morning and begin her work at once. These first minutes in the morning are precious, and no one should spend a moment in pausing to chat with the night nurse, who perhaps is a friend, or with her fellow-nurses, before beginning work. The ward discipline in this respect should be very strict. The head nurse is there to oversee things in general, and her own particular work should occupy each nurse at this hour. It is best to begin by giving the side of the ward under her care a general straightening up, unless it already is in order: the chairs are to be put in their proper places, unnecessary things removed from the stands, and the coverlets all straightened on the beds. This takes but a few moments to accomplish, and gives an orderly appearance at once, and makes the remaining work less confused. It is necessary to have the wards neat, quiet, and in good order by the time the physician enters to make morning rounds. The hour for rounds varies in different hospitals, but as in many nine o'clock is the time set, for the sake of convenience we will consider this as the hour. The convalescents' beds have been already aired by the night nurse, and are ready to be made up at once. If rounds are early, it will be impossible to make thoroughly the toilets of all the bed-patients unless they are few in number, but care should be taken to see that they are all clean, their mouths and teeth washed, and the beds straightened; then after rounds each one may be carefully finished. After the main sweeping and brushing has been finished by the ward maid, the daily ward dusting will come next in order, but it will of course be impossible to have it all thoroughly done for early rounds. This dusting is done simply to remove the twenty-four hours' accumulation of dust. For this purpose a damp cloth wrung out of a basin of a weak solution of carbolic acid should be employed. All the chairs, tables, window-sills, bed-heads, bed-frames, sides, and ends should be gone over in this manner, care being taken to change the water frequently. The dust-cloth should afterward be washed out in hot soap and water and wrung out of a 1 : 20 (5 per cent.) solution of carbolic acid before being hung up to dry. The bedside stands should be examined each day, and nothing left in them but convalescents' clothes: everything in the way of food, extra clothing, pasteboard boxes, etc. should be removed.

A ward floor should be made of hard wood, and then rendered impervious to absorption. Scrubbing hospital floors is a mistake, for in this way impurities and germs are constantly being absorbed by the wood instead of being removed: as a result, as soon as the floor dries the dust given off from it may contain the very germs that the washing is supposed to remove. Hard wood, finished with shellac varnish and then treated with a mixture of turpentine and paraffine, makes a beautiful floor and a perfectly smooth resisting surface, upon which the dust only rests and from which it can be easily rubbed off. The turpentine is also cleansing, since it dissolves and removes any spots or stains that have appeared; it has also disinfectant and deodorizing properties. To make this preparation,

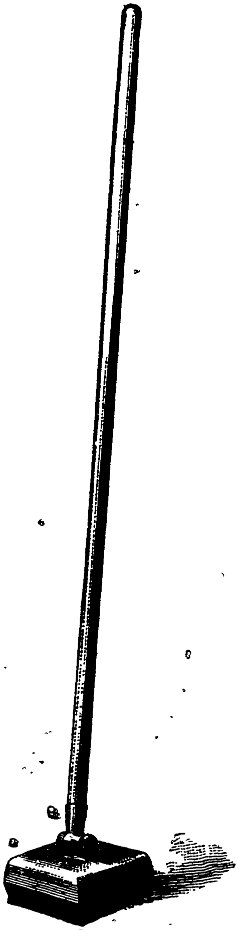
Take of Turpentine, one gallon;
Paraffine, six ounces.

Allow to stand for twenty-four hours till the paraffine is dissolved, then add one ounce of soft soap before using, mixing all thoroughly.

It can be applied with a pad of flannel fastened on an ordinary mop-stick. With this the floor is to be rubbed all over, and before the hard rubbing for polishing should be left an hour or so until the turpentine is absorbed; then it is polished, the rubbing being always in the direction of the grain of the wood, with a heavy polishing brush covered with flannel and weighted with from twelve to twenty-five pounds of lead. (See Fig. 1.) This application should be made every week or ten days, the floor being brushed up every day with a hair floor-brush. In brushing a hospital floor it is important to raise as little dust as possible: by fastening a flannel over the brush this danger can be almost entirely obviated.

After the patients and ward are in order each nurse should give her attention to that special part of the ward for which she is responsible: if it be the lavatory, she should see that all bottles, vessels, etc. are clean and in their proper places, and that the shelves and slop-hopper are in order. If the maid does not do her work well, the attention of the head nurse should be called to the fact. It is

FIG. I.



POLISHING BRUSH.

always best to have the criticism come from one in authority, but it is the nurse's place to see that the matter is reported, otherwise she herself will be blamed for being willing to have an untidy lavatory or any other department entrusted to her charge. This daily cleansing keeps the ward in good condition, but it is not sufficient to make a more particular and thorough cleaning unnecessary. When we stop to consider the number of patients with their various diseases who pass through a ward, with, say, an average of thirty inmates daily for six months or a year, besides all their friends and the people who come and go in the ward during that time, we can easily realize how necessary it is to be constantly on the alert with precautionary measures in the way of *thorough cleaning*. This should be done daily, weekly, semi-annually, and annually. In the weekly cleaning the bedside chairs and the window-sills should be washed thoroughly with hot water and green soap, the scrubbing-brush being vigorously used. One day should be set apart for this purpose, each nurse looking after her own division, and a second day for a thorough dusting and cleaning of the beds. In doing this one goes over the bedsteads with a solution of carbolic acid, and the mattresses are well brushed with a whisk broom. This precaution is absolutely necessary in free wards, where vermin are not infrequently brought in by patients or their friends, for if these pests are once allowed to get a foothold, the task of getting clear of them is difficult. A bedbug should never be seen in a hospital ward, and this weekly care of the beds is the only way by which the bugs can be kept out. The same precaution should be taken in private wards, and patients' trunks should not be allowed to remain in the rooms, but should be unpacked and taken to a trunk-room.

The most thorough cleaning of the ward should be done in the spring, and then, if possible, it is better to transfer the patients temporarily to another ward: usually, however, this is not possible, and so one selects a time when the occupants are few. Walls and ceilings should be thoroughly washed down and repainted, all the woodwork well cleaned, windows and chandeliers polished, and the beds disinfected thoroughly with carbolic acid. The floor is to be scoured at least twice with green soap, hot water, and brush, before being again paraffined. Every corner and every portion of the ward should receive this treatment.

Besides the regular weekly cleaning given to the beds, it should be the rule when a patient is discharged always to prepare the bed for the next occupant by giving it a carbolic wash. Bichloride should never be used for this purpose, as it corrodes and destroys the iron.

The mattresses should be sent to the sterilizing oven, or thoroughly brushed and left for some time exposed to the open air and sunshine. Blankets are treated in the same way. When these are too soiled or for any reason unfit to be used again before cleaning, they should be sterilized and put away until a number have accumulated from the various wards, and then all sent at once to be cleaned, instead of being washed at the regular laundry. If one does not do this, the blankets will become hard and stiff with ordinary washing, and will not wear as long as they would with proper care.

The ward utensils, such as the patients' basins, bedpans, and urinals, should, besides the attention given them daily, be well washed out with green soap on a certain day of each week and left in boiling water for an hour. The general bath-tub is to be cleaned thoroughly after each patient.

These are domestic details that must be looked after carefully and systematically, not in a spasmodic way, for they all indirectly have much to do with the patients' welfare. Above all, the ward is not to be made a storehouse for unused or broken articles of furniture, for, unless the rule be rigidly adhered to that only useful articles and those in good repair are allowed in the ward, we are sure to be hampered by an accumulation of rubbish.

CHAPTER IV.

BEDS.—BED-MAKING FOR BED PATIENTS; FOR CONVALESCENTS.—TO PREPARE A BED FOR AN OPERATION PATIENT.—FRACTURE BEDS.—MECHANICAL APPLIANCES FOR THE RELIEF OF BED PATIENTS.—HEAD-RESTS.—PADS.—LIFTING AND MOVING.

THE regulation bedstead for hospital purposes is made of iron; all other kinds are fast falling into disuse, and are only to be found in the older hospitals, where they are not sufficiently worn out to justify the expense of new and more modern ones. Any household would do well to have an iron bedstead on hand, and in any case where there is to be a prolonged illness in the house one should be purchased. Ten or twelve dollars will cover the expense. There are many varieties of the iron-frame bed, and just what selection is the most desirable is often puzzling to a buyer who has not had the actual experience of testing the merits or imperfections of the different kinds. A nurse who works over them daily ought to be a fair judge of what is required in the way of a bed for the sick. Four things should be taken into consideration in making a choice: viz. height, weight, durability, and simplicity. The height must be greater than that necessary for ordinary beds, not only because the continuous bending over a low bed could not be endured by nurses for any length of time, but because for purposes of examination and treatment the doctors must have a bed which will not necessitate much stooping. To the patient the question is really immaterial, for a footstool can be easily supplied for stepping in or out of bed, or if a patient thinks that he is more comfortable when sitting on the side of the bed, a lounge may be placed alongside for the feet to rest on. A single bed answers every purpose. It is rare for even the largest person to find it uncomfortable, and too wide a bed would make it impossible for the nurse to do her work with any comfort either to herself or to her patient.

The beds should be of medium weight. Great, heavy, clumsy iron beds are quite out of place, as it is impossible to move them without extra help, and they are apt to become wrenched during the process, and besides are not likely to last any longer than lighter ones. An iron-frame bed should last for years without need of repairs, if well put together and provided with a firm double-woven wire spring. It should be made with the utmost simplicity, for the sake of cleanliness, and should have absolutely no wood about it. The corners and crevices, where vermin or dust can lodge without being easily removed, should be as few in number as possible. A little more finish can be given to the bedstead by the addition of a brass rod across the foot and head and of brass knobs on the posts. Painting or enamelling with some pretty color adds much to the appearance. The length of such a bed should be 6 feet 6 inches, the width 37 inches, and the height from 24 to 26 inches. As its position has frequently to be changed, it should be mounted on casters. The only objection to these is that they make it hard to keep the bed straight, as one or both ends are readily moved by even a slight touch. It is therefore well to do without casters if enough men can be procured at a moment's notice to lift and carry any bed which has to be moved, for then the floors are not scratched, since the beds remain firm in their places. Every bed should be placed in such a position as to be freely accessible from all sides. The best form of mattress is one made of prepared horse-hair, weighing from 22 to 25 pounds, but to keep this mattress in good order it should, after being vacated by a patient, be disinfected in a steam sterilizer, and exposed for a short time to the sunshine and air before being again used. At intervals of twelve or fifteen months it should be taken apart, the ticking washed, and the hair renovated and made up afresh. In some hospitals two layers of army blankets are used over the wire mattress, but they do not make so comfortable a bed. Straw mattresses have this advantage—namely, that they can be renewed for each patient, but unless carefully made up they are apt to be lumpy and extremely uncomfortable. Feather beds are only met with in private practice, and a nurse's ingenuity will have to be exercised to effect a change, since any one who sleeps upon feathers in the present age is very apt to be "set" in her ways. The idea of making the mattress in three parts is not a good one, for if patients are at all restless, the divisions slip apart, and, although the middle portion of the mattress can be changed without interfering with the other two, it is after all not much easier to do this than to put on an entirely fresh mattress or to lift the patient to another bed. Each bed should be supplied with two pillows, one of hair and one of feathers. Frequently only one is required, and in fever cases or where there is much perspiration this should be of hair.

The covering should be light but warm, consisting of an upper and a lower sheet, 2¾ yards in length, and a draw sheet, 2¼ yards long and 2 yards wide. These should be made of white bleached cotton, as linen is more apt to be chilly and damp. Some light form of white cotton spread should be used on the outside, either of dimity or of a light-weight honeycomb pattern, but in hospitals, at any rate, the usual heavy white counterpanes should no longer be tolerated. A patient is often uncomfortable with a counterpane on, though he cannot discover the cause of his discomfort, and with operation cases and fever patients they should never be used, a clean white sheet being preferable. Counterpanes also interfere with the ventilation of the bed; and, though it is true that they make a ward look well, the patient's comfort should be the first consideration.

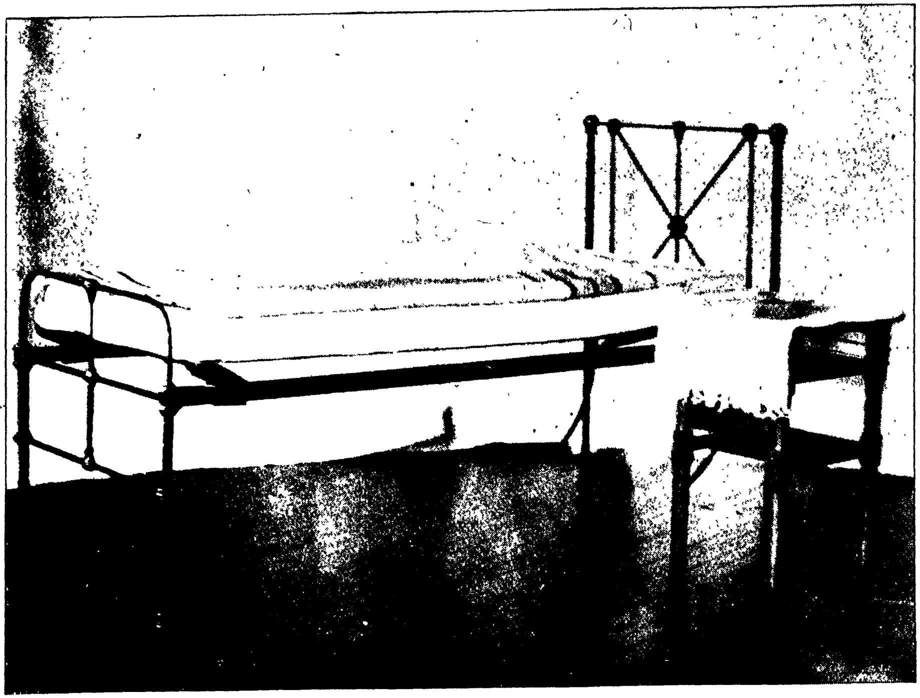
A nurse should be quite familiar with the best method of making a bed for a bed patient and with the manner of changing the sheets, pillows, and patient's linen, so that the bed may always be kept in good condition. Only a great deal of practice will make her quick and deft in the performance of this work. To make a bed for a patient who must be in it any length of time, a mattress should be selected that is smooth and even, not worn to a hollow in the centre: the lower sheet is put on first, and should be long enough to allow the ends to be well tucked in, first at the top and bottom, and then at the sides; next a draw sheet of rubber cloth 32 inches long and 45 inches wide is put on, the upper edge reaching to the edge of the pillow, and the lower coming down well below the place where the patient's hips will rest. The cotton draw sheet (doubled) should cover this entirely and be tucked in under the sides: in order that it may be perfectly free from wrinkles, it can be kept in place by being fastened with a safety pin at each of the four corners to the under part of the mattress; the two hemmed ends should be at the lower end, as there should never be a seam under the patient's back. The upper sheet and blanket come next, and lastly the counterpane. The upper edge of the blanket should be protected from soiling by being folded in the counterpane, at the top, between it and the upper sheet; to keep the coverlet clean a margin of about nine inches of the upper sheet is folded back over it. In tucking in these covers at the bottom one should be careful not to draw them too tightly over the patient's toes; they are to be loose enough to allow the feet to be moved about with comfort.

The changing of linen should be managed with as little fatigue and discomfort to the patient as possible. Unless the patient is very ill one person can do this easily. Only the upper sheet or a single blanket is to be left over him. The lower sheet and draw sheet to be removed are loosened at the top, bottom, and at both sides; one side is then folded along their whole length as flatly as possible close up to the patient. The fresh ones should then be folded lengthwise, alternately backward and forward, for half their width, and placed on the side of the bed from which the soiled ones have been removed, and the loose half tucked in at the side. The nurse then moves to the opposite side of the bed and turns the patient on his side with his face toward her; she can support him in this position with one hand while she tucks the sheets to be removed as closely and smoothly as possible up to his back, their place being taken by the fresh ones, which are made to follow them closely. Using both hands, the nurse now gently turns the patient toward the side away from her; the soiled sheets and the folds of the clean ones are drawn through; the former being taken away and the latter smoothed down and tucked in their place, care being taken not to leave the smallest wrinkle. Patients can often assist in this changing by means of the crane suspended above the bed, by which they can raise themselves more or less; but if a patient is quite helpless, then it is best to have a second person to assist at the changing of linen. In changing the upper clothing the fresh sheet and blanket are to be spread over first, and the others are then slipped away from underneath. It is quite unnecessary to expose any part of the patient in changing the entire bed-clothing. For convalescents it is unnecessary to have a rubber sheet on the bed, as its only object is to protect the mattress; when not needed for this purpose the patient is better without it, as it often causes perspiration and may be uncomfortably warm. In making a convalescent's bed it should first be well aired, and, no matter the time of the day at which a patient gets up, for a half hour or more the bed should be opened and aired. Two chairs should be used upon which to spread the clothes when taken off the bed: one is not enough, as they are apt to drag on the floor or become piled up, so that no air can circulate through them. Each piece should be shaken separately before being laid loosely over the two chairs.

In a hospital ward uniformity of appearance must be maintained in the beds, as it adds largely to the general neatness of the ward. Young nurses among their first lessons must practise making beds in such a way as to have them appear neat and uniform. It would never do to look down the ward and see some beds all hills and hollows, others with the spreads hanging farther down on one side than on the other, or with a corner hanging out in any direction, or to see the pillows, some showing the ticking through the end of the slip, or some lying flat and others bolt upright. After tucking in all the angles and making up a bed neatly, a general smooth appearance can be produced by running a flat stick, reaching across the bed, with some pressure, from the bottom to the top, before the pillows are put on. Patients are very fond of putting things away under the heads of the mattresses: nothing whatever should be allowed to remain there, and their towels and bath-cloths should be neatly folded and hung on the rung of the bed just behind and below the pillows, where they will be well aired and dried if damp.

To prepare a bed for an operation patient the same process is gone through as described in making a bed for a bed patient, with the exception that a single blanket is put on between the upper sheet and the patient, to be removed after the patient has reacted. The pillows should be removed to prevent nausea, and a towel pinned in their place across the top of the mattress, so that the head may lie low; two other towels should be hung over the head of the bed in case of vomiting after the anæsthetic, and a small basin placed on the bedside table. Instead of tucking the bed-coverings in all around, on one side they should be folded back to the edge of the mattress, so that the bed may readily be thrown open the instant the patient appears. Three large hot-water cans should be filled, encased in their flannel bags, placed in the bed, and left there until the patient is put to bed after the operation. The nurse should be particular to see that these cans are really hot and that they do their work well, for by the time the patient is ready to be put in the bed it should feel comfortably warm throughout. This heat assists the patient in reacting from whatever shock may have been sustained from the injury or from the anæsthetic and operation. But when the patient is once in bed the cans should be removed until consciousness is regained, else there is constant danger of burning him: a limb or arm or the trunk may be tossed about, or when moved may rest on the hot can, a burn perhaps instantly resulting without the patient being aware of it until consciousness returns. In cases where there is much shock after an operation, and all the warmth and stimulus possible is necessary to enable the patient to react, then the hot cans or bags should be put about him, but at a safe distance and

PLATE II.



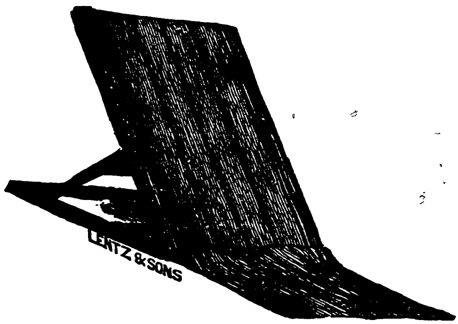
SURGICAL OPERATION BED.

separated from him by a blanket; but even then the nurse should very frequently slip her hand inside to assure herself that all is right.

Patients with fractures of any kind must have their beds made with special reference to their condition. The bed should be rendered firm and unyielding. This is done by placing under the hair mattress a fracture-board, made of slats each 1 inch thick and 3 inches wide. Made in this way, it will be lighter and afford better ventilation than one made of a single perforated board. An excellent fracture bed can be made of straw, by packing the straw very tightly and evenly into a firmly-made tick and covering it over with a long heavy mackintosh. This should be pulled tightly down and securely tied to the iron bed-frame, and the bed then made up with draw sheet, etc. in the ordinary way. Beds are also prepared in this way for spinal curvatures and other orthopædic cases. If a patient has to remain in extension or must not be moved from the bed for a number of weeks, the mackintosh should be kept fresh and clean by an occasional washing, after which it should be rubbed thoroughly dry.

Very numerous and often very complicated are the appliances which have been contrived for the relief of bed patients, but the more simple designs generally serve the purpose best. Those chiefly in use are head-rests, pillows, pads, and cushions of various kinds. It is a red-letter day for the patient when he is allowed for the first time to sit up in bed. He is raised at an easy angle, and supported in this position by means of the head-rest and pillows; hair and feather pillows combined will accomplish the same result, and these are generally used in private houses; but more pillows are required than when the head-rest is used, and a comfortable position is with more difficulty maintained. These rests are of many kinds, but the best is that made with a simple wooden frame and a canvas support (vide Fig. 2), which can be used with any kind

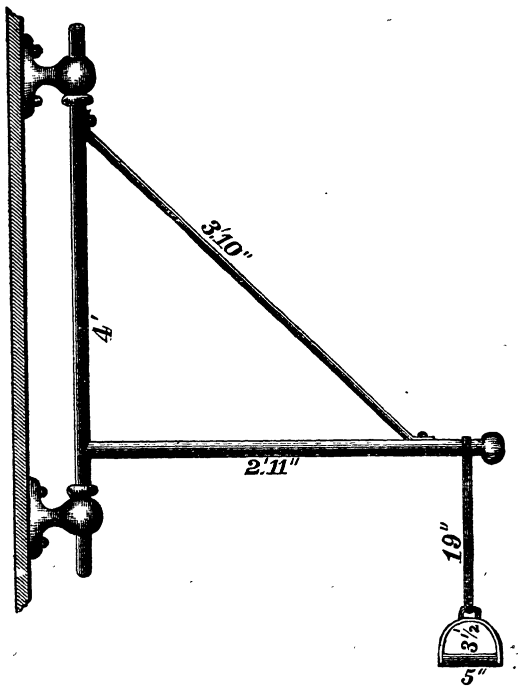
FIG. 2.



HEAD-REST.

of bed. A feather or hair pillow tucked in to support the small of the back, another for the upper part of the back and shoulders, and a small cushion for the head laid against one of these rests, will support the invalid in perfect comfort. In lieu of anything better a straight-backed chair may be turned upside down, fastened in place, and pillows arranged on it. To enable a patient to lift himself or change his position in bed, a crane will be found very convenient: this may consist simply of three bars of iron in the shape of a triangle fastened to the wall above the bed, or of a single rod fastened to the bed, to which a strap or handle is attached which hangs down within easy reach of the patient. (See Fig. 3.) This apparatus should be supplied with a hinge, so that the crane is movable to the right and left, and can thus be pushed aside when

FIG. 3.



CRANE FOR ASSISTING THE PATIENT TO MOVE HIMSELF IN BED.

not needed. Beds furnished with patent adjustments are rarely as comfortable as those which are less pretentious.

A head-rest is also a great comfort and support to patients suffering from shortness of breath arising from heart disease, asthma, or any other complaint which makes the upright position imperative. In connection with the head-rest the cylindrical cushion is used with patients who are inclined to slip down in bed. This is made of stout ticking 21 inches long and 8 thick, with rounded ends. (See Fig. 4.) It is

FIG. 4.

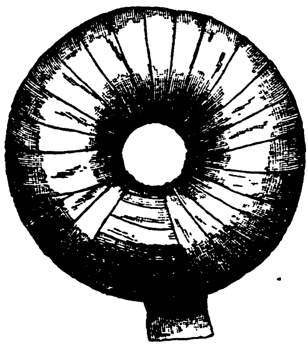
KNEE-CUSHION.

stuffed firmly with horse-hair and covered with cotton slips made to fit. To both ends of this pillow, which is slipped under the patient's knees, are fastened broad bandages which are carried up the sides to the top of the bed and tied to the iron rod tightly enough to keep the pillow in position under the patient, and so prevent him from slipping down. There should be a number of such pillows supplied to gynæcological and obstetrical wards, as they often give the greatest relief to patients after abdominal operations. When placed under the patient, just so that the knees rest upon them, they act by relieving the tension of the muscles of the abdomen and back, or when placed at the foot of the bed, where the patient can press her feet against them, they accomplish the same purpose. After abdominal operations, in place of the ordinary pillow, which is too high if the patient is nauseated, a small air-cushion or a feather pillow not too soft, and about

13 inches long and 10 inches wide, should be used for the head to rest upon during the first forty-eight hours. With very weak patients, or with those whom it is necessary to turn frequently from side to side, support should be given to the back by placing a pillow closely against it. Very often pressure along the spine can be relieved by partially slipping a hair pillow under the patient from either side, thus raising the middle portion of the back so that it does not touch the bed.

When a patient is confined to bed the portions of the body most exposed to pressure should be daily guarded against bed-sores. The most common sites are the lower part of the back, the hips, the shoulder-blades, the elbows, the tips of the ears, the back of the neck, and the inner surfaces of the knees, the heels, and the ankles. On the slightest indication of redness, even before any complaint on the part of the patient of a burning or stinging sensation in any of these places, the nurse should take care, in addition to employing the usual preventive treatment, to remove all pressure from the parts threatened. This may be done by means of cushions, which may be made of various shapes to suit the part to be protected. Besides the air-bed and the water-bed, there are on the market a number of rubber appliances in the way of cushions, among which we may mention the air-cushion, which is made square-shaped for the head and shoulders and circular for the back. For protecting the heels, ankles, and inner sides of the knees or the back of the head, a circular pad of a suitable size can be made of ordinary cotton batting. The cotton is firmly held in place by a gauze bandage passed around it several times, a hole being left in the centre which comes directly under the tender point, while the surrounding parts rest on the cotton. These pads are inexpensive and may be renewed frequently. For a small spot on the back, side, or heel, they answer every purpose. (See Fig. 5.) A few turns of a band-

FIG. 5.



HEEL-CUSHION.

age will hold one in place, unless it be on the back. Where a rubber ring is not available for the back in a case of bed-sore, a very good substitute may be found in a circular cushion made either of rubber cloth or of a double layer of oiled muslin stuffed with horse-hair. This can be washed, and by having two they may be changed and so kept fresh and free from odor. Water-beds and air-beds are sometimes ordered for patients who are predisposed to bed-sores, or for those who already have very bad ones, or who are in a perpetual state of moisture, a condition which is also likely to destroy a hair mattress. For paralytics they are indispensable. In getting a water-bed ready for use, a long heavy mackintosh is placed over the wire springs of the bed-frame, and the water-bed spread on this ready to be filled. Care must be taken to have it laid on the bed-frame exactly as it is to remain, for, when once filled with water, it is too heavy to readjust. The end with the opening, into which the water is to be poured should be placed at the foot of the bed. It is filled by means of a hose, or, if this is difficult to manage, the water may be poured in from a large pitcher through a funnel. The temperature of the water should be carefully tested, and should not be less than 100° F. This will allow for some slight cooling when it comes in contact with the rubber of the bed: if the patient has been ill long and is in a weak condition, he should in no case be put on it if the bed temperature is less than 98° F. To prevent the patient from rolling off the bed when filled, a wooden frame should be placed around it, both sides of which should be bevelled or else the sharp edges of the boards should be padded. The bed is to be made up in the usual way. An air-bed is arranged in a similar manner, except that the air is introduced with a force-pump and attention to the temperature is unnecessary. Rubber beds should be washed off and disinfected from time to time, and the greatest care taken to have no pins about them, because a pin prick might cause the bed to collapse and render it useless; this is important, as these beds are very expensive.

To become expert in lifting and moving sick people requires a great deal of practice, and a beginner should not be left alone to perform this office for the sick. She should at first assist an experienced nurse and thus learn the proper methods. It seems a difficult matter for many nurses to understand that, in moving him simply to change his position, it is of the utmost importance to support the patient: if this be properly done, quite a heavy person can be moved with little difficulty and without hurting him at all. Occasionally the complaint is made that a nurse has injured her back or strained herself in some way in moving a patient. This will generally be because she has failed to do the lifting properly. To move a heavy or medium-sized person in bed the nurse should put her right hand and arm obliquely under the patient's back, the hand being carried well down under the back, the patient's shoulder resting in the hollow of her own; the left hand is next put over and slipped well under the patient's other shoulder. The upper half of the body is now lifted gently and evenly and placed in the fresh part of the bed; the right hand being now slipped under the lower part of the back and the left just below the hips, the other half is moved over. To lift toward the head of the bed the right hand is placed well under the back, the heavy part of the shoulder being supported with the upper part of the arm and shoulder, and the left hand being placed below the hips: one then lifts gently and firmly. In doing this the greatest weight is thrown upon the right arm and shoulder. The patient can sometimes render some assistance by clasping the hands around the nurse's neck. In the same way support should be given with the left arm when raising patients to readjust or arrange pillows, the head being allowed to rest against the shoulder while the back is supported with the hand, and the other hand is used for putting the pillows in place. The head and shoulders are then placed back against the pillows with an easy, gentle motion. It is the height of awkwardness to pull or drag a sick person about the bed when working over him. The ideal way to change a bed patient is to have two single beds of the same height, one for the day and one for the night, each being provided with its own set of blankets, sheets, etc. The patient may be transferred from one to the other by placing the beds close together and drawing the mattress with the patient on it a short distance over that on the other bed; the occupant may then be transferred to the second bed by pulling on the sheet upon which he is lying. If there be a second nurse to assist, one can take the sheet at the head, and the other at the foot of the bed, and, both lifting carefully and at the same moment, the patient can thus be placed in the middle of the adjoining bed without the least jar, after which the sheet may be slipped out from under him. After abdominal operations this method is quite safe, but, of course, with some surgical cases moving is altogether out of the question. If two such beds are not procurable, as is often the case, a lounge may be wheeled up close to the bed, the patient, together with the sheet, lifted upon it, and left there until the bed has been aired and changed. Another excellent way is to have two mattresses with one bed: one person may draw away the mattress on which the patient is until it is half way off the bed; then the second mattress is put on close to the other, and the patient drawn by the sheet over upon it. It will afterward be easy to slide it the rest of the way on the bed. If a patient is to be carried to a lounge, this may be placed at the foot of the bed (with its head toward the foot of the bed) in such a position that the carrier need take only two or three steps from the bedside: he thus has to do no turning, and can lower the patient gently. Similarly, when the patient is to be transferred to it, the invalid chair should always be placed with its back toward the bed. When one is carrying a patient, it is best to straighten one's self up and allow the weight to fall upon the chest and front part of the body, since strain on the lower part of the back is thus prevented.

CHAPTER V.

HYGIENE OF THE SICK-ROOM AND WARD.—AIR.—VENTILATION.—METHODS OF VENTILATING.—SICK-ROOM TEMPERATURES.—DISPOSAL OF EXCRETA.—SOILED DRESSINGS AND SOILED LINEN.

No department of a nurse's work should appeal more forcibly to her than attention to the hygiene of the sick-room. She should thoroughly grasp the general principles which underlie the subject, and endeavor to apply them in the minutest detail. Thoroughly clean surroundings and a constant supply of pure, fresh air are the ideal conditions, but the question how these can best be secured may at times tax our ingenuity to its utmost. In well-planned hospitals these desiderata have usually been fully provided for, and it will be the nurse's duty simply to see that the means to this end, in so far as they are entrusted to her care, receive the proper attention.

Nurses are guilty of culpable inattention who neglect at all this daily and hourly feature of their work. A nurse should constitute herself, as it were, the ward thermometer and barometer, and train her senses to note any change in the ward atmosphere. She should never come into the room or ward from the outside air without noticing particularly whether any disagreeable odor be present or if the air be heavy and close; and if there be any suggestion of impurity, steps should be taken at once to remove the cause. She should be able to detect by her own sensations a temperature too high or too low, and air which is damp or chilly. It is just as important to charge each nurse in turn, for a certain length of time, with the responsibility of looking after the ward hygiene as it is to detail her to administer the medicines at the proper hours. Suitable hygienic conditions will sometimes do more to cure patients than the administration of drugs.

To render the condition of a ward wholesome, it is necessary not only to regulate its temperature, but also to provide for the ingress of a supply of fresh air whenever it is needed. It must be seen to that the ventilating flues for removing any accumulation of impure air are open and closed at the proper hours; that anything in the way of a disagreeable odor is removed; that deodorizers, if they are in use, are renewed; that the waste-pipes and kitchen-sinks are properly cleaned and flushed daily; and that no soiled or infected linen, no soiled clothing or dressings, are left standing about in uncovered receptacles, and that all vessels in use are kept thoroughly cleansed. No nurse can do this properly unless she trains herself to be always on the alert to see that no rule of hygiene which it is possible to observe is broken; and here, again, much will depend upon the acquisition of the habit of observation.

The limits of a text-book of nursing are necessarily too narrow to permit a full discussion of so important a subject as ventilation. It will be possible to touch only upon the fundamental principles and to describe in brief some of the most important methods.

We cannot insist too much upon the importance of nurses having a clear conception of the application of the laws of hygiene to the care of their own personal health. Only too often does the training-school superintendent find, on her tour of inspection of the nurses' sleeping-rooms, that more than one window has been tightly closed all night, notwithstanding the instructions that have been given. If a nurse cannot realize the importance of pure air for herself, how much less is she able to protect the health of those entrusted to her! how little will she be prepared to combat the errors and prejudices which she will daily encounter in her work as a nurse when on private or district duty!

The first division of the subject to consider is *ventilation*, but to clearly comprehend its importance one must first understand the conditions that call for it.

Air, being a mixture of colorless gases, is quite invisible, but changes in its composition are readily detected by its exhilarating or depressing effects on the system. As air occurs normally in nature, it consists of 20.63 parts of oxygen, mixed with 78.49 parts of nitrogen. Besides these two substances there is always some water in the form of aqueous vapor, and some carbonic acid gas. The quantity of aqueous vapor varies with the temperature, but on an average does not amount to more than about 0.84 per cent., and in the open air the proportion of carbonic acid gas (CO_2) is never greater than $\frac{4}{100}$ of 1 per cent. Of the two gases of which the atmosphere is fundamentally composed, nitrogen is of no biological significance, except in so far as it dilutes the otherwise too energetic oxygen, upon which all members of the animal and vegetable kingdom depend for the performance of those functions which in their combination we recognize as life. When we remember that air is a mechanical mixture and not a definite chemical compound, we cannot fail to be struck with the constancy of its composition. Normally, carbonic acid gas is being poured out into the air from many sources: men and animals breathe in oxygen and breathe out carbonic acid gas, and in the combustion of wood and coal large quantities of oxygen from the air combine with the burning carbon to form the same substance (carbon dioxide, carbonic acid gas). This production, which might otherwise be excessive, is partially compensated for by the action of plants, since it is well known that trees and plants in their growth split up the carbonic acid gas which they find in the air, retaining the carbon themselves and setting the oxygen free.

It will be readily understood that where anything interferes with the natural methods of purification of the air, as must be the case where people are hived together in cities and manufacturing towns, the proportions above given may be seriously altered by the introduction of impure gases, smoke, dust, and organic matter of various kinds.

Substances containing carbon are present in the body, and it is through the oxidation of these, with the formation of carbon dioxide (a process of combustion), that the body heat is maintained; therefore it is necessary that the air with its contained oxygen should enter the body freely in order that these chemical changes may proceed satisfactorily. The lungs are the organs set apart to render possible the free interchange of the gases of the blood with those of the external air. Each time a breath or inspiration is taken, a certain amount of oxygen enters the lungs; thence it passes through the walls of the capillaries (which ramify over the air-cells of which the lungs are composed) into the blood, by which it is distributed to the tissues. Carbon, burning slowly or quickly, is changed finally, as we know, to carbon dioxide. This finds its escape into the outer air again principally through the lungs, so that with each expiration the air breathed out is charged with a certain amount of impurity in the form of carbonic acid gas. Moreover, physiologists tell us that certain extremely poisonous organic substances, of the nature of which we are as yet in complete ignorance, accompany the carbon dioxide and add materially to the deleterious effects of the expired air. Unless some provision is made to remove these impurities from the air that is being breathed by our patients, instead of breathing in fresh, uncontaminated air, they will take in again the same impurities that were breathed out; hence one great necessity for ventilation. Besides this, organic matter is being constantly given off by the skin, as well as by the lungs, not only in the form of vapor, but also as small particles of waste or decayed tissue. The atmosphere, besides containing these impurities coming from the bodies of men and animals, is influenced more or less by the different localities and surroundings; thus in some places where there is much decayed vegetation, in swampy or marshy tracts of land, in overcrowded communities, where dirt in dark corners and in vessels is allowed to accumulate, where refuse and offal of every description remain unremoved,—in all such places the oxygen in the air is decreased in quantity, and the air itself is contaminated with poisonous gases and compounds, thus rendering it unfit to breathe. The burning of illuminating gas is another factor to be considered, since it deprives the air of its oxygen and gives in return gases unfitted for respiration; thus in burning one cubic foot of ordinary gas eight cubic feet of fresh air are used up. The same remarks apply to the combustion processes in stoves and furnaces.

These, then, are some of the conditions which healthy people have to encounter in breathing the air about them: it is obvious that the conditions become much more serious in rooms or in hospitals where disease is continuously present. The quantity of impurities given off from diseased bodies and from the excreta is enormous, so that the matter found in the air of the sick-room and in the dust which collects upon the furniture is likely to contain a large proportion of organic matter, and not seldom the germs of disease.

The necessity for good ventilation and thoroughly clean surroundings thus becomes at once apparent: in a word, the foul air must be replaced by pure, fresh air.

The methods of ventilation may be divided into two great classes, natural and artificial. In each case the air must be changed without causing a draught. The smaller the space through which the air is admitted the greater the danger of having draughts, and the smaller the room, the more quickly and easily does the air become impure. The amount of pure air which should be supplied for each person in an hour is 3000 cubic feet —*i. e.* about 1 cubic foot per second. The volume of a given mass of air varies, like that of all gases, with changes in temperature and pressure; thus gases expand when heated and contract when cooled or when they are subjected to increased pressure.

Natural ventilation is chiefly dependent upon three factors, the action of the winds, the movements produced by the unequal weight of the different air-strata (brought about by temperature and pressure changes), and the diffusive power of gases. As we said above, heated air expands, and so in a room heated in any way the air must expand more or less according to the degree of heat. The surplus will escape in various ways through doors, windows, and crevices. The outside air, being heavier, will now have a tendency to enter the room and displace the lighter air, but this air which enters becomes heated in its turn, and thus two constant currents of air, one going out, the other coming in, are established. This will occur, of course, only when the temperature of the outside air is different from that of the inside air. These air-currents may at times be so rapid as to produce a draught. If the room has the same temperature as the outside air, then there will be no ventilation or change of air. In summer, when windows and doors are all open, the atmosphere is much alike both inside and out, and for any change that is produced we must depend upon the wind.

But in order to have good ventilation it is necessary that the air which enters should penetrate into every part of the room, and become well mixed with that already there. In the case of winds or air-currents produced by temperature variations, if the velocity be great, the fresh air may enter one portion of the room and pass directly through and out again, thus affecting only the small portion of the air coming directly in its path.

Diffusion of gases goes on perpetually according to the well-known physical law.* In whatever part of the room the air is warmest, the air-currents will be toward that part, as they always flow in the direction of the least resistance. No matter into what part of the room the cold air enters, it will always fall. In ventilating by means of windows the entrance of the fresh air and the exit of that which has been exhausted should be regulated by opening the windows from the top only and on opposite sides of the room, one toward the direction in which the wind blows and enters, and the other away from it. In this way any draught that may be caused will be too high up to harm the patients, unless a door should be left open at the same time, so that an opposite current is produced. Another advantage in having the cold air enter at the top is that it will become slightly warmed in its descent, and not be so apt to be felt by those who are up and about the room. When the windows are open, however, care should be taken not to have a patient in bed directly under the one through which the air enters. If there is a fireplace with a fire in it, it will not be necessary for the second window to be open to let out the heated air, as the draught created by the fire attracts the air to the fireplace and so up the chimney. The fireplace is considered the best method of extracting the air, but this mode of ventilation is suitable only for small wards. Where there is only one

* Gases diffuse inversely as the square root of their densities.

window in a room, or where there are two on the same side, a fireplace is necessary, and in summer a burning lamp or candle should be kept standing in it to warm the air and produce an upward current. To avoid draughts and to secure a constant supply of pure air in a room, various artifices must be resorted to, some of which are more particularly applicable to private nursing and district work, where a nurse often has to invent her own arrangements and explain away a great many objections. A simple way is to raise the lower sash of a window six inches, and place a board across the opening below; the air will then enter between the two sashes and be directed upward, where it becomes diffused and cannot blow directly upon any one. If the sill of the window is deep, the sash may be raised until its edge is even with the surface of the sill, and in this way the same end is accomplished. In a room with but one window, a pane of glass may be taken out and a piece of tin or pasteboard placed in a slanting direction across the opening, or a pasteboard box may be so placed that the current will be directed upward. As another expedient, a window can be opened in an adjoining room and the room filled with fresh air, and then the door into the sick-room opened to admit it. The patient may be covered up, head and all, for a few moments two or three times a day, while all the windows are thrown open and the room is thoroughly flushed.

Natural methods of ventilation are those chiefly employed in private houses, and the arrangement of some of the simpler plans very frequently devolves upon the nurse. This is quite right, since she is on the spot at all hours, and should understand just what is required and what is the best thing to do in any particular case. In institutions, however, both natural and artificial methods are used, for no matter what artificial means may be resorted to in the winter for heating and ventilating, in the summer doors and windows are freely opened, and the natural forces are depended on for the distribution of air. Here, on the other hand, it is not necessary for the nurse to plan so much as to fulfil, and it is her duty to acquaint herself with the exact method employed in the particular hospital in which she works, and to make sure that whatever part of its fulfilment falls to her share is faithfully carried out.

The system by which fresh air can be introduced into the room at almost any degree of temperature desired by passing it over hot-water coils or by admitting it without being heated at all, while at the same time the foul air is removed by ducts, is by far the most complete method employed as yet. The temperature of the ward can be regulated by proper observation and with a little care, so that the absence of impure air or disagreeable odors is remarkable. A full description of this plan may be found in Dr. J. S. Billings' description of the Johns Hopkins Hospital.

A thermometer should be suspended at a central point in the room or ward, not too near the gas or the windows, and the temperature recorded once an hour. The frequency of such observations will much assist a nurse in realizing what variations of temperature may take place within an hour, and the noting of it should train her in the habit of observing atmospheric changes. This record should be kept faithfully and punctually day and night; and when the temperature is found to be higher or lower than the degree required, the next step after recording it is to remedy the condition by either increasing or decreasing the heat-supply. It would hardly seem necessary to say this were it not a well-known fact that nurse after nurse has been known to pause in her work long enough to look at the thermometer, and, finding the temperature as high as 76° F. or 80° F., has yet calmly recorded the same and resumed her interrupted work, not at all realizing that she has performed but the smallest part of her duty. She might just as well, in many cases, omit her patient's medicine as neglect the regulation of the temperature of the air by which he is surrounded. In the same way draughts may blow about some nurses, who, if they have not been especially instructed on the point, will have no idea that the regulation of them has anything to do with their duties. These are minor details, and may seem trivial, but they are important ones. The ward or room temperature must be regulated according to the nature of the disease. In fevers it should be of course lower, varying from 60°–65° F., but in lung affections it should be kept at about 70° F.

Variations in the temperature of the air take place normally at different times in the day, it being warmer at high noon and cooling off toward night. Particular attention should be given to patients in this regard between the hours of one and six in the morning, since at this time the sick, and even well people, often feel chilly sensations. It is during these hours that the vitality is lowest and many deaths occur. An extra blanket should be supplied, warm drinks given if necessary, and the ward temperature kept up, not by closing all windows and openings and shutting in the foul air, but by the addition of more heat in whatever form it is supplied, whether by means of a fireplace, steam, or hot air.

Give plenty of sunshine to patients and ward, but be particular to exclude its glare on hot days or if it is shining directly upon the face or making itself uncomfortably felt. It is surprising how many people, in other respects very intelligent, dread the night air, and how carefully they exclude it from their sleeping rooms, forgetting that it is the purest air obtainable at that moment, and therefore the best, provided it is not entering directly from some cess-pool or contaminated portion of the country.

The disposal of the excreta of a ward or sick-room is one of the most important considerations in connection with its hygienic condition. The sputum and other evacuations, improperly cleaned vessels, soiled dressings, and soiled linen, if not properly taken care of, are prolific sources of impure air.

Sputum-cups for patients should be made of glazed earthenware, straight up and down, without any corners or cracks, and provided with a simple movable cover when in use. They should be sterilized in the Arnold steam sterilizer for one hour in every twenty-four hours. Bed-pans and urinals should be washed out thoroughly, boiling hot water being allowed to run on them for some little time before they are put away. Soiled dressings should be received in basins with covers and at once carried from the ward, and, unless special disinfection is necessary, put into the soiled-dressing can, which is made of metal and closely covered, and if possible carried away directly to be destroyed. Vomited matter or evacuations from the bowels or bladder should never be carried through a ward or from a room without being covered over either with a towel or rubber cloth. The rubber cloth is better, as it keeps in the odor: it is also impervious and can be scrubbed and disinfected. The object of all these precautions is to reduce to a minimum the scattering broadcast through the hospital of those organic impurities which do so much harm.

The above is, of necessity, an inadequate description of so vitally important a subject, but no pretence is made to do more than endeavor to direct the student's thoughts in the right direction. Any woman will remain superficial if she fail to listen carefully to the lectures on hygiene and read for herself books that will enable her to have a deeper knowledge of the subject.

CHAPTER VI.

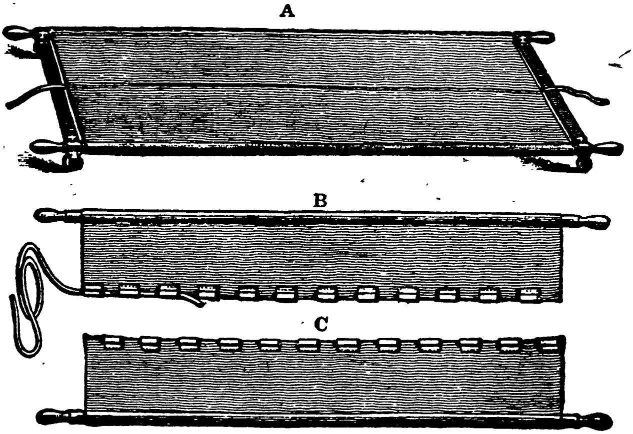
Care of New Patients.—Treatment.—What to Observe.—Reporting to the Physician.—Care of the Bed Patients.—Frequency of Bathing.—Care of the Teeth and Mouth.—The Prevention and Treatment of Bed-sores.—Care of Convalescents.

The first attention a nurse gives to a patient will depend entirely upon the condition he is in when placed in her care or when brought into the ward. He may be able to walk, or possibly just strong enough to be moved if seated in a wheel-chair, or, on the other hand, he may be so helpless that he has to be carried, and that, too, in the easiest manner possible. A stretcher will be found most convenient for carrying such patients. This should be made of stout canvas, 6 feet 6 inches in length and 2 feet wide, with hems on either side wide enough to allow two hard wood poles, 7 feet long and 2 inches in diameter, to be pushed through them; the poles are kept in place by means of a movable cross-bar at each end, which prevents the two sides from folding together. (Vide Fig. 6.)

In every hospital with free wards there should be two receiving-rooms—one for men, the other for women. Each should be provided with bath-tubs and all requirements for giving the first bath, and in addition there should be kept here a stock of wrappers, night-gowns, stockings and slippers, gray blankets, and a bed.

A patient who is able to walk or to be moved in a wheel-chair should be taken directly to this room, and at once given the first bath; a night-gown, wrapper, and slippers are then put on, and the patient enveloped in

FIG. 6.

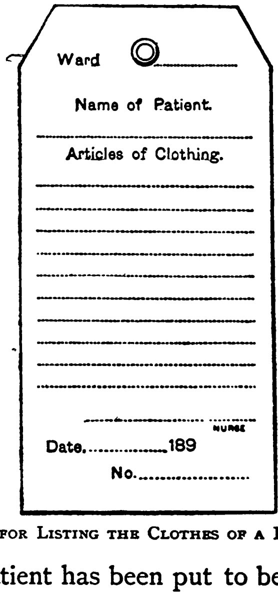


STRETCHER: (*a*), ready for use; (*b*) and (*c*), the two halves separated.

blankets and sent into the ward. Except in a case of emergency no patient should be taken to a free ward among other patients with his own clothes on: they should be removed and he should have at least one bath, either in bed or in the tub, before he comes near other patients. His clothing should be inspected and a list taken, after which all articles are sent to the disinfecting oven in a covered metal box. After sterilization they are sent to the laundry to be washed, or if clean enough are hung up carefully in the patients' clothes-room—a large room well ventilated and set apart for this purpose. Sometimes, however, a patient is admitted in an extremely critical condition: then no time should be lost, and the physician orders such a patient to the ward at once. In anticipation of this, a bed should, if possible, be kept freshly made up, so as to be ready at a moment's notice. If the patient be very dirty as well as very ill, the upper coverings should be thrown back and a long black rubber sheet spread over the bed; a bath blanket is thrown over this, and the patient is lifted into bed. A second bath blanket is now thrown over him, and the regular bed covering added when it is necessary. This protects the clean bed and saves any extra moving of the patient if the doctor sees fit to order a bath in bed. After the bath, the rubber and blanket can be easily slipped out, and the patient rests in a perfectly clean bed.

The bath-rooms and clothes-room should be quite separate from the wards, but so few hospitals have this system that we shall consider in detail the other plan, according to which all patients are taken directly to the wards, where the nurses, besides other necessary attentions, give them their first baths and look after their clothing and valuables. If a patient walks in, he is usually given a chair placed in the hall or room outside the ward until the doctor has given orders in regard to him. The head nurse should immediately report the admission of a patient to the ward, and under no circumstances should she neglect to do this. A nurse should be detailed at once to look after him, to see that his chair is comfortably placed out of the way of draughts and of passers-by. His general condition is then noted. The temperature and pulse are taken first and reported, and if any special symptoms are present these should be reported at the same time. The doctor will then give his orders, but if there be any delay while waiting for him, the patient must still be kept under observation and made to feel that he is receiving attention and consideration. Possibly he would like a glass of water, or if he has not eaten for some time and is in need of food, he may feel too strange and frightened on his entrance to a hospital to ask for these things, and the nurse should not wait to be asked, but should inquire herself. As milk is usually a safe form of diet, a glass of it may be given without hesitation. If a bath is to be given, in a woman's ward this duty devolves upon the nurse, in a male ward upon the orderly. In giving the first bath any peculiarity about the patient should be noted, and the presence of swellings, lumps, scars, sores, or any kind of rash should be reported at once to the head nurse, whose duty it is to inform the doctor. After the patient has been cared for, attention is next given to the clothes and valuables. The nurse in charge finds out from the patient if he has money or other valuables. She makes a list of these in a book kept for the purpose, to which she signs her name, and hands them over to the hospital clerk, who deposits them in the safe. Absolutely no responsibility should be assumed by a nurse for the valuables of any patient, and whatever is retained by him remains at his own risk. If nurses do not adhere strictly to this rule, sooner or later trouble is sure to follow. The inspection of the clothing is a duty which usually falls to the lot of the probationer or junior nurse. She should examine each article carefully to be sure that it is quite free from parasites, and if such are present or if the clothes are soiled, they should be listed and sent to the disinfecting oven or to the laundry; in the latter event they should be marked with the patient's name and ward. If, however, they are clean, all the smaller articles should be neatly folded together and wrapped in a large square of coarse gingham to protect them from dust; the dresses or coats should be hung up in the division of the clothes-closet assigned to them, the small articles being placed on the shelf below in a compact bundle, to which is attached a tag on which is written a complete list of the clothes, with the date and name of the patient and the signature of the nurse.

FIG. 7.



FORM FOR LISTING THE CLOTHES OF A PATIENT.

After the patient has been put to bed and is rested and quiet—that is, in about an hour—his temperature and pulse should again be taken, as the first record may be untrustworthy if, as is likely to happen, one or both have been influenced by the excitement of coming into the hospital. A specimen of urine is now obtained (in women always by catheterization), and kept for the doctor's inspection; at the same time one ascertains whether or not the bowels are in a normal condition.

If a patient is very ill, if he has a chill, or if the body or feet are cold, hot bags or cans are to be applied without delay.

It may be impossible to give a full bed-bath at once to an invalid in a weak condition or to one to whom the bath is disagreeable, and we often have to proceed gradually. When there is plenty of time a full bath should be given to a bed patient every day, and in some cases this is absolutely necessary; but if there are many to be bathed in a limited time, each should have a daily bath at least as far as the waist, particular attention being devoted to the spaces under the arms. The surfaces between the thighs should also be cleansed daily, and a full bath given twice a week. Absolute cleanliness of the body and of the bed are two most important factors in hastening convalescence. A bed patient's hair should be washed occasionally: if precautions are taken, no danger of taking cold need be feared. Powdered borax is mixed in hot water, the pillow and shoulders are protected with a rubber sheet, the patient moved over to the side of the bed, and two basins of hot water are placed on the adjoining bed-table, one containing the borax solution, the other simple hot water for rinsing. The washing can then be done quickly and easily. The hair is rubbed thoroughly and spread out on the rubber cloth until it becomes quite dry. To free hair from parasites the head is bound up for two or three days in a cloth soaked in a 1 : 20 (5 per cent.) solution of carbolic acid, which is kept moist all the time, the pillow of course being protected by a rubber cloth or else the head covered with a cap of oiled muslin. After the hair is dry, alcohol is rubbed in about the roots to destroy the nits, which soon after drop off. In a free ward it should be the rule to have every patient's head examined carefully, and when necessary a preparation of larkspur and ether applied. In the case of a woman who is too weak to have all her hair attended to at once, a part only should be done at one time; thus one braid might be dressed in the morning and the other later. The hair, however, should never be allowed to go uncared for more than twenty-four hours, and if it be handled deftly, the operation will be a pleasure to the patient instead of the ordeal it sometimes proves to be. Here, again, success comes only from much practice and perseverance. Every time one has long and difficult hair to care for, one more opportunity is afforded for practice, and the process should not be hurried through, but the nurse should try each time to make some improvement in her methods. The arrangement of the whole head should not be attempted at once: it is best to part the hair into two strands at the back, and then take one side, this again being subdivided if necessary. The combing or brushing should be done gently but firmly: we should begin at the ends and work upward, the hair being always grasped by the left hand at some point between the comb and the head, so that there may be no jerking or pulling. The best way to dress the hair is in two braids, care being taken to draw each well over to the side and to braid low down just below the ear, so the patient may not have to lie on two hard lumps of hair. The first two or three turns taken should be looser than the subsequent ones.

The mouth and teeth are to be carefully looked after, and so far as possible kept clean and sweet. The condition varies very much in different patients. Where the accumulation of sordes and mucus is rapid, and where the lips and tongue are stiff and parched, attention may be needed every hour, but in ordinary cases twice a day or after each meal will usually suffice. The mouth should be kept as moist as possible, and the same treatment carried out through the night as during the day. Night nurses are not so attentive as they should be in this regard, and often this happens, not so much from lack of time as from want of thought. There are various mouth-washes in use. A weak solution of borax answers as well as anything. Listerine is very cleansing and has disinfectant properties; a solution of lemon-juice, glycerine, and distilled water is refreshing and softens the tissues; but where fissures appear they are to be treated with frequent applications of vaseline or cold cream. Where the gums are soft or spongy and sore a few drops of the tincture of myrrh added to pure water may be used. The best sponges for washing out the mouth are made of small squares of dressing gauze or old linen, since these can be burned immediately after use. One of these squares should be wrapped about the index finger, dipped in the wash, and inserted into the mouth. Every portion of the cavity should be well gone over, the sponge being passed along the gums and inserted behind the wisdom teeth—a place often neglected—thence over the roof of the mouth, inside the teeth, and under the tongue. If the tongue is badly furred, it should be soaked and then scraped.

To guard against bed-sores is one of the first injunctions given to a nurse who is entrusted with the care of a bed patient: the danger of such an occurrence varies with the nature of the disease and the weight of the patient. It is just here that good or bad nursing tells, and the development of a bed-sore while the patient is under a nurse's care gives ground for severe criticism, and should be a source of mortification to her. Bed-sores result from continuous pressure on a certain spot or spots, also from friction between two surfaces, and from lack of proper care and cleanliness: their formation is favored in certain conditions where the nutritive processes taking place in the body are faulty. Those due to pressure occur most frequently on the hips and lower part of the back, the shoulders, and the heels; those from friction on the ankles, the inner surfaces of the knees, or on the elbows and back of the head from frequent movements in the bed. Those resulting from malnutrition of the entire system may appear in almost any place where there is the slightest pressure, and may show themselves first in the form of pustules, which are followed by a rapid breaking down of the tissues. This last variety is the most difficult to keep in check, and even with the utmost care they are sometimes unavoidable. Preventive treatment consists in absolute cleanliness and the removal of pressure. The back and shoulders should be bathed night and morning, and gentle friction employed to keep the skin clean and active; they are afterwards rubbed with a 50 per cent. solution of alcohol to harden the skin; and finally the parts are dusted thoroughly with some kind of powder which will absorb the moisture. For this purpose the oxide-of-zinc powder or bismuth mixed with borax are of equal value. If there is much moisture from perspiration or from involuntary evacuations, this process is to be repeated whenever indicated. The sheets must be kept perfectly smooth and dry under the patient: sometimes even a slight wrinkle will produce redness and tenderness. The first indication of undue pressure is redness of the skin; the patient may complain of a stinging sensation, but we must never depend upon him to report this, but must be on the watch all the while, so that the first sign may not escape us. Any abrasion of the skin is to be first carefully washed, and a small pad of cotton sprinkled with iodoform placed over it and kept in position with celloidin, or sprinkling with iodoform powder and then covering with rubber tissue is said to be excellent for protecting the back both before and after an abrasion appears. The pressure may be removed by means of rubber or cotton rings. A change of position is advisable, and where it is possible the patient should be turned on his side, the back being supported with a pillow well tucked in.

If, however, in spite of all our precautions, a bedsore has formed or a patient is admitted with one, the physician is to be told at once, as he may prefer to outline the treatment himself: often, however, it is given over to the care of the nurse, and then should be treated like any other wound. The part is sponged clean with soft gauze sponges, a solution of boric acid or a weak solution of carbolic acid being employed, and the cavity packed with strips of iodoform gauze or treated with iodoform ointment, over which a layer of borated cotton is applied. The whole is sealed with a layer of gauze dipped in celloidin. If the sore is a very bad one, it should be dressed twice daily; for small ones once a day will be sufficient. If there be a slough, it may be removed by poultices, but these are seldom or never ordered now, as they soften and tend to weaken the surrounding tissues, and thus favor pus-formation. A packing of gauze moistened in carbolic solution is better. Weak granulations may sometimes require stimulation: where they are too exuberant some caustic application may be indicated. The formula for the celloidin solution will be found elsewhere. With this preparation the use of a rubber plaster to hold a dressing in position is quite unnecessary. The adhesive plaster is undesirable, not only because it is uncleanly, but on account of the irritation which it produces and the difficulty and pain experienced when it has to be removed.

In the first stage of convalescence from an acute disease, when the temperature has become normal or nearly so, a limited soft diet is ordered, and if the patient is allowed to sit up in bed, he is to be supported by a head-rest or with pillows. In the next stage he may be allowed a little solid food and may sit up out of bed (at first only for a few minutes, the time being gradually prolonged each day), and from this on there will be a gradual increase in privileges until strength is restored. The second stage is more or less prolonged according to the particular case, but not until a patient is discharged do a nurse's duties cease. Especial attention is required during convalescence lest too much be attempted and bad results follow. The temperature and pulse should be taken and recorded twice in the twenty-four hours, the amount of sleep noted, and the increase in weight determined about once a week.

When the patient sits up in bed a flannel vest should be placed under the night-gown, and the shoulders are to be well protected. A loose flannel dressing-jacket is comfortable and looks well. Nightingales are very convenient to put on and off: they fit well about the shoulders, and are in every way best for hospital use. They may be made of a double thickness of outing flannel, are inexpensive, and do not shrink in washing. Unless the weather is very warm, gray blankets should be wrapped about patients when out of bed or when in the wheel-chair. White bed blankets should never be used for this purpose. If a patient can sit up in a chair to have his bed made, his feet and body are to be well enveloped in blankets. Long loose warm dressing-gowns are the best to use for moving to and from the bed, as they are easily put on and off, thus saving the patient's strength.

Seeing too many friends is one of the chief evils that may befall a convalescent: friends in their joy that the danger is over do not realize that the patient's strength has not yet returned, and should the nurse forget this fact and allow two or three friends to visit him at one time, and another set almost immediately after, much harm may result. It is just as important during convalescence as when he is in bed that the patient should be protected from excitement and from any overtax of the nerves and strength: one or two visitors at the most are sufficient for one day, and even then the time should be limited, and no visits whatever should be allowed after 8 or 8.30 in the evening. A patient should have been cared for and settled for the night by 9 or 9.30 at the latest; even if he shows an inclination to talk still later, the nurse should use tact to prevent it. The patient should be bathed, the bed freshened, the ventilation regulated, the room settled and darkened, a glass of milk or some nourishment given, and finally the back gently rubbed for a few minutes, without any conversation whatever taking place.

If the condition of a patient at any time shows a marked change for the worse, the nurse should at once notify the physician, and without instructions from him she should never willingly assume the responsibility of being alone with a dying patient. Whether she is in a hospital or on private duty, a nurse should always see that the proper arrangements are made after death. Her duties to her patient do not cease until the body has been decently cared for and the bed and room have been left in perfect order. In a hospital it is desirable to remove all traces of death as soon as possible, on account of the other patients. The limbs should be straightened before the rigor mortis or stiffening of the muscles begins, the eyes closed, and the jaw held in position by placing a support under the chin; for this a roller bandage or a small piece of wood which has been covered with some soft material is generally employed. The nostrils, mouth, rectum, and vagina should be packed with common cotton or any soft substance that will absorb, and thus prevent the escape of, post-mortem discharges. After this has been done the body should be bathed with a 2 per cent. aqueous solution of carbolic acid; if there are any wounds, they should be covered with fresh cotton and then neatly bandaged; if it be necessary the hips may be enclosed in a large triangular binder; the knees are to be held together by a broad bandage; the hair should be brushed smoothly; and finally stockings and a simple night-gown should be put on. If the case be one of infectious disease, the body should be wrapped in a sheet which has been wrung out of a 5 per cent. aqueous solution of carbolic acid, and which should be kept damp. In a hospital, as soon as these preparations are completed, a card should be made out with the name of the patient and of the ward, together with the hour at which death occurred; and this should be sent with the body, which is to be at once removed from the ward. A nurse should never mention or discuss a death with any of the patients. When on private duty, as a rule, the nurse has but little further to do; but if it should be necessary she should be ready to offer suggestions, so that the arrangements may be made with as little trouble to the family as possible. She should not leave the room till all is in order and all traces of her work have been removed. Where there is no one else to look after the proper disinfection of the room, the duty of seeing that this is properly done will devolve upon her.

CHAPTER VII.

Baths. — Classification. — Temperature. — Baths for Cleanliness. — Tub-baths. — Bed-baths. — Foot-baths. — Baths as Therapeutic Agents.—Mustard-bath.—Simple Hot Bath.—Hot-air, Steam, or Vapor Baths.—Salt-water Baths.—Sponge-baths and Tub-baths in Typhoid Fever.—The Cold Pack.

The subject of the skin and its functions, with those of the ~~sebaceous~~ and ~~sudoriparous~~ glands, will have to be learned by the nurse from her lectures on Anatomy. An accurate knowledge of the structure and physiology of the skin is indispensable in order to comprehend satisfactorily the indications for and the action of baths. Baths may be classified according to the temperature at which they are employed, the special purpose for which they are used, or the method of their preparation. Simple baths are usually spoken of as hot, warm, tepid, or cold. Thus, broadly speaking,

A hot bath	may vary	in temperature	from	100° to 112° F. or higher.
A warm	"	"	"	90° to 100° F.
A tepid	"	"	"	70° to 90° F.
A cold	"	"	"	33° to 65° F.

The baths that come within the province of a nurse's work are given for cleanliness, to reduce fever or inflammation, to induce perspiration, to produce general relaxation, or to modify the circulation of the blood.

Baths for cleanliness may be given either by sponging the patient while in bed or by immersing him in a bath-tub. To give a bed-bath a nurse must first have on the spot all the things which she will require. It is exceedingly bad management, and not a little trying to the patient, if, when she has once begun her work, the nurse is obliged to stop at intervals to run for something not at hand. The old proverb, "The head should save the heels," applies no less here than elsewhere in a nurse's work. The time for the morning bath is also that for changing the bed-linen, so one should have the fresh sheets, pillow-cases, and night-gown all warmed and ready to put on; towels brought at the same time should be either warmed by hanging them before the fire or by wrapping them around a hot-water tin. The nurse should have beside her a good-sized pitcher of hot water and another of cold water, a slop-jar for changing the water, a bath basin, and two single bath blankets. The other necessary articles will be found in the "nurse's toilet-basket." Everything is taken off the patient, and she is allowed to lie between the two blankets. The body is to be bathed in sections, the face, neck, and arms being first taken, then the chest and abdomen, next the feet and legs, and finally the back and surfaces between the thighs. The entire bath can be given under cover, or at any rate no more than one part need be exposed at a time, and the whole procedure should not last, as a rule, longer than fifteen or, at the most, twenty minutes. The first bath, however, may of necessity take longer than this, and if a patient is very dirty a few drops of aqua ammonia or a little borax powder added to the water will be found useful.

Either of these will also be of advantage if the odôr of perspiration is unpleasantly strong; in any case, a little alcohol or eau de Cologne will be found refreshing, though to some patients even this may not be agreeable. After the bath the finger-nails and toe-nails should be cleaned and pared. Towels should be used generously, and cold, damp ones should never be employed. The water should be kept pleasantly warm by being changed twice or three times in the course of a bath. If the patient seem exhausted after it, a glass of hot milk or some form of light food may be given, and if the feet are at all cold a hot can should be applied.

Some nurses are extremely untidy about giving a bed-bath. On entering a ward one is sometimes confronted with a screen about a bed: from underneath it, strewn all around on the floor, can be seen, perhaps, a hot-water can no longer needed, the nurse's dressing-basket, a towel or two, or the soiled linen just removed from the bed. Such a scene speaks louder than words for careless work on the part of the nurse in charge.

Patients can frequently, if wheeled into the bath-room, take their bath in the ordinary tub, or at the bedside if a portable tub be procurable. If able to give themselves the bath, the nurse must remain near at hand, lest they should become faint or need any assistance. In giving a patient a bath a sheet is spread over her and she is lifted in, leaving the sheet to cover over the top of the tub, since it would otherwise interfere with sponging. (Cf. also the method of giving the tub-bath in the case of a typhoid-fever patient.) When ready for bed the patient may be lifted out again under cover of the same sheet, and placed on a second, well-warmed, sheet, in which she is wrapped. A blanket is then thrown over her, and she is left for a few moments until all moisture is absorbed and she is rested.

Foot-baths may be given in bed by spreading a rubber sheet across the lower part of it in order to protect the mattress. The patient lies on her back, bends the knees, and places her feet in the tub, which is arranged lengthwise in the bed. The same method is followed in giving a mustard foot-bath, only then the knees and foot-tub are enclosed in a blanket. Mustard foot-baths are often prescribed for severe colds where the symptoms are mainly confined to the head, and for headaches where there may be too much blood going to the head, the object of the bath being to dilate the blood-vessels of the extremities, thus bringing more blood to these parts, and in this way equalizing the circulation. Hot water alone will do this, but the addition of mustard hastens and increases the effect. The amount of mustard to be used varies according to the strength of the mustard and the sensitiveness of the skin: it should be first mixed with a small amount of water and made into a paste before being added to the bath, or it may be put into a small bag and this put into the bath. The feet are allowed to remain in from fifteen to twenty minutes, the water being kept at the same temperature or even made warmer by adding more hot water from time to time; they are then taken out, wiped gently, and tucked well in with blankets. Where it is necessary for any reason to increase the circulation in the lower extremities, this is usually the method employed—a method often advantageously combined with friction and the application of hot-water bags or cans.

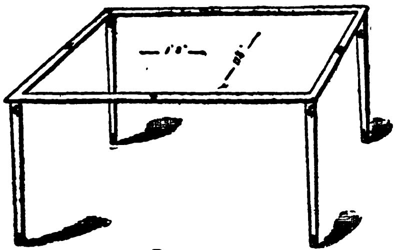
The physiological action of the different forms of the hot bath (hot-air, vapor, and steam bath) is very much the same. When given to induce perspiration (diaphoresis), the utmost care should be taken to see that the preparations are thoroughly made and that each step is successfully carried out, for without such precautions the labor will be in vain; and it is folly to produce but a partial result where only a copious perspiration will be of any avail. To give a hot tub-bath for this purpose, the tub is half filled with water at 100° F., and drawn to the bedside; the patient is lifted in and the temperature of the water gradually increased until the thermometer registers about 110° F. This temperature is maintained for from twelve to fifteen minutes, after which the patient is lifted out into a prepared bed, on which a long rubber is spread with three or four hot blankets over it: these are to be wrapped all around her, tucked in closely about the neck, and watched continually so that no air enters. Plenty of water is given to drink, as the more fluid there is in the body the more profuse the perspiration will be and the greater the amount of the impurities removed. After the sweating process has been kept up for about an hour, the patient is gradually uncovered, sponged under a blanket with alcohol and water, and the wet blankets are removed. While in the bath, cloths wrung out of cold water are applied to the head. It is well to keep the fingers on the pulse when the patient is in the bath, and on the first indication of faintness to remove her to bed immediately. The hot water dilates the superficial blood-vessels, the pores of the skin or sweat-glands have their activity increased, their orifices are freed from any accumulation, and urea and other waste matters in the blood, which normally should have been given off by the skin, or which have been retained in the system owing to an inadequate excreting power of the kidneys, are carried off with the perspiration. This continues only as long as the vessels are well dilated and the skin-glands active, and, as we have said, is much assisted by copious draughts of water.

Hot baths are frequently prescribed for convulsions in children, as the heat relieves the muscular tension and pain, equalizes the circulation, and produces sleep. When given for influenza they are often ordered hot at first, the temperature of the water being afterwards reduced by the addition of cold water.

Where a drug, such as pilocarpine, is ordered, its diaphoretic action should be assisted by wrapping the patient in two or three blankets, placing plenty of hot cans at the sides between the blankets, and over all spreading a large rubber sheet to condense the heat and exclude the air.

Unless special appliances are available for giving the hot-air, vapor, or steam baths, it is difficult to make them thoroughly successful with only an average nurse, and it is better to rely upon the hot-water bath. The vapor bath presents the least difficulty. The patient is placed on a long rubber sheet and blanket and her clothing removed; over her are put two small bed-cradles high enough to support the weight of the covering; the cradles are covered with two blankets,

FIG. 8.



BED-CRADLE.

and over all comes a long rubber sheet, which is pinned with large safety-pins at short distances along the sides of the mattress, rendering the enclosure as air-tight as possible. A small opening is left at the end of the bed for the introduction of a long tin spout or rubber tube attached to a kettle of water, which should be kept boiling by means of a small gas stove or alcohol lamp. A patient can be left thus for from half an hour to an hour, and is then sponged as after the hot bath. The same lamp, kettle, and tube can be be used for moistening the air of a room in cases of croup or other laryngeal diseases. Similar methods may be used for the hot-air bath, air heated by an alcohol lamp being introduced instead of vapor. The alcohol lamp is sometimes set inside the bed in a basin, but this cannot be done without risk. If the patient is able to sit up, he may be put on a chair with his feet in a foot-bath of hot water; the clothing being removed, he is then covered in closely with blankets fastened like a tent from his neck down around the chair and reaching to the floor. An alcohol lamp in a large tin basin underneath the chair is then lighted, and if the patient is kept well wrapped up he will soon perspire freely. After he returns to bed, he is sponged as after other baths.

Where the ward or house is heated by steam, this agent can be employed advantageously. The pipe may be cut at a convenient point, and a T inserted, to which can be attached a small length of pipe on which to fasten the hose; the amount of steam is regulated by a valve in the T. The other end of the hose is introduced under the cradle, and by this means a thorough steam bath can be given. In a hospital these arrangements can be carried out with little trouble, but in a private house it may be necessary to employ a plumber, who will supply the hose or tubing, or a piece of common garden hose on an emergency may suffice.

Local baths are used chiefly to relieve inflammations. Thus for sprains a foot-bath, in pelvic inflammations, for pain, or to induce menstrual discharge, a sitz-bath is frequently ordered, in which the patient occupies the sitting position, and only the thighs and part of the trunk are immersed. These are given in tubs specially shaped for the purpose.

A salt bath is ordered for its tonic effects. It can scarcely take the place of sea-bathing, but where this is not obtainable or where for some reason or other it is contraindicated, the following will be found a good substitute: Salt may be mixed with the ordinary bath-water in the proportion of from 18 to 27 pounds of sea salt to 100 gallons of water; such a bath will be strong enough to redden the skin and will generally have an exhilarating effect. Medicated baths beyond these rarely come within the province of a nurse, as anything like satisfactory treatment from them is to be obtained only in sanitaria (hydrotherapeutic institutions) fitted up with all the proper appliances, where the whole course of treatment is systematically taught and carefully supervised.

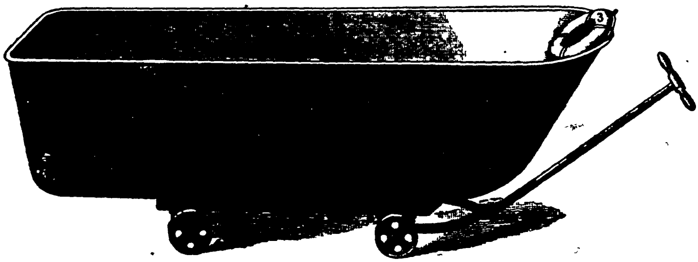
The cold bath as a therapeutic agent is used principally for its antipyretic effect. The most common methods used are the sponge-bath, the cold pack, and the cold-water tub-bath. These are employed chiefly for the reduction of temperature in typhoid fever, occasionally in pneumonia and other acute infectious diseases. In giving a sponge-bath to reduce temperature the nurse should disturb the patient as little as possible: if the bathing has to be repeated often, the continual moving irritates a typhoid patient and may aggravate the nervous symptoms. It is not really necessary to turn him over and spread a long rubber sheet under him, the only object being to protect the bed from any moisture, and this can be done by means of two large bath towels or a small draw sheet. In preparing to give a sponge bath there should be ready (1) two large towels to protect the bed; (2) one of medium size for spreading over the abdomen; (3) two small ones as compresses for the head (or an ice-cap); (4) two medium-sized sea-sponges; (5) two basins, one for the towels and compresses, the other for ice-water; (6) a rubber to protect the pillow. A wet compress is kept on the head all the time. Whenever the compress becomes at all warm, it should at once be changed for a second, which has been put on ice ready for the purpose. The temperature of the bath-water is kept at about 65° F. by lumps of ice; a foot-bath tub is the best kind of basin to use, as it does not necessitate changing the water. The patient is covered with a sheet, and the body is gone over in sections just as in the bath for cleanliness: the sponging, beginning with the face and neck, proceeds to the arms; it should be done with long light strokes, as the object is to bring the water in contact with the body without producing friction. One changes the sponge with every third or fourth stroke. After the arms, the chest and abdomen, and next the legs and feet, are taken, but before going on to the latter a wet towel is wrung out and spread over the chest and abdomen. This should be changed frequently. Finally, the patient is turned over on one side with the towels well tucked in, so that the back may be sponged; if very weak she can be supported with one hand while the other is used for bathing. The exposure of the parts being bathed to the air assists evaporation, and hence materially aids in the lowering of the temperature, and it is also better not to rub the patient dry. Five minutes' time is given to each section, the parts where large blood-vessels are near the surface being sponged longest. A piece of ice wrapped in a cloth and laid in the axillary spaces and along the carotid arteries is often useful. The legs from the knees down require less sponging, since they cool quickly as a rule. The whole bath occupies about twenty minutes. The patient is now turned on her back, a gown open all the way down behind, but closed in front, is slipped on, and the temperature taken. The patient should be encouraged to drink plenty of cold water during the bath.

The simplest way to apply the cold pack to reduce temperature is as follows: A long rubber sheet is put on the bed; two sheets are taken, each folded lengthwise into four thicknesses, wrung out of cold water at 60° F. or 65° F., and placed one under and the other over the patient, being tucked snugly in about the neck, under the arms and sides, and extending to the ankles. The sheets are removed at the end of fifteen minutes and the procedure repeated. It requires four such packs of fifteen minutes each to equal one bath of ten minutes, but in spite of this the pack may sometimes be preferable, and is more particularly suitable for children. The cold pack is also sometimes ordered in conditions of delirium, of extreme nervousness, and to induce sleep. In such cases one sheet only is required. This is wrung out of cold water, and the patient wrapped in it, the feet being left free. She is then enveloped loosely in blankets, and left thus from twenty minutes to an hour; if the feet are cold, a hot can may be put to them. This is also sometimes spoken of as the "drip-sheet." Where symptoms of delirium are present an ice-cap or wet compresses made of gauze must be kept constantly applied to the head: in any case they are a source of comfort.

An affusion to reduce temperature may be given by wrapping the patient in a sheet and placing him on a canvas cot, and then sprinkling him with water from an ordinary watering-pot.

Tubbing the patients is an excellent way to reduce temperature. This method, introduced by Brand, whose name it bears, was used by him with extraordinary results, and fortunately is now beginning to find favor in our best American hospitals. Where it is used, a temperature of 102.5° F. is generally an indication for the bath. A portable tub is necessary. (See Fig. 9.) This is filled two-thirds full of water

FIG. 9.



PORTABLE BATH-TUB.

at a temperature of 70° F. and rolled to the bedside. The night-gown being removed, the patient is wrapped in a sheet and lifted in, the feet being immersed first, and the body gradually lowered until it is completely covered. The hands remain free, as the pulse must be watched. A ledge at the head of the bath has a rubber pillow or ring on it, upon which the head, covered with a wet compress (towel or sponge), rests. A temperature of from 68° to 70° F. is maintained by adding a little ice. When the proper time has elapsed a dry sheet is spread over the tub, in which the patient, freed from the wet one, is wrapped as she is lifted out. She is then placed on a long rubber sheet on the bed and covered with a single blanket. In about ten minutes the wet clothing is removed and she is wiped dry.

The temperature is to be taken at once, and again half an hour later. If there be much nervous tremor or blueness (the latter especially being not infrequent), friction should be given in the tub. A long-handled flesh-brush covered with flannel may be used for this purpose. When in bed, if the shivering should still continue, the patient should not be covered with a number of blankets, but a hot can may be placed at the feet and the friction continued, the rubbing being always toward the heart, and any stimulants or nourishment that may have been ordered should be given. Some patients find a temperature of 70° F. too cold and the shock too great, in which case one may start with water at about 85° F., and then gradually reduce the temperature to 68° or 70° F. by adding ice. The average duration of such a bath is also from fifteen to twenty minutes: the first one should last only about ten minutes, so that the patient may become accustomed to the treatment. The nurse who has never seen such a bath given before may be alarmed by the condition of the pulse, which becomes hard and small, but this is due to the contraction of the superficial blood-vessels, with consequent increase in the arterial tension, and is not serious. A soft intermittent pulse is a different matter.

The advantages of a cold bath are—(1) its antipyretic effect; (2) its quieting effect on the nerve-centres, whereby delirious symptoms are frequently checked and sleep is induced; (3) the modification of the circulation, shown by the slower and stronger pulse. The increased frequency of breathing which ensues when the patient is first immersed gives more oxygen to the lungs and aids in the propulsion of blood through them. Hæmorrhage from the bowels is regarded by many physicians as a contraindication to its use.

Apart from its antipyretic powers, the cold bath is sometimes ordered to stimulate the circulation or for its effect on the nervous system: it should then be given in the morning and should not last over five minutes. The patient is to be vigorously rubbed immediately after it, and if reaction does not set in warm drinks should be given, external heat applied, and the friction continued.

As accuracy is an important feature, there should be a bath thermometer to test the temperature of the water, as one cannot trust implicitly to the subjective sensation of touch.

CHAPTER VIII.

DISINFECTANT SOLUTIONS.—THE METRIC SYSTEM.—THE PREPARATION OF SOLUTIONS.

WITH the development of bacteriology and as a result of constant experiment the list of disinfectants or germicides in use is always changing, and what is to-day accepted as the most valuable drug for destroying micro-organisms may in a few months, or even sooner, be replaced by a new one: statements made as to the value of the different chemicals as disinfecting agents cannot as yet be accepted as final.

Corrosive sublimate was for some time considered the most powerful germicide in use, carbolic acid coming next after it; but recent investigations have shown that the action of sublimate is not so effectual as that of carbolic acid. The former, it is true, brings about decided changes in the condition of certain forms of germs, but does not, as was first supposed, always kill them. Besides, the drug is objectionable on account of its intensely irritating and poisonous qualities. Heat in various forms is now relied upon more than chemical preparations for sterilization, but certain solutions are still used for the destruction of germs or as a preventive against their development.

CARBOLIC ACID (C_6H_5OH).

The best-known and most frequently employed chemical disinfectant is perhaps carbolic acid. It is a product of coal tar distilled at a high temperature, and when purified comes to us in the form of white crystals readily soluble in water, glycerine, or alcohol. Carbolic acid will not dissolve, however, in all proportions in water, so that aqueous solutions stronger than 5 per cent. cannot be made. It is one of our principal disinfectants; at the same time it is a deodorizer, and is sometimes applied locally as an anæsthetic.

Solutions of a weaker strength than 5 per cent. will not destroy all germs, but owing to the irritating qualities of the substance it cannot always be used so strong, and where it has to come in contact with the skin or mucous membranes the strength of the solution is reduced, weaker solutions being employed.

To mix a 5 per cent. or 1 : 20 solution the bottle containing the crystals is set in hot water until these are melted; then 1 part of carbolic acid is taken, 19 parts of boiling water are added to it, and the whole is shaken vigorously until all the globules of carbolic acid have been dissolved by the water. If the water be not sufficiently hot or the solution not well shaken, globules of the acid may remain undissolved—a condition full of danger, since one of these will burn any living tissue which it touches. It is a good plan always to glance at the solution before using it, to be certain that none of these globules are present. Sometimes 1 part of glycerine and 1 part of alcohol are added to assist in dissolving the carbolic acid.

Keith's dressing is a carbolic-acid preparation much in vogue, especially in abdominal surgery. It consists of 1 part of pure carbolic acid mixed with 15 parts of glycerine.

Corrosive Sublimate ($HgCl_2$).

Bichloride of mercury is soluble in 16 parts of cold water, and ranks next to carbolic acid as a disinfectant, being used in solutions varying in strength from 1 : 500 to 1 : 150,000. The 1 : 1000 and 1 : 2000 solutions are most often employed. Where it is used for washing out any of the cavities of the body very weak solutions are used (1 : 5000 to 1 : 10,000). It is now but rarely employed for this purpose, as the drug is readily absorbed, and has frequently been known to produce symptoms of poisoning. These symptoms are quite definite, and should be carefully watched for by the nurse. As a disinfectant for clothing it is objectionable, because it stains white materials yellow, nor can it be used to disinfect instruments or anything made of metal, as it corrodes them.

To make a 1 : 1000 solution 1 gramme (about 15½ grs.) of the powder is dissolved in 1 litre (about 2 pints) of water; weaker solutions can be prepared from this. It requires to be made fresh frequently, as it decomposes and loses its disinfectant qualities if allowed to stand a long time. An equal amount of common salt added to the bichloride will hasten its solution and prevent decomposition.

Boracic Acid.

This drug is classed among disinfectants. It is true that its disinfectant properties are not very marked, but it possesses the additional advantage of being non-irritating. It is used in the 5 per cent. or saturated solution and in solutions of weaker strength for its cleansing effects in the washing out of cavities, for superficial wounds, or for irrigating the bladder. The saturated solution is made by adding 1 part by weight of the acid to 19 parts of water. In making the solution it is much better to use the drug in the crystallized rather than in the powdered form.

Permanganate of Potassium and Oxalic Acid.

These are used in conjunction in saturated solutions to prepare the hands before operation and in the final preparation of the skin of operation patients. The exact germicidal value of these substances has not yet been definitely determined, and we must await the results of bacteriological investigations before saying more about them.

Absolute Alcohol.

This is used for cleansing and disinfecting the skin previous to operation and for preserving catgut and other ligatures. It has but little germicidal power.

There are a number of other preparations in use, such as creolin, pyoktanin, salicylic acid, peroxide of hydrogen, and lysol, but their comparative merits as disinfectants have not been fully established, and it is unnecessary to enter into detailed descriptions as to their preparation or application.

THE METRIC SYSTEM.

The adoption of the metric system as the standard method of weight and measure is the natural result of the influence of foreign scientific education. In Europe, except perhaps in England, it is universally used, chiefly on account of the greater convenience which it affords. It is being more and more employed by the public, and is now exclusively used in the exact sciences. As many modern hospitals and physicians employ the metric system so constantly, it is absolutely necessary that the nurse become familiar with it.

The standard taken first was the metre (39.39 inches) —a standard which can be recovered at any time should the present rule be lost, since it approximately represents the ten-millionth part of a quadrant of the earth's meridian. All the other terms in the system are derived in some way from the metre, which is taken as the unit.

Any subdivision of the metre is expressed by Latin prefixes; on the other hand, when it is increased or multiplied, Greek prefixes are used. The former are deci- (from decem, ten), centi- (from centum, a hundred), and milli- (from mille, a thousand); the latter are deca- (from deka, ten), hecto- (from hekaton, one hundred), and kilo- (from chilioi or chilia, a thousand).

The two arrangements, then, would be as follows:

Decreasing.

Metre.

decimetre = one-tenth, .1, or $\frac{1}{10}$ of a metre.
centimetre = one-hundredth, .01, or $\frac{1}{100}$ of a metre.
millimetre = one-thousandth, .001, or $\frac{1}{1000}$ of a metre.

Increasing.

Metre.

dekametre = ten metres.
hectometre = hundred metres.
kilometre = thousand metres.

Thus, one decimetre, ten centimetres, or one hundred millimetres } are equivalent expressions.

The cube of a centimetre is called a cubic centimetre, and is written 1 cc.

The standard of capacity is based upon the standard of length, and is represented by the litre, which is equal to 1000 cc. The weight of 1 cc. of distilled water at 4° C. is called 1 gramme, and in this way we get the unit of weight.

Thus, we have the metre	as the unit of		length,
the litre	"	"	capacity,
and the gramme	"	"	weight;

and the same prefixes as were used for the metre denote their division or multiplication.

In the case of the litre the divisions are rarely spoken of as decilitre, centilitre, or millilitre, but for convenience the cubic centimetre, the equivalent of the millilitre, is used entirely; *e. g.* we say 100 cc. instead of a decilitre, or 10 cc. rather than 1 centilitre, or 1 cc. rather than 1 millilitre.

The relation of the metric system to the weights and measures of the tables in common use are as follows:

1 metre	=	39.39 inches.
25 millimetres	=	1 inch.
1 litre	=	33.81 fluidounces, or about 2 pints.
29.37 cc.	=	1 fluidounce.
4 cc.	=	1 fluidrachm, or 5 cc. = 1 teaspoonful (French).
1 cc.	=	15 minims, approximately.
1 gramme	=	15½ grains, approximately.
1 grain	=	.065 of a gramme.

The term micro-millimetre is used in measuring microscopical distances, and means $\frac{1}{1000}$ of a millimetre; it is indicated by the Greek letter μ; thus a red blood-corpuscle is said to be from 6 to 9 μ in diameter.

THE PREPARATION OF SOLUTIONS.

In the preparation of solutions the greater convenience of the metric system over the old system will be made at once obvious by giving a few illustrations, since with it the use of vulgar fractions is entirely done away with.

Solutions of carbolic acid and corrosive sublimate are the ones ordinarily used in hospitals, and for the sake of convenience strong standard solutions are always kept in stock, and weaker ones made from these, when required for use, by diluting with the necessary amount of water. It will be found very useful to adopt as a standard strong solution of both of these, one which contains in 20 parts 1 part by weight of the drugs. We speak of these as "1 : 20 solutions." The weaker solutions are made most easily by simple dilution, although of course, if one wishes, they can be made by dissolving the antiseptic substance in water in the desired proportion.

When using solutions of standard strengths (1 : 20) it is important to remember that 20 cc. of the solution correspond to 1 gramme of the antiseptic substance. We said above that 1 gramme was the name given to the weight of 1 cc. of water. Thus, to make a solution of the strength of 1 : 1000 we must have 1 gramme of the chemical in 1000 cc., or 1 litre, of the finished solution; this is readily obtained by mixing 20 cc. of our standard solution with 980 cc. of water. The whole litre thus contains 20 cc. of the standard solution—*i. e.* 1 gramme of the original substance in 1000 cc.—and the solution is thus rightly named "1 : 1000."

For making bichloride solutions the metric system is almost exclusively used. Remembering that 1 litre equals 1000 cc., and taking a 1 : 20 solution as the basis for making the weaker one, we take

20 cc.,	and add	enough	water to make up	1 litre	for a	1 : 1000	solution.
10 cc.,	"	"	"	1 litre	"	1 : 2000	"
5 cc.,	"	"	"	1 litre	"	1 : 4000	"
4 cc.,	"	"	"	1 litre	"	1 : 5000	"
2 cc.,	"	"	"	1 litre	"	1 : 10,000	"
1 cc.,	"	"	"	1 litre	"	1 : 20,000	"

To make more dilute solutions than these it is more convenient to start with a 1 : 1000 solution and dilute this. For instance, to prepare 1 litre for irrigation of the strength of 1 : 100,000, one has simply to dilute the 1 : 1000 solution 100 times; thus, 100 cc. of the new solution must contain 1 cc. of the 1 : 1000 solution; 1000 cc. (a litre) would therefore require 10 cc. of the 1 : 1000 solution; so by taking 10 cc. of the 1 : 1000 solution and adding enough water to it to make up a litre, the new solution is made. To make a solution of the strength of 1 : 150,000, we must have 1 cc. of the 1 : 1000 solution in 150 cc. of the new solution. Now, 150 cc. is contained 6.6 times in 1000 cc., so that for 1 litre of the new solution we must have 6.6 cc. of the 1 : 1000 solution. Similarly, solutions of any strength can be made.

The old method of using apothecaries' weight still prevails in making up the various strengths of some solutions, particularly those of carbolic acid. To make a 1 : 20 solution of carbolic acid, one has only to add 1 part of the acid to 19 parts of water; as a rule, however, not less than a quart is made at one time.

Thus, let it be required to make 1 quart of a 1 : 20 solution of carbolic acid. Now, 1 liquid quart = 32 ounces. If in 20 ounces of the solution 1 ounce of carbolic acid is contained, then in 1 ounce or part of the solution there will be only $\frac{1}{20}$ of an ounce of acid, and in 1 quart or 32 ounces of the solution there must be 32 times $\frac{1}{20}$ of an ounce—*i. e.* $32 \times \frac{1}{20} = \frac{32}{20} = 1.6$ ounces, or 1 ounce and $4\frac{4}{5}$ drachms.*

The weaker solutions are usually made in strengths of 1 : 30, 1 : 40, 1 : 50, 1 : 60, 1 : 80, 1 : 100, and of course to make up any of these strengths from the pure carbolic acid one proceeds in a precisely similar manner.

For instance, to know how much pure carbolic is needed to make any amount of a 1 : 40 solution, one will require an amount of acid equal to one-fortieth of the whole solution.

Example: Let it be required to make a quart of 1 : 40 solution of carbolic acid. Now, 1 quart = 32 ounces. The amount of acid required is of course $\frac{1}{40}$ of 32 ounces $= \frac{32}{40}$ or $\frac{4}{5}$ of an ounce of carbolic acid—*i. e.* a little less than $6\frac{1}{2}$ drachms.

We so frequently hear the term "per cent." in connection with the different solutions that to avoid all possibility of error we will discuss its meaning in detail. The term is best explained by an example. Thus, by

* Then, taking this amount of acid, sufficient water is added to make the whole up to 32 ounces or 1 quart, and the required solution is obtained.

a 3 per cent. solution of carbolic acid we mean one of which 100 parts contain 3 parts of the acid. Thus, if we have a mixture containing 3 minims of carbolic acid and 97 minims of water, we have a 3 per cent. aqueous solution of carbolic acid. A 1 : 20 solution of carbolic acid (1 part carbolic acid in every 20 parts of the solution) will be a 5 per cent. solution. For,

In 20 parts of solution we have 1 part carbolic acid;
∴ " 1 part of " " $\frac{1}{20}$ part "
∴ " 100 parts of " " 100 times $\frac{1}{20}$ (= 5) parts carbolic acid.
So that a 1 : 20 solution is a 5 per cent. solution.

Similarly, one can reckon the percentage in any other solution; for instance, in a 1 : 40 solution

40 parts contain 1 part of carbolic acid;
∴ 1 part contains $\frac{1}{40}$ " "
∴ 100 parts contain 100 × $\frac{1}{40}$ (= 2½) parts carbolic acid.
So that a 1 : 40 solution is a 2½ per cent. solution.

Since the weight of a given volume of carbolic acid differs but slightly from that of the same volume of water, these solutions may be made up with sufficient accuracy by measurement instead of by weight.

When a nurse has once familiarized herself with these simple points, she will wonder how the process could ever have seemed a difficult one to her. In dealing with such poisonous drugs it is necessary to understand what we are doing, and we should not always trust to memory, which is apt to fail us at a critical moment. My experience as a teacher in training-schools has taught me that any extra time spent in the elucidation of fundamental principles is never lost.

CHAPTER IX.

BACTERIOLOGICAL NOTES.—DISINFECTION OF CLOTHING, ROOMS, FURNITURE, WARDS, EXCRETA, SPUTUM, AND VESSELS.

THE subject of bacteriology as applied to the work of a nurse is too extensive to be fully discussed in one chapter of a book on nursing, and only an attempt will be made to impress the student with the necessity of clearly comprehending how much it depends upon her whether or not the great modern discoveries are utilized in daily life for the prevention of disease. Next to the physician, the nurse's work is most important in relation to disease, its causation and prevention, for in every department of nursing she comes daily in contact with disease in some form, and much depends upon the intelligence and care with which she carries out her principles. It is therefore important that she should not only be taught carefully the principles, but also obtain some idea of the technique, of bacteriology, and that she should acquaint herself at least with the popular literature on the subject. The beginner cannot do better than read the articles prepared by T. Mitchell Prudden, M. D., for general reading in his two small books, *The Story of the Bacteria* and *Dust and its Dangers.* These might be read preparatory to attending lectures on bacteriology, and will render more interesting the practical demonstrations of the various forms of bacteria, their methods of growth, and their relation to the different forms of disease.

Bacteria—so called from the Greek word meaning rods (sing. bacterium, plural bacteria)—micro-organisms, germs, or microbes (*i. e.* tiny forms of life), are among the various terms employed in describing the many and widely different classes of these organisms. It has been found that there are almost innumerable forms of these micro-organisms, and that they are everywhere present—in the air, in water, and in vegetable tissues, and consequently in foods. Although the majority of the varieties are harmless to man, it is now known that some of the most prevalent diseases, not only those which have been for a long time termed infectious and contagious, but also the so-called blood-poisoning, inflammations, fevers, and abscesses, are caused by certain kinds of bacteria. Every form requires its own peculiar kinds of nourishment and suitable surroundings to enable it to grow and increase. They are found most often where both heat and moisture are present; putrefaction cannot take place without them; in the decay of organic material they play an important part, so that we shall not be surprised to learn that the excreta from the body, the sputum, fæces, and urine, form favorable culture-media for various forms. In crowded localities, where uncleanliness prevails, they grow in abundance, while in hospitals they are always present, and constant precautions must be taken to keep in abeyance and if possible destroy all virulent forms. Bacteria cling to moist surfaces, and as long as they are in a moist condition they will not be swept into the air nor be carried from one point to another except by animal agents; but when these surfaces are allowed to dry, so that the organisms can be blown about as dust by the winds, then it is that they are carried and scattered everywhere and become a source of danger. If they be introduced into wounds, they may cause inflammation or suppuration, or on entering the body may produce blood-poisoning and various forms of fever.

In hospitals or wherever disease is present the means taken to prevent the spread of the micro-organisms must vary according to whether they are in a moist or dry medium. If the substance which contains them be moist, as sputum or fæces, then precautions are taken to see that it be kept so until entirely removed from the ward for disinfection; or the different disinfectants may be used at once, as some of these will destroy germ-life immediately, while others will at least prevent their further development and multiplication for the time being. If the germs are dry, as we know they must be in the dust in a ward full of patients, then daily care is exercised to reduce the amount of dust to a minimum.

The measures taken to prevent bacterial contamination or accumulation include thorough cleanliness, a free supply of oxygen, destruction of fomites, etc. by sterilization, and the isolation of infectious cases. Cleanliness in the ordinary sense of the word relating to sick-rooms and hospitals has been discussed in Chapter III., but cleanliness in relation to germs has a much deeper sense; and where there is reason to suspect the presence of infectious germs we should always be sure to keep on the safe side, and the cleaning done should amount to sterilization in regard to vessels, clothing, and excreta.

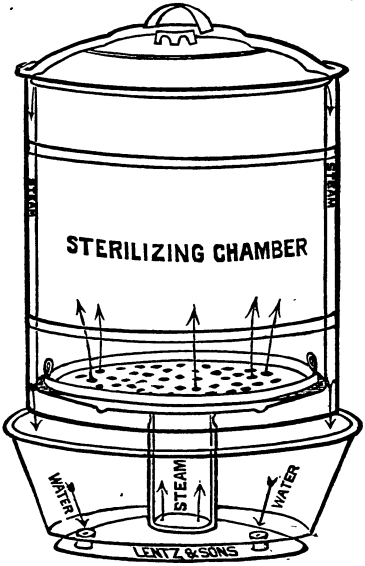
Sterilization is effected in two ways—either (1) by the action of heat or (2) by means of chemical agents —but the term "sterilization" is usually employed when heat is used, and "disinfection" where the action of chemicals is relied upon.

Bacteria are destroyed by either dry or moist heat: the latter in the form of steam is the means chiefly used, since a moist atmosphere at 100° C. (steam) will sterilize much more effectively than dry air heated to a much higher temperature. With our present appliances steam can now be obtained with little difficulty, and if fabrics be not exposed to its influence too long at one time, they are injured less than by dry heat. Dry heat is not so penetrating, and requires a longer time to do its work, not to mention the fact that such things as leather and woollen fabrics, if they be exposed to it long enough to destroy the germs, will generally be rendered completely unfit for further use.

The application of dry heat is a baking process: the objects to be sterilized are exposed to a steady temperature of not less than 300° F. or 150° C. for one hour.

With moist heat the objects to be sterilized are usually exposed to the steam on two or three separate occasions, the length of time necessary for the process depending, *cæteris paribus*, upon the resistance to heat possessed by the organisms to be destroyed. Bacteriologists teach that to entirely destroy all germ-life and all spores, it is necessary to expose whatever is to be sterilized to the steam at 100° C. for three successive days for thirty minutes or more (according to the bulk of the articles) each day, and during the time intervening to keep them in a room at a temperature of 30° C. For smaller articles, instruments, solutions, and foods the Arnold sterilizer (Fig. 10) is most complete and inexpensive. For sterilizing bedding, mattresses, clothing, and large articles a regularly-built disinfecting apparatus is essential. For public use these should be provided in various parts of large cities, but every hospital should have its own.

Fig. 10.



Arnold Steam Sterilizer.

Another method of sterilizing is to boil the articles in simple water, though usually a chemical substance is added to the water.

The chemicals used for the destruction of bacteria are called germicides; those which arrest and prevent development, disinfectants: the various kinds of these and the methods of preparing some of them have been given in the previous chapters, and we will now consider their action and application. Disinfectants should always be fresh, otherwise they may lose their activity.

Carbolic acid is one of the most efficient of the known disinfectants, but a solution under 5 per cent. in strength is not capable of destroying all germ-life. It should be made to come thoroughly in contact with whatever is to be disinfected, and allowed to remain so for some hours. It is the chemical substance most frequently used for disinfecting clothing.

Milk of lime is considered especially valuable to render innocuous the evacuations from the bowels, but it should be freshly made, otherwise it is useless: it must be thoroughly stirred up with the contents of the bed-pan, which must then be allowed to stand for not less than an hour. This is the best method of disinfecting typhoid stools. The milk of lime is made by adding 1 part of slaked lime to 4 parts of water.

Chloride of lime (chlorinated lime) is perhaps a better disinfectant than milk of lime, but it is not always reliable, as it may be stale, and is objectionable owing to its disagreeable odor. From this substance in the presence of air and moisture is set free nascent chlorine, a most powerful reducing agent and highly inimical to living organisms.

Corrosive sublimate or bichloride of mercury is used in solutions of from 1 : 500 to 1 : 150,000, but for *destroying* germs the strength used should not be less than 1 : 1000. It is a powerful irritant poison, and must be used with great care. Its value as a disinfectant is not equal to that of carbolic acid. It is not usually used for disinfecting white linen or cotton clothing, as it discolors them.

Permanganate of potassium and oxalic acid are employed principally for the disinfection of the skin.

The principal point to remember in disinfecting with solutions is that the disinfectant must come in contact with or be diffused through the substance for a prescribed length of time, in order that it may be effectual in destroying the bacteria: a mere washing with the solution or pouring it over the object will be of no use.

Care and Disinfection of an Infected Room.—In a hospital there should of course be no superfluous furniture or articles to remove at the beginning of the disease, but if in private rooms there are such, they are to be taken out at once: carpets, upholstered furniture, hangings, and bric-à-brac, or any personal clothing, the color of which may be destroyed by the action of steam, must not be allowed to remain. The daily care of such a room consists in wiping off the furniture with a damp cloth and sweeping the floor with a broom covered with a damp cloth wrung out of a 1 : 20 carbolic-acid solution; besides this, the floor must be rubbed thoroughly with a damp cloth every second or third day. If the disease be contagious, further care may be taken by hanging up a damp sheet, kept moist, in the line of air-currents. All such cloths that are used daily should be washed in hot soapsuds, and then, when not in use, left to soak in a 1 : 20 carbolic solution. After the patient has recovered from an infectious disease he should receive a hot soap-and-water tub or sponge bath (including a thorough washing of the hair), followed by a thorough sponging with carbolic or bichloride solution, after which he is wrapped in clean sheets or clothes and taken to another room. The next thing to do is to remove the clothing and bedding for sterilization. Now begins the disinfection of the room. The mattress is brushed off, wrapped in a damp sheet, and sent to the sterilizer. The clothes are also steamed, and then sent to the laundry. Where there is no sterilizer, the bedding must be soaked in 1 : 20 solution of carbolic acid, and afterward boiled, and the mattresses ripped apart and boiled or else burned.

The care of the infected room should then be as follows: Close up tightly and leave it for twenty-four hours, until the dust has settled; then enter very gently, so as not to disturb the dust, and wipe off everything in the room with a cloth wrung out of 1 : 1000 bichloride solution. Treat all the woodwork, floors, furniture, and the bed-frame in this way, and use for the crevices about the bed-frame pure carbolic acid, applying it with a small brush. Wash down the walls with bichloride solution 1 : 1000, and then leave the windows wide open, so that the sunshine and air may enter freely.

Where steam can be secured an excellent method is to fill the room with steam, keeping up the supply till the moisture falls on the walls or floor: nearly all the bacteria will be on the moist surfaces, and the walls and floor may be washed off with a disinfectant solution before they are allowed to dry. The old method of fumigating with sulphur has been proven to be quite inadequate, as it exercises little if any destructive power on bacteria.

Evacuations from the bowels in typhoid fever or dysentery should be received in a vessel, containing some milk of lime, which should be closely covered before being carried from the patient's bed through the room or ward. An equal amount of the milk of lime is then added, the whole thoroughly stirred together, the vessel covered and left to stand for one hour.

In hospitals where there are many typhoid patients, and no conveniences for treating the stools with the lime for that length of time, they should at least be mixed with the lime, and when they are emptied down the hopper a good stream of very hot water from the hot-water pipe should be allowed to run into the vessel and down the pipes. In the country, where these conveniences are still less frequently found, the stools may be mixed with bran or sawdust and burned.

In regard to the sputum of patients several points must be carefully considered viz.—the receptacle in which it is deposited, the manner in which it is kept, and the final disposition of it; especial precautions should be observed with the sputum from tuberculous lungs, the organism that causes this disease being very virulent and infectious and retaining its infective properties for a long time. Probably direct contact with tuberculous sputum is the greatest source of infection; besides, if it be allowed to dry and become scattered broadcast, the bacilli may unconsciously be absorbed with the inspired air into the lungs, and lie quiescent for months until favorable conditions develop, under which the germs can multiply and reproduce the dread disease. Therefore, every precaution should be taken to destroy the bacilli contained in the expectorated matter. The sputum-cups used for such patients should be either of china or paper, so that they may be boiled or burned, and made simply, with no crevices in which particles of sputum may lodge. In a ward where there are a number of patients, the cup should be kept covered and the sputum moist, so that none of it, becoming dry, may escape into the air of the ward. The cup should be frequently cleansed, and before the contents are thrown away the germs should be destroyed by boiling in a 2 per cent. solution of carbonate of soda for one hour, or by being exposed to heat in a steam sterilizer for at least as long. The paper cups with their contents should be burned.

Two sets of cups should be kept, and boiled in the soda solution each time before being used again. All vessels, tubes, or cups that are used for the mouth in diphtheria or in syphilis or cancer should be kept in a 1 : 40 carbolic-acid solution or in a saturated solution of boric acid, and boiled before being used by another patient. Bed-pans used in cases of cancer, in dysentery, or other infectious diseases, are to be soaked in a 1 : 20 carbolic-acid solution, and boiled before again coming into general use. Sheets and clothing stained with typhoid or dysenteric discharges must be at once washed out, or soaked in a disinfectant solution and steamed before being sent to the laundry. The bedding and clothing from any case of infectious or malignant disease should always be put to soak at once in a 1 : 20 carbolic-acid solution. A full description of the methods of disinfection to be employed under different circumstances will be found in Dr. G. H. F. Nuttall's recent manual entitled *Hygienic Measures in Relation to Infectious Diseases*, to which the student is referred.

CHAPTER X.

ENEMATA.—KINDS.—METHODS OF PREPARATION.—FREQUENCY AND MODE OF ADMINISTRATION.—CARE OF APPLIANCES.—DOUCHES.—CATHETERIZATION.

THERE are various methods employed for injecting fluids into the body. When they are introduced into the intestines through the rectum, we speak of giving *enemata* (singular *enema*, with the accent on the first syllable). Since the purposes for which they are used are manifold, there are many different kinds of enemata.

A convenient classification is as follows:

1. Simple, laxative, and purgative enemata.

2. Nutritive enemata for the introduction of nourishment.

3. Sedative enemata for local or systemic effects.

4. Astringent enemata which check hæmorrhages and diarrhœas (*e. g.* hot water or ice-water, solutions of alum or nitrate of silver).

5. Emollient enemata for soothing irritated and painful mucous membranes: starch and certain drugs are used for this purpose.

6. Antispasmodic enemata to relieve flatulence—*e. g.* the turpentine enema.

7. Anthelmintic enemata for destroying worms: salt, turpentine, and quassia are used in this way.

8. Antiseptic or germicidal enemata, used in the various forms of dysentery.

9. Stimulating enemata—*e. g.* hot water, hot whiskey and water.

General Directions for Giving an Enema.

The patient is placed on his left side with the knees flexed, since the sigmoid flexure of the colon lies in the left iliac fossa, and the fluid will be thus more easily retained; the bed is to be protected with a rubber sheet and a towel; a receiving vessel must be at hand ready for use. In very obstinate cases of constipation the knee-chest position is ordered, but this is rarely necessary. The basin of water is placed on the rubber sheet and the enema administered under cover.

For a simple enema the amount for an adult varies from one to four pints, for a child from a half to one pint, and for an infant about two ounces are sufficient. The best time to administer a simple enema is in the morning just before beginning the morning toilet.

To give a simple enema ordinary suds are made with common brown soap and water, the temperature of which should be about 95° F. when ready for use. A bulb syringe is used, care being taken to fill it to the nozzle before introducing into the rectum, since any air left in the syringe will pass into the intestines and may cause pain. The bulb syringe is better than any other form, as a certain amount of intermittent gentle pressure, which is necessary, can best be obtained in this way. The nozzle is always oiled or vaselined before introduction, as the soapy water will not lubricate it sufficiently. Forcible insertion of the nozzle is to be avoided, and one must be careful to pass it in, following the natural curve of the rectum, for a distance of two or three inches. If the point of the nozzle should meet with any obstruction, no attempt should be made to force it in, as the impediment must be either the wall of the rectum or an accumulation of fæcal matter, which will have to be removed before proceeding further. The water is to be introduced in a gentle and steady stream: if rapidly and spasmodically injected, there will probably be pain and an intense desire for immediate rejection. After the full quantity has been given, the patient should try to retain it for ten or fifteen minutes in order to obtain satisfactory results. A folded towel pressed against the anus will assist the patient in resisting the desire to expel the intestinal contents.

If one simple enema is not effectual, it should be repeated in half an hour and a larger amount given. Sometimes, after operations or where the action of the bowels has been sluggish, a laxative enema is given instead of a simple one, or the laxative enema is followed by a simple enema in the course of half an hour. The laxatives ordinarily used are olive oil or glycerine, the former softening the fæces, the latter increasing the peristaltic action. If olive oil is ordered, the average amount given is six ounces in a hard-rubber syringe; a simple oil enema is seldom successful unless followed by the soapsuds, which should be given half an hour or an hour later. To give a glycerine enema, half an ounce of glycerine is mixed with the same amount of water at a temperature of 95° F. and given with a hard-rubber syringe. It is rarely necessary to follow it up with warm water afterwards, this amount being as a rule sufficient in the most obstinate cases. If not successful the first time, it should be repeated in an hour. In mild cases from half a drachm to one drachm of glycerine is effectual, and for children and infants the contents of a straight medicine-dropper is enough. When laxatives *per rectum* fail, purgative enemata are resorted to. These are made by adding drugs, such as turpentine, Epsom or Rochelle salts, or castor oil, in certain proportions to the simple enema:

Formula 1.

Castor oil,	℥ij;
Turpentine,	ʒss.

Mix, and introduce with a hard-rubber syringe, following, in half an hour, with a quart of soapsuds.

Formula 2.

Turpentine,	℥ss;
Rochelle or Epsom salts,	℥j;
Mix with warm soapsuds,	Oj.

The Rochelle salts are the better, as they dissolve quickly. Sometimes it is necessary to introduce the oil or glycerine high up, and to do this one may attach a rubber male catheter to the end of the syringe, passing it up the rectum six or eight inches.

Of the various enemata above described, undoubtedly that with the half ounce of glycerine gives the best results in ordinary cases, but for very obstinate constipation or after an operation, where it is imperative that the bowels shall not be obstructed, the turpentine and Rochelle salts are the best.

Nutritive enemata, as the name implies, are intended to nourish the body, and are given when food cannot be retained by the stomach, or when it is necessary to give that organ a rest, or where the system requires more nourishment than can be given by the mouth. They should not be given oftener than once in four hours or six times in the twenty-four hours, and the quantity administered at any one time should not exceed six ounces; the frequency and amount are, however, generally regulated by the physician according to the nature of the case.

A nutritive enema should never be given just within the rectum, as may be done with an ordinary enema. Absorption by the mucous membrane of the large intestine goes on slowly, much more so than in the small intestine, where this process normally takes place; moreover, the absorptive power of the rectum is less than that of any other portion of the large intestine. Thus we shall not uncommonly find that a part at least of a nutritive enema may lie unabsorbed, and as it decomposes cause irritation of the mucous membrane, until a second one is given, when a portion of both will probably be rejected. This kind of enema should therefore always be introduced as high up as possible, and for this reason should be given through a rectal tube made of heavy rubber about a quarter of an inch in diameter, of which at least eight inches should be inserted into the rectum. This thickness will be sufficient to prevent the tube from coiling up on the inside, as very often happens where one of soft rubber is used. The tube, however, must not be so stiff as to endanger the integrity of the walls of the intestine when moderate force is used in introducing it. After being well oiled the tube is inserted, and to the outer end a small funnel is attached. The enema, having been previously mixed in a half-pint or pint pitcher, is poured very gently and very slowly into the funnel, which has been elevated, and is allowed to trickle through the tube. In this way no air is introduced. A folded towel should be slipped under the patient to catch any drops and to receive the tube when withdrawn. After each time the tube is to be washed out thoroughly by allowing warm water to run through it, and then kept in a weak solution of boric acid. To prevent irritation of the mucous membrane where the enemata are to be given for any length of time, it is well to irrigate on each occasion with simple warm water, using the tube in the same way as for an enema, and then by lowering it to allow the water to run out. This precaution will enable us also to make sure that the bowel is empty before giving a nutritive enema. Food given in this way should be very nourishing, and concentrated foods, such as extracts of beef, beef-juice, eggs, and milk, are generally used, stimulants of some kind being often added. Two excellent formulæ are—

1.	One whole egg;	
	Table salt,	grs. xv;
	Peptonized milk,	℥iij;
	Brandy,	℥ss.
Or, 2.	The whites of two eggs;	
	Peptonized milk,	℥ij.

This makes about four ounces. The addition of salt aids in the absorption of the egg.

Brandy and whiskey are very irritating, and should be given only every other time, unless especially ordered; if omitted, the quantity may be made up by adding another ounce of milk. The milk should always be peptonized, and can be rendered so by adding twenty grains of Fairchild's prepared pepsin to one pint of milk. The vessel containing this is allowed to stand for fifteen minutes in water at a temperature of 100° F., and afterwards placed immediately on ice.

The pure beef-juice is given in quantities of from an ounce to an ounce and a half twice in twenty-four hours, or six ounces of beef-essence may be given and repeated once. For thirst a pint of water is given at at one time, and should always be introduced high up. After a nutritive enema the patient should be kept quiet for twenty or thirty minutes.

Sedative medicines are sometimes given by the rectum. Among these bromide and chloral are administered for their systemic effects, and opium in some form more especially where there is localized pain. If a patient is nauseated, these drugs are sometimes ordered by enema, which should be always given with the tube inserted at least six inches.

In shock or collapse brandy and hot water are often thus given, and should also be administered high up. If no rectal tube is at hand, a large-sized flexible male catheter will answer the same purpose. A small pillow placed beneath the hips will help the flow upward.

In hæmorrhage from the bowels hot-water or ice-water injections may be ordered. These are best given with a fountain syringe. This can be hung up, and the flow of water can then be regulated by the pressure of the fingers on the tube, and the bag may be refilled as soon as it is empty. This is the most convenient method also where astringents, such as nitrate of silver and alum, are dissolved in large quantities of water for irrigation of the intestines in dysentery.

Emollient enemata are prescribed in diarrhœas and dysentery; probably the best, where there is much tenesmus, is that made of starch and opium. The starch is bland and unirritating, while the opium soothes the pain, not only by lessening peristalsis, but also by its direct action on the nerves. In the diarrhœa of children more particularly, it gives excellent results, but the action of the laudanum must be closely watched. To prepare a starch enema one takes a sufficient quantity of laundry starch, and adds enough cold water to dissolve it; then boiling water is poured on until a thin paste is formed which is free from lumps; after this becomes cold the exact quantity ordered is taken (usually two ounces), and into it is stirred the required number of drops of laudanum. The injection is given slowly and gently through a small rectal tube.

Turpentine enemata for flatulence may be given according to the following formula:

Mucilage of acacia,	℥ss;
Spirits of turpentine,	gtt. x.

To be administered high up.

Nurses should be most particular about the care they take of the appliances employed in giving enemata. These should always be thoroughly cleaned before being put away, and this can best be done by allowing first hot soapsuds, and afterwards simple hot water, to run through the tube. They should never be put away damp, but hung up lengthwise to drip and dry. The nozzle is to be left for some hours in a 5 per cent. solution of carbolic acid, and then well washed off or boiled before being used again.

By a douche is generally meant a jet of fluid directed with a certain amount of force upon a limited surface, external or internal. Among those given internally are the vaginal, the nasal, and the aural douche. Douches are given for cleanliness, for their stimulating effects, or to relieve inflammation; like other baths, they may be either simple or medicated. The vaginal douche is very frequently used in hospitals, and is usually made by adding some disinfectant to the water, preferably a solution of carbolic acid. If it is for cleansing purposes, a 1 per cent. solution is usually the strength ordered; to allay inflammation, a hot solution of the same strength, the temperature ranging from 105° to 115° F. or even higher, can be employed. The fountain syringe with a glass douche-nozzle attached is the best instrument to use. Before the nozzle is inserted the stream of water should be allowed to flow through it until it is warm, and it should then be introduced well up toward the posterior wall of the vagina. If no special amount is ordered, a quart or three pints will be enough. The douche should always be given with the patient in the recumbent position; even if she be up and about, she should be made to lie down for such treatment. Glass nozzles are the only ones that can be kept quite clean, and they should be of the simplest possible construction. After being used hot water is allowed to run through them, and they are kept in a small open-mouthed bottle filled with 1 : 20 carbolic-acid solution, with the patient's name on the label. Each patient in the hospital requiring douches should have her own douche-nozzle. Before being used for another patient the nozzle is to be washed thoroughly and boiled for one hour in a 5 per cent. solution of carbolic acid.

Catheterization.—As it is important for a nurse to know early in her training how to catheterize a patient, the subject will be discussed here. Cystitis is an inflammation of the mucous membrane lining the bladder, which may be due to many different causes. One of the prolific sources of this inflammation is the introduction of foreign material into the bladder on a catheter. If germs are introduced, the urine will be decomposed, more germs will be developed, and inflammation will result. When this is the case, the fault rests with the doctor or nurse, in most cases with the latter, since she is usually entrusted with the work. To avoid this, therefore, every nurse should make sure, when an order has been given her to catheterize a patient, that a cystitis, if such unfortunately should occur, will not be traceable to any neglect on her part; otherwise she may feel that she has been the cause of weeks or months of intense suffering to a patient through her carelessness. Let her, then, see that the utmost cleanliness is exercised. The glass catheter is by far the best for women, but, of whatever material it be made, the instrument should be absolutely clean before use. The glass, metallic, or rubber catheter may be rendered thoroughly sterile by boiling in a 1 per cent. solution of carbonate of soda for five minutes; it is then laid in a clean basin containing a warm solution of boric acid, where it remains until it is needed. A gum-elastic catheter should be soaked for one hour in a 1 : 1000 bichloride solution, then washed off thoroughly in hot sterile water, and placed in the boric-acid solution.

In preparing to catheterize a patient the nurse is to wash her hands with soap and hot water, and afterward soak them in a 1 : 1000 bichloride solution. She then takes sterilized gauze sponges, the basin with the boric solution and catheter, a vessel to receive the urine, and some sterilized oil. The patient lies flat on the hips with the knees somewhat separated; a sheet or blanket is next thrown over each knee, leaving the vulva exposed: this is necessary, as one must see that the parts are clean. In bathing, gauze sponges should be used to separate the labia, and the region of the meatus urinarius carefully washed. The catheter is then dipped in the oil and introduced, care being taken to touch with the hands only the portion which will be left outside. With a glass catheter no oil is necessary.

The urethra is situated just above the vaginal outlet, and can be easily seen as a rule: the end of the catheter should enter the bladder quite readily. If any obstruction be met with, the instrument should not be pushed forward, but withdrawn slightly and the course changed. If the urine ceases to flow, the catheter is to be withdrawn a little or the position changed, when it may flow again. If the bladder is very much distended, it should not be emptied entirely the first time. When removing the catheter the finger should be placed over the end, so that any drops of urine remaining in it may not fall upon the bed. After the urine has been drawn off the parts are bathed and dried. Hot water is passed freely and with some force through the catheter. Glass catheters may be boiled in soda solution, and then kept in a 5 per cent. solution of carbolic acid. The others, after being thoroughly washed and dried, are laid aside, folded in a clean towel, and must be sterilized in the manner described above before being used again.

If a specimen of urine be required for examination, it should be drawn directly into a sterilized bottle, the top of which is to be plugged with clean cotton.

CHAPTER XI.

TEMPERATURE.—PULSE.—RESPIRATION.—CARE OF THE THERMOMETER.—CHARTING AND RECORDING NOTES.

THE temperature, pulse, and respiration of the body in health bear a certain ratio to one another, and any variation in one will usually be found associated with changes in one or both of the others. Thus it becomes necessary, when considering the condition of one, to bear in mind at the same time that of the other two. A knowledge of the functions of the skin, of the circulation of the blood, and of the chemical changes that take place in the body and produce heat, is necessary for a full comprehension of the establishment and maintenance of the bodily temperature, by which we mean the degree of heat found in any part of the body. This is nearly equal everywhere, since the blood which penetrates all portions of the system has for one of its functions the general distribution of the heat. In health the temperature varies constantly within certain narrow limits, although a normal temperature by no means indicates that a person is free from disease. The normal temperature of the human body is 98.6° F. (37° C.), but under certain circumstances may be anything between 97.5° and 99.5° F. A temperature above or below these points is to be considered abnormal, that is, as denoting a departure from that of the normal or healthy condition. These variations may be classed under three different headings:

First: those dependent upon the time of day at which the temperature is taken, as definite daily changes take place within the limits mentioned above. During the greater part of the day about the mean temperature of 98.6° F. is maintained, but by four or five o'clock in the afternoon this is found to have increased to 99° F., or may even be a little higher; at eight o'clock in the evening the fall begins, which continues until the lowest point, 98° or 97.5° F., is reached by 2 A. M. The temperature may continue low until between six and seven o'clock, when it again rises to 98.6° F. These fluctuations are easily accounted for, since during the day food and exercise tend to gradually elevate the temperature slightly, while after eight o'clock in the evening, when there is rest of body and mind and the hours are passed fasting and in sleep, there is naturally a slight decrease.

Secondly: those dependent on the part of the body in which the temperature is taken; thus the temperature in the axilla is always lower than that of the mouth by three-tenths of a degree, while that taken by rectum is half a degree higher than that taken in the mouth.

Thirdly: those dependent on other causes. Thus the ingestion of highly-seasoned, stimulating foods elevates the temperature. Again, certain general or local causes may exercise a decided influence on the heat of the whole or of certain parts of the body; for instance, profuse perspiration reduces temperature, or if the hands and arms are dipped in cold water, while the axillary temperature may be subnormal, that taken by the mouth may give a normal reading.

Any departure from the normal temperature, beyond certain limits, indicates a deviation from health or the invasion of disease, and in many instances the intensity of the morbid process is directly proportionate to the elevation of the temperature.

Abnormal temperatures are recognized as (1) subnormal, (2) elevated. A subnormal temperature may range from 96° to 98° F. In conditions of collapse it may go as low as 95° F., but this is extreme, and there is little hope of a patient rallying with such a temperature. A general depression of the vital forces may produce a subnormal temperature, or local causes—*e. g.* traumatism by producing shock—may have a similar effect. In paralysis, after severe hæmorrhage, in some diseases where there is a continual tissue-waste going on, in chronic malaria where the blood has been much impoverished by the malarial organism, in some nervous disorders, and in certain poisonings that affect the heat-centres, in heat exhaustion,—in any of these conditions there may be a depression of temperature.

Elevation of temperature means an excess of heat in the body, due either to an increased production or to an over-accumulation from imperfect dissipation.

The range of temperature compatible with life may be fairly placed between 95° and 109° F., either of these extremes usually being a fatal symptom. Some extraordinary cases, however, with remarkably high and low temperatures, have ultimately recovered. We may then classify the temperature conditions as follows:

Temperature of collapse	95°–97° F.
Subnormal temperature	97°–98° F.
Normal "	98.6° F., with variations.
Subfebrile "	99.5°–100.5° F.
Fever of moderate degree	100.5°–103° F.
High fever	103°–105° F.
Hyperpyrexia	above 105° F.

The temperature should be taken at least twice a day, owing to the diurnal variations; thus, a morning temperature may be normal, and the evening temperature found to be considerably elevated. The instrument for measuring the heat of the body is called a clinical thermometer, to distinguish it from the ordinary ones. The Fahrenheit scale is the one principally used in America; in Europe the Centigrade and Réaumur take precedence.

The rule for converting Fahrenheit degrees into those of Centigrade is to subtract 32, multiply by 5, and divide by 9. For instance,

$$104° \text{ F.} = \left[(104° - 32°) \times \frac{5}{9}\right] \text{C.} = 40° \text{ C.}$$

To reduce Centigrade to Fahrenheit multiply by 9, divide by 5, and add 32 to the result.

$$\text{Thus, } 40° \text{ C.} = \left[\left(40° \times \frac{9}{5}\right) + 32°\right] \text{F.} = 104° \text{ F.}$$

To reduce Fahrenheit to Réaumur subtract 32, multiply by 4, and divide by 9.

The instrument should be accurate, self-registering, and clearly indexed. Hicks' thermometer with a Kew Observatory certificate is considered the best, but all thermometers change with age, and should be tested by a standard frequently and the necessary corrections made. The best way to test a thermometer is to place it, along with one of known accuracy at the same moment, in the mouth or rectum. After these two have been left long enough to register, they are taken out together and the results compared. The mercury should be shaken down below 95° F. on the index. The temperature may be taken cutaneously between two folds of the skin in the axilla or groin, or in some of the cavities of the body, either the mouth, vagina, or rectum. The length of time necessary for obtaining the registration depends upon where the temperature is taken and upon the thermometer used. None register under three minutes except the special one-minute thermometer, which is too expensive for hospital use. The time allowed for registration in the axilla should be ten minutes at the very least, in the mouth or rectum from three to five minutes. The axillary temperature will be from one-tenth to three-tenths of a degree lower than that taken by the mouth.

The rectal temperature is the most accurate, as by this method the patient is not required to assist; indeed, for children it is the only one feasible. Precautions must be taken to have the rectum free from fæces. The bulb of the instrument is to be oiled and inserted gently for about one and a half inches: the only disadvantage lies in the inconvenience of the procedure, unless indeed there be any disease of the parts, since then an elevation might be due merely to local causes.

For obvious reasons, however the temperature is most commonly taken by the mouth. The thermometer should be placed under the tongue, the patient being instructed to close the lips tightly over it, but not to bite it. If the lips be dry, they should be moistened, and one should be careful not to take the mouth temperature directly after a hot or cold drink. If a patient is too weak, or the lips and mouth so dry that they cannot be kept tightly closed, air will be admitted and the record will be inaccurate. Moreover, the method is not a safe one for unconscious or delirious patients, since they may bite off the bulb and swallow it. Should this accident happen, it should be reported at once to the physician, though as a matter of fact he can do nothing, and the results are not likely to be serious. In several cases which I myself have seen, and which were left to nature, no harm resulted.

In taking the axillary temperature the arm-pit should be wiped thoroughly dry from perspiration and the thermometer placed in the hollow: the arm is then held closely to the side with the elbow flexed and the hand resting on the opposite clavicle. If the patient is very weak the arm should be held in place by the nurse. Sometimes there is too much emaciation to admit of the close contact of the skin surfaces: in such cases or where there is excessive perspiration an axillary temperature should not be relied upon. It is convenient at night, since it can be done with but little disturbance to a sleeping patient, whereas if it is taken by mouth when half asleep he is liable to allow the lips to open. In recording a temperature one always states where it has been taken, unless ordered to take it only in one particular place.

Before using the same thermometer for another patient the nurse should be particular to wash it off thoroughly with some antiseptic solution and wipe with a clean napkin. When thermometers are not in use they should be kept in a glass filled with a fresh solution of bichloride of mercury (1 : 1000), the bottom of which is covered with absorbent cotton as a soft bed for the mercury bulbs to rest upon.

It is an excellent thing to learn to judge of the condition of a patient's temperature by the touch, training the fingers or hand to feel differences, and controlling the impressions thus received with the results obtained with the thermometer, since the attention of a nurse with a well-trained touch may sometimes be drawn to an unusual condition in a patient that otherwise might pass unnoticed. It should be remembered, however, that the surface temperature is not a reliable index to the general bodily temperature: the skin may feel comparatively cool when the thermometer in the rectum shows an elevation of several degrees.

The thermometer is of great value in diagnosis, and in any doubtful case the temperature should be regularly taken at short intervals until other symptoms manifest themselves. In hospitals one occasionally meets with a malingerer who, if not watched, will shake the mercury up, producing an unaccountably high temperature. With children a high temperature is not necessarily so serious as the same would be in an adult. In hysteria the temperature may reach 104° or 105° F., and then fall without a recurrence.

In recording a temperature or pulse, where any doubt exists as to the accuracy of the observation it is advisable to place a question-mark (?) after the record, in order that the attention of the physician may be called to the possibility of an inaccuracy. But extremely high temperatures actually do occur. These are instances of the so-called "paradoxical" temperature, and are more likely to occur just before death. Observers whose reliability cannot be called into question have reported temperatures (in the last stages of disease) as high as 112° F. In sunstroke 109° F. and even higher temperatures have been recorded. Hilton Fagge cites a case of a young woman (observed by Teale) in which on four different occasions the mercury was buried in the bulb at the top of the thermometer at a point above 122° F. Whenever, however, the thermometer registers an extraordinary temperature (whether above or below normal), the results should be controlled more than once, and several different instruments should be employed, before we are convinced that no error on our part has been made.

Fever or pyrexia may be classed as continuous, remittent, or intermittent. A continuous fever is one in which the temperature is uniformly above the normal line with but slight variation, such as is seen in pneumonia. In a remittent fever there is a rise and fall as in typhoid fever, although the temperature never reaches the normal line. In intermittent fever the temperature is high, but at some time during the twenty-four hours drops to the normal line or even below it, as in malarial fever.

A febrile temperature may fall by crisis or by lysis. By crisis it drops suddenly to the normal, as is usual in pneumonia, while by lysis the fall is gradual, as in typhoid fever. A convalescent's temperature may be influenced by apparently trivial causes, such as slight over-exertion, a change in the diet from light to more solid food, or by excitement of any kind. A sudden and decided increase generally indicates some complication, and the doctor should be informed at once; in fact, any rise of temperature above 103° F. should be reported. More than this, a sudden drop from a high temperature to a subnormal point (unless in pneumonia) most probably indicates collapse, and the physician should be notified.

Before death the temperature in fevers may be very high, while in chronic malignant diseases and cachexias it may be subnormal.

Charting temperatures should be done with neatness and accuracy: one nurse at a time should be set apart to take temperatures and pulse-rates and record the same for the whole ward.

The lines should be lightly and evenly drawn, and the point at which the temperature stands indicated by a small (not too heavy) dot. The night and morning records are best done in black, while the temperatures taken in the intervening hours may be marked in red ink.

A patient should not have access to his chart, nor is it right to keep a patient informed of the course of his temperature, since it may have a bad effect upon even the most sensible patient to know that his fever still continues high.

The specimen charts of typhoid fever, pneumonia, and malarial fever given at the end of this chapter, and taken from actual cases, show the variations and different types of temperature in those diseases, and also the method of charting (Plates III., IV. and V.). Plate VI. is an example of a bedside record.

THE PULSE.

The examination of the pulse is an important guide to the patient's condition, since from it one may draw conclusions in regard to the strength and action of the heart. One of the most difficult things a nurse has to learn is to count the pulse accurately and to understand its variations and their significance. This requires much practice, and the proper skill can only be acquired by much perseverance and close study. She should begin by counting the pulses in normal cases until she becomes thoroughly acquainted with the characteristics of the healthy pulse, and whenever she has an unoccupied moment she should count the pulse in various patients and note their differences and peculiarities. When she has heard the pulse of a patient described, she should examine it repeatedly until she feels that she could recognize another like it. Frequently it is necessary to watch the pulse of a sleeping patient: this should be practised until it can be done without disturbing the sleeper.

The pulse is dependent upon the rhythmical contraction of the heart. With each heart-beat the blood is sent through the arteries with more or less force, distending the arterial walls, and it is the sudden expansion of the artery, felt under the fingers, that we call the pulse. This distension takes place only during the systole or contraction of the heart, and the diastole or period when the ventricle is filling with blood is represented approximately by the interval between two pulse-beats. An artery can be recognized by the intermittent pulsation in it and by the elasticity of its walls. The rise of the pulse-wave is clearly defined, but can be arrested in most cases by firm pressure made with the fingers. The points to note in taking the pulse are—

1. Frequency;
2. Rhythm (regular or irregular);
3. Whether or not it is intermittent;
4. Size of artery;
5. Degree of distension between the beats, if any; exists;
6. The character of the pulsations—
   (*a*) Whether the rise is sudden or gradual;
   (*b*) Duration of impulse—long or short;
   (*c*) Fall—abrupt or gradual;
   (*d*) Dicrotism;
7. Compressibility—
   (*a*) Low tension;
   (*b*) High tension;
8. Thickening of the vessel-walls.

The character of the pulse depends upon the action of the heart, the condition of the arteries, and the amount of resistance in the capillaries.

The action of the heart determines—

(1) The frequency of the pulse;
(2) Its rhythm and regularity;
(3) Its force and strength.

By frequency is meant the number of beats in a given time. The normal number of beats in a minute varies in different people, and the pulse is slower and stronger in men than in women, and in women than in children.

The average pulse in

Men is from	60 to 70	beats per minute.
Women "	65 to 80	
Children "	90 to 100	

The normal pulse is recognized by—

(1) Its perfect rhythm;

(2) The equal force of successive heart-beats;

(3) The medium size of the artery.

The pulse is usually taken at the wrist, where the radial artery is easily felt pulsating because it lies directly over a bone and is superficial. The index and middle fingers are placed over the artery, pressing firmly enough to feel the beat. One counts usually for half a minute. After long practice it is possible to count accurately a pulse as frequent as 160. It is sometimes more convenient to take the pulse in the temporal artery.

The normal pulse may be affected by the same causes which produce variations in the normal temperature. Its frequency is increased by—

(*a*) Food or exercise. The pulse will be fuller and more forcible, and the vessels of the surface relaxed.

(*b*) Excitement. It is quickened, but the acceleration lasts only while the excitement continues.

(*c*) Position. The rate is higher when the patient is standing than when sitting or lying down.

It should be noticed whether the pulse at both wrists is the same, as often the volume or frequency of one is greater than that of the other: in aneurism there may be almost complete obliteration of the pulse in one wrist. One may be startled at times, on feeling for the pulse of a newly-admitted patient, to find absolutely no pulsation over the spot usually palpated. This is frequently due to an anomalous distribution of the vessels in one arm or to a previous injury which has severed the radial artery on that side.

In illness the pulse indicates the effects of the disease on the system and the existing amount of enduring power. One of the most marked differences between the pulse in health and in disease is that in the latter there is an increased susceptibility to the same influences that cause variations in health. In most diseases the pulse is accelerated, and the more frequent the number of beats the weaker, as a rule, the heart's condition.

The terms used to express the quality of the pulse, "quick" and "slow," "strong" and "weak," are vague, inaccurate expressions, as *quick* or *slow* might refer to the length of each beat or to the rate at which the beats follow one another, and *strong* and *weak* are quite indefinite. We use the term *frequent* for a pulse up to 110 or 115; a pulse from 115–140 we call *rapid;* a pulse of from 140 upwards we call *running.*

We speak of a pulse being long or short when describing individual pulsations. The terms forcible, vehement, sluggish, or feeble are also used to express the condition of the heart. There are several different types of pulse; thus a pulse may be—

1. Irregular (either in force or in sequence);
2. Intermittent;
3. Dicrotic.

In an irregular pulse the beats differ in length, force, and character: the term may apply to the strength or to the rhythm or to both. An intermittent pulse may be present throughout life in a healthy individual. An intermittent or an irregular pulse may be induced by—

1. The condition of the respiratory organs;
2. Acute disease where it may be a grave symptom;
3. Certain conditions of the nervous system.

When the pulse is intermittent a beat is lost from time to time. Where this occurs in health the causes are not fully understood. The condition may be brought on by nervousness or exhaustion.

A dicrotic pulse indicates a relaxed condition of the arterial system, and consists of one beat followed by a second, which is in reality a wave in the blood-current produced, not by another contraction of the heart, but by the closure of the aortic valves. This secondary pulse-wave is usually less forcible than the first, but sometimes resembles it so closely as to be counted as an individual beat. Nurses have been known, in counting a pulse of this kind, to obtain a result exactly double the actual number of heart-beats. The error becomes at once apparent if one hand be held over the point of maximum impulse of the heart on the chest-wall, while the other is at the wrist. A dicrotic pulse is found frequently in the acute fevers, particularly in typhoid fever.

The tension of a pulse is determined by the degree of resistance which the artery offers to the pressure of the fingers, and the terms used in this connection are "high" and "low;" if the resistance is considerable, we say that the tension is increased or that it is plus (T +); in the opposite condition we have a decreased or minus tension (T —).

The remote causes of high tension are—

1. Excess of animal food or of alcoholic drinks;

2. Sedentary habits with the resulting imperfect oxidation;

3. Constipation.

High tension may be present as a result of obstruction in the arteries or capillaries, caused by—

1. Changes in the vessel-walls or deposits of lime due to age;

2. Gouty conditions;

3. Organic disease of the heart or kidneys;

4. Chronic lead-poisoning.

Sometimes also there is a pulse of high tension in pregnancy.

In a low-tension pulse the arterial tension is diminished, owing to the weakened condition of the heart or to a relaxed state of the peripheral vessels, and the pulse becomes easily compressible: it may have the feeling of being large and full, but this does not always indicate an energetic and strongly-beating heart. In extreme cases, where the heart is very weak and the amount of blood sent out with each systole small, the pulse becomes easily compressible, and we have what is known as the running pulse. This may be produced by prolonged exertion, mental or bodily fatigue, and certain conditions of the nervous system.

The special characteristic of a high arterial tension is the non-compressibility of the pulse-wave; the artery may remain full between beats, and may be rolled under the finger like a cord. The pulsation for this reason may not be very marked, and may convey the impression that the pulse is not strong, but on examination it will be found to resist more strongly the more it is compressed. The immediate causes of this condition are—

1. Increase in the force of the heart's beats;

2. Contraction of the smaller arteries (*e. g.* from the application of cold to the external surface of the body).

One should be very observant of the effects produced upon the pulse by therapeutic measures. In giving medicines which affect the heart any difference in the pulse before and after administration should be carefully noted. If a bath is ordered the pulse should be watched closely. Stimulants increase the frequency of the heart's action, while antipyretics have a depressing effect.

The ratio borne by the pulse to the temperature and respiration is of much importance. If a pulse is more frequent than the temperature would lead us to expect, this is usually an indication of a weak heart, and the weakness is, as a rule, in proportion to the deviation from the normal ratio of pulse to temperature.

THE RESPIRATION.

External respiration is the act of taking in and giving out air by the lungs. This permits of the interchange of gases in the lungs, the blood in the small capillaries being separated from the air by an extremely thin membrane. The venous blood brought to the lungs by the pulmonary artery is oxygenized, and returns through the pulmonary veins to the left heart as bright arterial blood. The average number of respirations to the minute in an adult is eighteen, in a child from twenty to twenty-four. Any marked variation from this is abnormal. In some diseases, such as peritonitis and pneumonia, the respirations may be very rapid; when over forty the symptom is considered grave. There are cases, however, in nervous and hysterical patients where the respirations may be exceedingly rapid, perhaps over sixty per minute. In some pulmonary diseases the respiration may often be out of proportion to the pulse-rate. In taking respirations one should note—

1. The frequency;
2. If regular or irregular;
3. Whether difficult or easy;
4. Noisy or quiet;
5. Deep or shallow;
6. Symmetry of chest and its movements;
7. The type, abdominal or thoracic.

The most peculiar type of breathing is that found in the dyspnœa of certain diseases of the heart and kidneys, known as *Cheyne-Stokes* respiration. There is an increase in the frequency and intensity of the respirations up to a certain point, then a gradual decrease until they entirely cease for several moments, when the cycle is repeated.

Stertorous breathing is that in which there is a loud snoring sound with each inspiration.

In taking the respiration one must not allow the patient to be aware of the fact, for he will unconsciously control it. After taking the pulse the fingers may be left on the wrist, and while apparently counting the pulse the rise and fall of the chest may be noted.

In some affections, such as asthma and heart disease, there is dyspnœa—that is, difficulty in breathing—and a sitting position is the most comfortable. At times the breathing is so bad that the patient cannot assume the recumbent posture at all—a condition known as orthopnœa. The ear should be trained to detect differences in breathing, so that even in the dark the slightest change may be at once noticed.

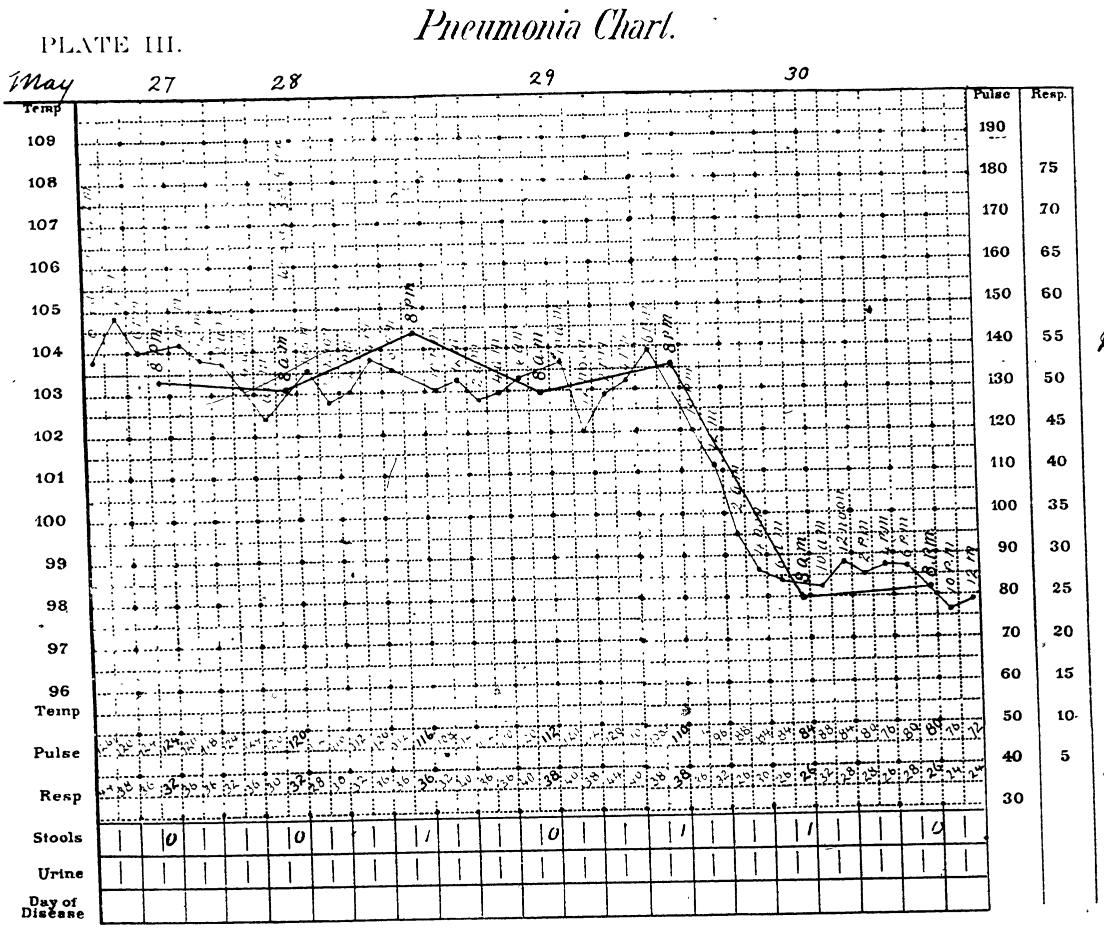
In diseases where changes in treatment are few, as in typhoid fever, a brief note of them can be made on the temperature chart at the time that they occur. (*Vide* specimen chart.) After operations, however, particularly after abdominal sections, and in certain diseases where the treatment varies every few hours, a bedside or hourly record-sheet should be kept, each step of the treatment being neatly and accurately put down by the nurse. Such a sheet should not be arranged for more than twenty-four hours, so that at the end of that time a summary of the treatment may be made. The physician on his morning and evening visits will then be able to see at a glance just what has been done, without having to enter into a detailed report before the patient. The temperature should never be reported to the physician nor the symptoms discussed in the presence of a patient: if it is necessary to see the physician alone for a moment, one tries to do so outside the room either before or after the visit, though, as a rule, the record should be clear enough on all points to fully explain the case.

[P]

Ma

Temp
109
108
107
106
105
104
103
102
101
100
99
98
97
96
Temp
Pulse
Resp
Stools
Urine
Day of Disease

PLATE III.


Pneumonia Chart.
May
27
28
29
30
Temp
Pulse
Resp.
109
108
107
106
105
104
103
102
101
100
99
98
97
96
190
180
170
160
150
140
130
120
110
100
90
80
70
60
50
40
30
75
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45
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25
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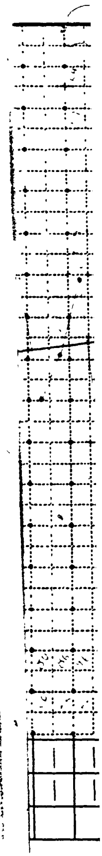
15
10
5
Stools
Urine
Day of Disease

hart.



hart.

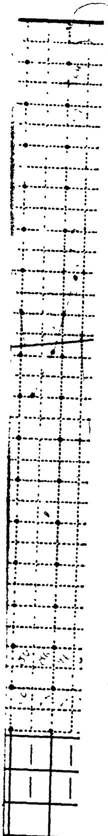


PLATE IV.

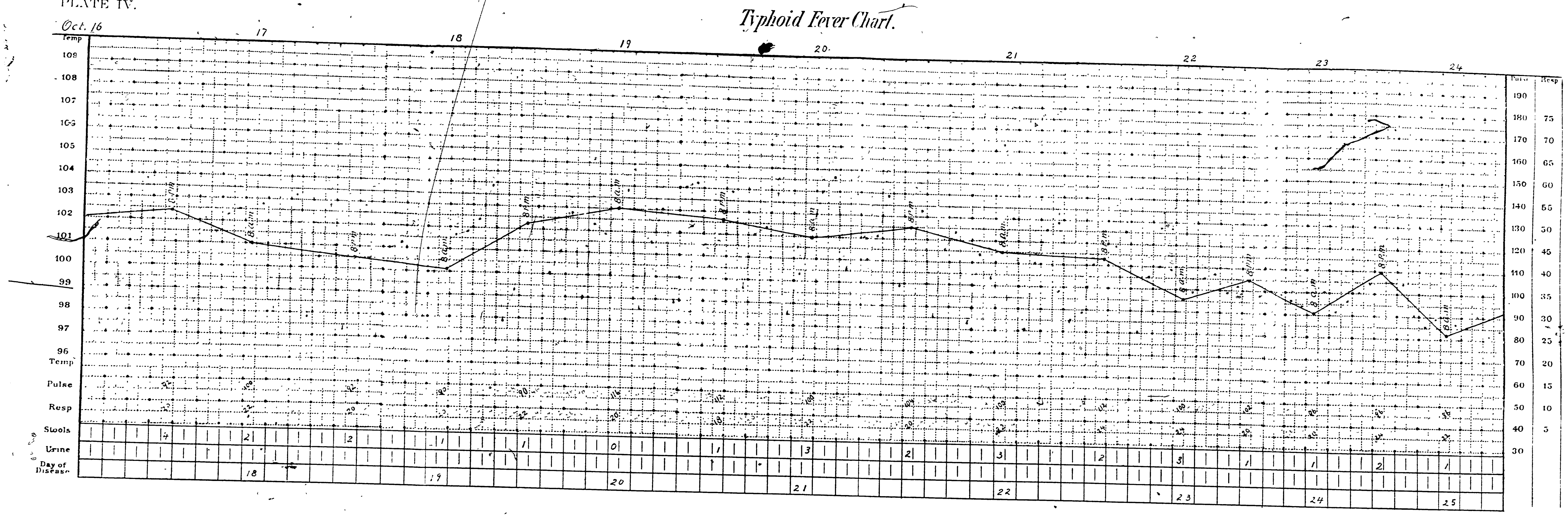
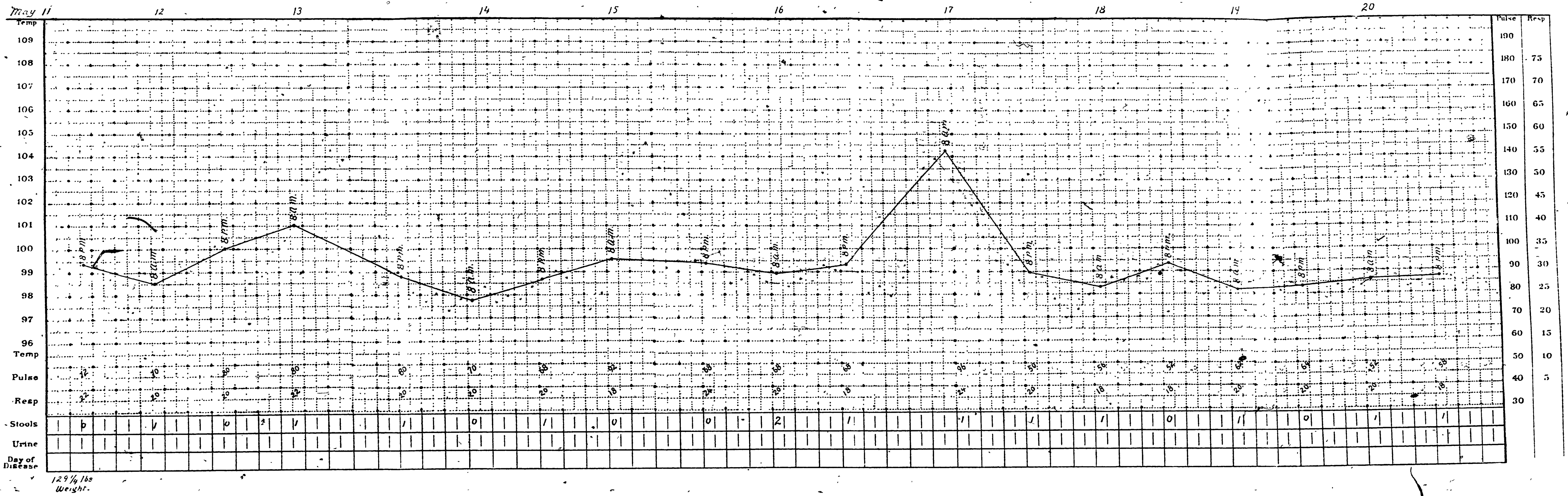

Typhoid Fever Chart.
Oct. 16
17
18
19
20.
21
22
23
24
Temp
Pulse
Resp
Stools
Urine
Day of Disease

PLATE V.

Malaria Chart.



SUMMARY: Sleep, 5 hrs. Urine, 770 c. c. Tr. capsici, gtt. vj. Stimulant, brandy, ℨij. Nourishment, milk and lime-water, ℥iij by mouth; milk by enema, ℥vj; brandy by enema, ℨij. Purgative enemata, ij. Stool, 1.

PLATE VI.

DATE, May 20, 1892.

Hour.	Temp.	Pulse.	Sleep.	Urine.	Stool.	Medicine.	Stimulant.	Nourishment.	REMARKS.
A. M.									
1				Per cath 200 c. c.				Enema {Pep. milk, ℥iij; Brandy, ʒj}	Retained enema. Has had much pain.
2						Tr. capsici, gtt. iij			
3			1 hour.						Vomited greenish clear fluid, ℥ijss.
4	98.6	72						Enema {Pep. milk, ℥iij; Brandy, ʒj.}	Retained enema. [night.
5									
6									Has been noisy the latter part of
7									
8	99.6	80		Per cath 170 c. c.					
9			½ hour.					By mouth: Milk and lime-water, ʒj.	
10			½ hour.				Brandy, ♏xxx		
11								Milk and lime-water, ʒij.	
12	99.8	76							Headache. No other pain.
P. M.									
1			¾ hour.					Milk and lime-water, ʒiij.	
2				Voided 100 c. c.			Brandy, ♏xxx		
3								Milk and lime-water, ʒiij.	
4	100	78							Enema, {Oil, ℥iij; Turpentine, ℥ss.}
5								Milk and lime-water, ʒiij.	Enema, {Soapsuds, Oj; Rochelle salts, ℥ss.}
6			½ hour.				Brandy, ♏xxx		Enema expelled; partially-formed stool, moderate amount.
7					1			Milk and lime-water, ʒiv.	
8	99.6	82				Tr. capsici, gtt. iij		Milk and lime-water, ʒiv.	Rectal tube inserted. Flatus expelled.
9			1 hour.						
10							Brandy, ♏xxx		
11			45 min.	Voided 300 c. c.				Milk and lime-water, ʒiv.	Comfortable. No pain.
12	99.8	7[illegible]							

SUMMARY: Sleep, 5 hrs. Urine, 770 c. c. Tr. capsici, gtt. vj. Stimulant, brandy, ʒij. Nourishment, milk and lime-water, ℥iij by mouth; milk by enema, ℥vj; brandy by enema, ʒij. Purgative enemata, ij. Stool, 1.

CHAPTER XII.

External Applications (general and local).—Dry Heat.—Hot-water Bags and Cans.—Hot Bottles.—Flannels.—Salt-bags.—Moist Heat.—Fomentations.—Poultices.—Cold Applications.—Ice.—Cold Water.—Lotions.

External heat, whether applied generally or locally, is intended to give additional warmth to the body, to allay inflammation and relieve pain, to promote suppuration, or to act as a diaphoretic. Cold applications are used chiefly to reduce temperature and inflammation, but are employed besides for their stimulating effect.

It is a matter of every-day experience that warm weather makes itself felt much sooner and more severely when the atmosphere is saturated with moisture than when it is dry. Just in the same way hot moist applications have a much more marked effect and are more depressing than dry heat at the same temperature.

Dry heat when required for its general effect is administered by means of the hot-air bath, and is often ordered when the kidneys are failing to do their work well: the waste products, not being excreted in the normal amount, are accumulated in the system, and the hot air, acting upon the body by dilating the superficial blood-vessels, produces copious perspiration and brings about in this way the elimination of much of the poisonous material. Its application is described in the chapter on Baths.

When dry heat is applied for the sake of warmth alone, it is best to use hot bags, bottles, or cans. Such bags are made of india-rubber and are of different shapes and sizes. When required for use, they should be filled not more than about half full of hot water, for when quite full they would be heavy and difficult to adjust: before screwing on the top the air must, as far as possible, be expelled. Hot-water bags must be watched, as they are liable to leak and make the bed wet, if the top be not tightly screwed on.

Except for applying heat to flat surfaces like the side of the face or abdomen, hot-water bags are not so serviceable for hospital use as the hot-water tins, bottles, or bricks. With tin cans particular care must be taken lest the patient be burned: they are especially valuable in warming the bed for an operation patient, but on no account should they be left beside an unconscious patient unless they can be constantly watched. In invalids the vitality of the tissues is lowered, and it is an easy matter for them to sustain a burn which in their case may prove very troublesome, though in a healthy person it might heal at once. This is especially true of paralytics. Hot bottles are not very safe, as they are apt to crack or burst. If they must be used, they should be placed with the corked end away from the patient, and should not be filled more than two-thirds full. The chief recommendation of bricks is that they retain the heat a long time; on the other hand, it may be objected that they are uncleanly and clumsy. Like the hot-water bag, these cans or bricks should be protected by cases made either of ordinary flannel or of canton-flannel, and placed in the bed with a blanket between them and the patient. These appliances are used in the warming of beds for operation patients, for cold extremities, for pain, during a chill, in cases of collapse or shock, or for very ill patients in the early morning hours.

Hot flannels are sometimes ordered for inflamed joints and abdominal pains. The flannel should be made very hot, wrapped in a heated paper or cloth, and applied quickly, the whole being covered with a layer of cotton-wool and oiled muslin. Salt-bags are used for the same purpose, for neuralgias, and more especially for earache. They are simply flannel bags filled with sea-salt, heated just as hot as can be borne, and covered with a pad of cotton-wool and oiled muslin. They retain the heat a long time, and are very soothing. In earache competent authorities recommend the use of the so-called "Japanese hot box."

Moist heat is more penetrating and has a more pronounced effect than dry heat. It is applied where there is pain from muscular spasm, since by dilating the superficial blood-vessels it relaxes the tissues, quickens the circulation in the affected part, and by drawing the blood to the surface vessels relieves the tension of those more deeply seated, and thus eases the pain. Moist heat is better in acute inflammations which we cannot prevent from going on to suppuration. The application should be as hot as can be borne. It hastens suppuration by increasing and promoting the activity of the leucocytes or white blood-corpuscles, the relaxed condition of the blood-vessels caused by the heat and moisture perhaps facilitating their escape through the walls of the vessels.

For a general systemic effect warm tub-baths are ordered: they relax the muscles, relieve nerve-tension, equalize the circulation of the blood, and induce sleep. For sleeplessness they should be given in the evening after all the arrangements for the night have been made, so that the patient will not again be disturbed. The vapor bath is another method of applying heat generally, and is used for the same purpose as the hot-air bath. For localized pain, fomentations, stupes, and poultices of various kinds are prescribed, their action being precisely the same, since they relieve pain and inflammation by dilating the blood-vessels in the neighborhood of the painful part. Poultices are best used in cases of deep-seated pain or continuous inflammation. They may be made of any non-irritating substance which will hold and convey moist heat, both of which conditions are fulfilled by linseed, which is perhaps most commonly used. To make a linseed poultice the meal is stirred slowly and evenly into water which is already boiling: the mixture is then boiled for several minutes, being stirred briskly all the time, until it is thick enough to be beaten well with a spoon, by which process the lumps are removed and a certain amount of air incorporated with it, making it light. If well beaten and boiled, when finished it will make a light smooth paste, just stiff enough to drop away from the spoon. A layer half an inch thick is spread on a piece of muslin or coarse cloth of the required size, a margin of an inch being left to be turned in;

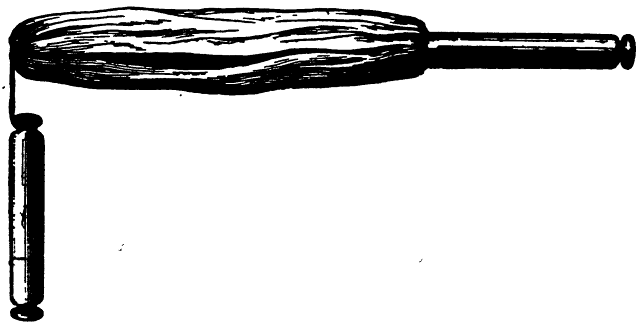
the surface is vaselined and covered with a layer of thin gauze; the edges are turned over and the whole covered with a rubber cloth or rolled in a towel to keep it warm, and carried to the patient. One poultice should never be removed until another is ready to be put on. Before it is applied the skin is to be wiped dry. Oiling the poultice with vaseline prevents irritation of the skin and the formation of papules. The poultice when in place should be covered closely with a layer of cotton-wool and oiled muslin to prevent the escape of the heat and moisture. It must be changed at least every three hours, and where it is desired that a uniform temperature be maintained it should be changed oftener—every hour or so. A poultice should be applied as hot as the patient can bear it: it should never be left on until it becomes cold, and should never be reheated and used again. Bread is seldom if ever used, as it retains the heat only a very short time.

Linseed poultices are sometimes ordered to remove sloughs from a wound, and then are best made with 1:40 carbolic-acid solution. They are not so useful for this purpose, however, as gauze wrung out of a 1 per cent. solution of carbolic or a saturated solution of boric acid, laid in light fluffs against the parts and changed frequently. If poultices are ordered for such a purpose, they should not be left on after the slough has come away. One sometimes sees them used until the granulations and surrounding tissues look pale and flabby, a condition which indicates a lack of vitality due to too much moisture, the tissues having become water-soaked. Charcoal as a deodorizer is occasionally ordered where there are sloughs which give off an offensive odor. One part of powdered charcoal is mixed with two parts of linseed, and the poultice made as above: before applying it is well to sprinkle a little charcoal over the surface. The application, however, is a very untidy one, and for this reason is seldom ordered. Instead of it we would recommend gauze dipped in a saturated solution of permanganate of potassium, which makes an excellent deodorizer.

A starch poultice on account of its soothing properties is used in skin diseases where there is much irritation. The starch is mixed first with a little cold water, and then enough boiling water is added to make a thick paste. It is spread on muslin covered with a layer of gauze and applied like other poultices. If there be a great deal of pain, a few drops of laudanum may be sprinkled over the surface just before it is applied.

The most pleasant way of applying moist heat is by means of fomentations, but they are somewhat troublesome, as they require to be changed very frequently. Where heat is the first requirement, this should be done every ten or fifteen minutes, but if they are used principally for their moisture, then every twenty minutes will be often enough. In no case should they be left on until they are cold and clammy, and, in fact, unless very thoroughly applied, fomentations do little or no good. The best material to use is coarse old flannel: an old blanket answers excellently, as the fibres are thick enough to retain the heat for some time, while the meshes are coarse enough to allow the circulation of warm air through it. Two layers of flannel are taken, dipped in boiling water, and lifted into the wringer. The latter is made of a stout piece of ticking 18 inches long and 15 inches wide, with a hem at each end through which runs a stick. This is called a "stupe-wringer." Another form of stupe-wringer may be made according to the figure here presented (Fig. 11). By twisting the sticks in oppo-

FIG. 11.



STUPE-WRINGER.

site directions the flannel is wrung out so tightly that it will not drip, and then carried in the wringer to the bed. By keeping two stupes in use, one need not be removed until the other is ready to put on. The skin having been first dried, the folds of the flannel are shaken out: the stupe is then put on and covered with a thick layer of common cotton-wool and one of oiled muslin, such a covering being always allowed to overlap the poultice or fomentation by at least two or three inches. After stopping the use of stupes a layer of cotton-wool or flannel over the part for a day or two is advisable. Small hot compresses for the eye, breast, or neck can be wrung out tightly, and perhaps best, in a lemon-squeezer. Hot compresses are applied to the throat for spasmodic closure of the glottis or in spasmodic croup. Either hot sea-sponges or flannel may be used instead. Since it is the combined effect of heat and moisture that is desired, they should be changed every ten or fifteen minutes.

The material used for hot fomentations for the breast should be cut in circular pieces large enough to cover the breast, and should have a small round hole in the middle for the nipple; the latter should never be covered.

The action of heat differs from that of cold, in that heat expands and dilates, while cold contracts. Heat increases the bodily warmth, cold decreases it. Cold may prevent suppurative processes, while heat tends to promote them. They both act as sedatives to painful nerves.

In inflammation a portion of the tissues is injured and certain changes occur, which are evidences that Nature is endeavoring to repair the injury done. These changes are associated with redness, heat, swelling, and pain, which in their combination are largely the expression of an increased supply of blood to the part. Unfortunately, Nature in her efforts too often goes beyond what is useful to the organism, and, when the inflammation threatens to become too acute, it may be desirable to check it in its progress. It is just here that the value of cold applications is most marked. Acting as they do, by contracting the small blood-vessels of the part, they lessen the amount of blood directed thither, and so are often successful in preventing the formation of pus.

Cold is applied either by means of the cold bath or by compresses, packs, sponging, coils, or ice. The cold bath best allows of the general application of cold. When this is used for its stimulating effect, it should not as a rule be continued over five minutes, and a vigorous rubbing should follow, in order to secure reaction. The cold pack and ice-water sponging are used, as well as the cold tub, to reduce fever in the manner described in the chapter on Baths. Cold compresses are made of two or three thicknesses of lint or linen wrung out of cold water and applied over the inflamed surface, being changed frequently. If iced compresses are ordered, a small block of ice partially wrapped in flannel is placed in a basin: there should be two compresses, one of which is kept on the ice, while the other is on the patient. They are thus kept constantly cold by frequent changing. Compresses are particularly useful where little weight can be borne.

The most effectual way to apply cold continuously is by means of the india-rubber ice-bags. These can be made in different shapes; for instance, helmet-shaped for the head, but long and narrow for the neck and spine. Perhaps the most useful of all is the simple ice-cap. The ice should be crushed into small pieces and mixed with a little common salt to intensify the cold. The bag should never be more than half filled, and one must be particular to expel the air, as far as possible, before screwing on the top. A layer of moist lint or cotton is always placed between the skin and the bag; otherwise the extreme cold is not only painful, but is apt to irritate the skin, even producing "frost-bites." If possible, it is better to suspend the bag, as the weight is sometimes a source of discomfort to the patient. Thus a bandage can be fastened to the neck of the bag, and the two ends pinned to the pillow just high enough up to allow the cap to barely touch the head. At times a piece of ice is wrapped in moist lint or old linen and passed gently over the head in order to cool it. When using the bags, care must be taken to refill them before the ice has melted; nurses are not always thoughtful enough about this, and a doctor's confidence in a nurse is justly shaken when he sees such neglect.

Ice-water coils can be made of rubber tubing, which if necessary may be sewed upon a piece of rubber cloth (in circles) about an inch apart for five or six rounds: a yard or two of tubing is left at each end to be used as a siphon. A large pan of ice-water is raised above the patient, into which one end of the tubing is placed, with a funnel inserted into it covered with gauze to prevent clogging, while the other end is laid in a second basin on the floor which receives the water. The method is very cumbersome, and attention is needed to see that the upper pan is kept full. Coils are sometimes ordered for the head in delirium and for the abdomen in tympanites. The stream of water may be regulated by a stopcock, thus making the same amount of water last as long again.

The process of crushing ice necessarily takes place in a hospital every day, and for the purpose a stout canvas bag should be kept on hand, in which the ice may be placed and beaten with a mallet when a large quantity is needed. For breaking up small pieces, an icepick is best, but in doing this at night the nurse must take care not to disturb her patients. Ice may be easily and noiselessly cracked with a stout hat-pin. In private nursing, where only a small quantity is needed, it should be preserved from melting by being wrapped in flannel.

Lotions are medicated moist applications, and may be either hot or cold. In using an evaporating lotion, one thickness of lint or muslin is saturated and left exposed to the air to promote evaporation. The applications are changed often enough to keep the lint moist.

Where other—*i. e.* non-evaporating—lotions are ordered, lint or muslin, folded as for an ordinary cold compress, and wrung out of the required solution, is applied and covered with oiled muslin.

CHAPTER XIII.

COUNTER-IRRITANTS.—MUSTARD POULTICES (PLASTERS AND LEAVES).—TURPENTINE.—IODINE.—LINIMENTS.—CUPPING.—CANTHARIDES.—THE CAUTERY.

COUNTER-IRRITANTS are therapeutic agents applied externally to produce a condition of irritation or inflammation, in order to relieve a diseased condition in some adjacent or deep-seated part of the body. By the application of a substance to the skin which will irritate the ends of the sensory nerves and dilate the blood-vessels of the part, the flow of blood through these vessels is increased, and the tension in those which are more deeply seated is lowered as a result of reflex nervous influences which are as yet imperfectly understood. If an irritant be placed directly over an affected part, relief is often quickly obtained, and irritation applied to a part distant from the one diseased is also frequently beneficial. Thus, for instance, pain in the head or abdomen may be relieved by a mustard foot-bath, since the vessels of the lower extremities, dilating, attract large quantities of blood to them and relieve any congestion in those of the head and abdomen.

By the use of counter-irritants we may produce at will—

(1) Mild irritation;
(2) Irritation producing inflammation;
(3) Vesication or blistering.

Mild irritants are called rubefacients, since they cause redness of the skin by distending its capillaries. All classes of irritants act as rubefacients when applied only long enough to produce such an effect, but those commonly employed are mustard, turpentine, iodine, and aqua ammonia. Dry cups may also be used for the same purpose.

The mildest mustard application is the mustard poultice: it is made with linseed meal in the same way as an ordinary linseed poultice, except that 1 part of mustard is well mixed with 6 parts of the meal. This may be left on as long as the poultice is warm. Its action is more gradual and less irritating than that of the mustard plaster, which is made of mustard mixed with flour in different proportions according to the effect desired. The usual formulæ call for from 1 to 6 parts of flour or meal to 1 of mustard, and the nurse should be able to state the exact amount of mustard used. These ingredients are rubbed thoroughly with cold water into a paste, which is spread between two layers of muslin or linen of the size required: the plaster is applied for from ten to twenty minutes, the outside being covered with folds of linen or cotton to absorb any superfluous moisture. The skin of one patient may be much more sensitive and respond more quickly than that of another, and when the stinging sensation is acute and the skin well reddened the plaster may be removed. Care should be taken not to leave it on long enough to blister the skin, as may happen with delirious or unconscious patients if the effect is not closely watched. Where the skin is very tender, as with children, the proportion of mustard should be diminished by one-half and the plaster left on only a few minutes, just long enough to produce redness, after which a warm linseed poultice should be substituted for it. After a mustard plaster has been removed, the skin is dusted with rice powder, anointed with cold cream or vaseline, and covered with a soft piece of muslin.

Mustard leaves are frequently ordered, but, though far more convenient, they do not take the place of the old-fashioned mustard plaster. They cause so much discomfort from the time that they are applied that they frequently have to be removed, before the desired effect is produced. Their chief recommendation is that they are ready at a moment's notice, as they need only be dipped in tepid water and put on. A thin piece of muslin or gauze placed between the mustard leaf and the skin renders its effect more gradual. When the skin is thick and its action sluggish, the surface should be first scrubbed with hot water and soap to remove fatty substances, and then rubbed briskly before applying the mustard, otherwise the result obtained will be very slight and the process will take a long time. Mustard should not be mixed with hot water, as this destroys or lessens the strength of the volatile substance which gives the drug its irritating properties. As soon as the necessary reaction has been produced the plaster should be at once removed. The effect should be watched carefully, lest the action be more extensive than was intended and a blister result. Where the skin has been over-irritated, the white of an egg will be found very soothing. It may also be incorporated with the plaster before the latter is applied.

Turpentine is also in common use as a counter-irritant, but is chiefly applied in the form of stupes for abdominal pain or tympanites. These are prepared and applied much as hot-water stupes: half an ounce of turpentine is mixed with about a pint of boiling water, the flannel dipped in it and wrung out very tightly. The mixing with the water tends to emulsify the turpentine (of course the oil will not dissolve in the water), and renders its application to the skin more uniform than it would be if it were sprinkled over the flannel, and also lessens the danger of causing blisters. The stupes should be applied as hot as the patient can bear them, and should be covered snugly with cotton-wool and oiled muslin. They may be repeated in fifteen or twenty minutes if the pain or distension is not relieved, provided that the skin is not over-sensitive.

A third counter-irritant is the tincture of iodine. It is applied both to the skin and mucous membranes, a camel's-hair brush or a swab being used to paint the fluid lightly over the seat of the pain. This first coating is allowed to dry, and a second may then be applied. More than two coatings are apt to blister, and on sensitive skins one will be found sufficient. If the smarting is intense, sponging with alcohol will relieve the pain.

Aqua ammonia may be ordered, as its irritating qualities serve as a stimulant where immediate reaction is required, as in conditions of shock or unconsciousness. A piece of lint saturated in the solution is applied, being closely covered with oiled silk, and left on from five to ten minutes. Ammonia is also used as an application after bites or stings from insects or poisonous reptiles.

Chloroform is used alone as a rubefacient. It causes redness and smarting of the skin, and will blister if left on too long. It is also employed in liniments, both for its irritating and sedative qualities.

Liniments are of various kinds. They are frequently used to allay muscular pain, and can be applied with friction and well rubbed in: a piece of lint soaked in the solution and bound on over the aching part for a short time often answers the same purpose.

Croton oil is a powerful irritant, producing an eruption in the form of little vesicles that may become pustules. From two to four drops, rubbed on with a small piece of flannel, are enough to apply to a surface of from 1½ to 3 inches square. Its action is so powerful that physicians frequently dilute it with an equal amount of olive oil or oil of sweet almonds.

Cupping is of two kinds, wet and dry, and is most often ordered to relieve inflammations of the eye, lung, or kidney, or even muscular pains. Small glasses are made especially for the purpose, and come in sets of about five, but if these are not obtainable, wine-glasses or medicine-glasses will answer. To prepare for dry cupping a spirit-lamp, matches, and cups are necessary. The usual method is to take a stiff metal probe or piece of wire, wrap about the end a small piece of cotton, dip this in alcohol, ignite it, swab the inside of the glass, remove, and apply the glass. The heat causes the warm air to expand, so that some is driven off, and the partial vacuum formed is filled by the skin and tissue over which the glass is placed. The main thing to remember is that the edges of the cup must never be allowed to become warm enough to burn the patient when applied. Five to seven cups are applied at one time and allowed to remain on five minutes, after which they are removed by making pressure about the glass and inserting the tip of the finger under the edge, so as to let in the air. Linseed poultices are sometimes applied after the removal of the cups: in this way the dilatation of the blood-vessels may be kept up for some time. The process of wet cupping is carried out in much the same manner: one needs in addition a scarificator or small scalpel, a few sponges, and a dressing of lint for the wound. After the skin has been scrubbed with hot water and soap and washed off with a 1 : 20 carbolic solution, the surgeon makes a few small superficial cuts, over which the cup is applied. After a sufficient quantity of blood has been withdrawn, the bleeding may be checked by sponging, a pad of lint is placed on the surface, and held in position by a covering of gauze dipped in celloidin or by rubber strapping.

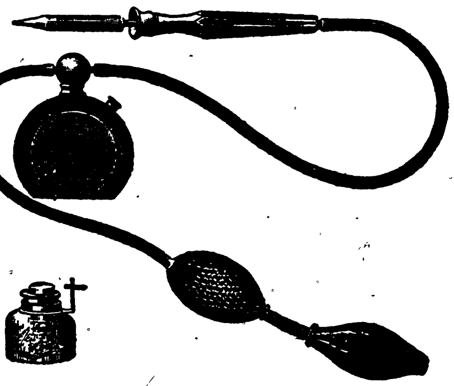
Cantharides is used for blistering. It is used either as a plaster or in the liquid form: in the latter the powdered cantharides is contained in solution in collodion (vesicating collodion). The plaster is the preparation most often used. The physician usually orders a plaster of a definite size and designates the part to which it is to be applied, but if no definite directions have been given the nurse must not use one larger than three inches square. The object of scrubbing the skin first with hot water and soap is to remove the oily substances or anything else that might interfere with the action of the plaster. The plaster is prevented from becoming displaced by passing a bandage around it loosely: there must be no pressure, as plenty of room must be left for the formation of the blister; and for this reason the plaster should not be held in place by adhesive strapping, for if it cannot yield pain will result from this tension. The plaster is left on from four to eight hours, according to the effect desired. If it is necessary to blister, and vesication has not appeared at the end of eight hours, a linseed poultice may be put on over it to supplement its action. Great care should be exercised when blistering applications are used over the region of the kidneys, or anywhere, in fact, in the case of patients suffering from kidney affections: cantharides is a most violent irritant, and not infrequently causes strangury, or may even set up an acute nephritis. In applying the cantharidal collodion, the space to be covered is first outlined with oil to prevent the spreading of the vesicant; the collodion is painted over the surface by means of a camel's-hair brush, and afterward covered with a layer of soft lint and oiled silk.

To dress a blister, the lower part of the bleb is punctured with a scalpel or the scissors, and the fluid which comes from it received in absorbent cotton; when it is empty a simple dressing of oxide-of-zinc ointment or vaseline on lint is applied and held in place with celloidin or strapping. One must never remove the skin from a blister at the first dressing. Sometimes it is desirable to have the fluid reabsorbed, in which case precautions are taken to prevent rupture of the vesicle.

Leeches are seldom if ever ordered now-a-days, as wet cupping is more cleanly and usually answers the same purpose, but it may be as well to understand how they are used. A leech is capable of removing from a drachm to half an ounce of blood. The skin, after being scrubbed briskly with soap and water, is dried and rubbed, and the leech applied. This is done by placing the animal in a medicine-glass with its pointed extremity (the head) toward the orifice of the glass, which is inverted and applied to the spot where we wish the leech to fasten itself. If it is slow about biting, a little cream rubbed over the spot or a drop of blood from a needle-prick will cause it to take hold. It may be left on for from half an hour to an hour, according to its activity: if very sluggish, it is to be gently stroked with a bit of linen. When full it generally lets go of its own accord; if not, a little salt sprinkled on its head will cause it to drop off. An attempt to pull it away may result in the breaking off of its teeth, which when left in the flesh may set up inflammation. To increase the bleeding after the removal of the leech, hot poultices or stupes are useful; where it is too free, a compress snugly applied or ice wrapped in lint, and held in place by a bandage over the wound, will usually be sufficient. Leeches should not be applied over large blood-vessels—bony surfaces, over which pressure can be applied, should rather be chosen. The same leech should never be used twice. Leeches are best kept in a jar of water covered with a perforated top and having a little mud at the bottom: it is not necessary to change the water often. Those of the American species are the best to use for children, since they abstract less blood and are less vicious than foreign leeches.

The Actual Cautery.—By the application of the actual cautery, as opposed to other methods of cauterization, we mean the use of the heated iron or some other apparatus in which actual heat is used. The most valuable form of cautery and the one most often employed in hospital practice is that known as the thermo-cautery. The instrument invented by Paquelin of Paris is perhaps the most suitable (Fig. 12).

FIG. 12.



PAQUELIN CAUTERY.

The principle of the apparatus is based on the property possessed by platinum of remaining incandescent, when heated red-hot, as long as the vapor of some highly combustible carbon compound is thrown upon it. Platinum points of shapes varying according to the purposes for which they are to be used are attached to a tube connected with a bottle of benzine, the vapor of which is pumped slowly by means of a rubber hand-bulb into the hollow platinum point.

When not in use the different parts are kept in a box in special compartments which allow the instrument to be safely carried about.

About the employment and care of the Paquelin cautery we shall now say a few words:

1. The preparation of the instrument for use: (*a*) A small quantity of benzine is poured upon a piece of absorbent cotton which is placed in the bottom of the bottle, only as much as is sufficient to saturate the cotton being used. This precaution prevents the escape of any excess of benzine when the cautery is in use, for if a bottle containing benzine as an ordinary fluid be used, the liquid occasionally gets into the rubber tubing and an explosion may occur. (*b*) The rubber tubing with the bulb is connected by means of the stopper to the bottle containing the benzine, and the platinum tip is screwed to the handle, the other end of which is attached to the rubber tubing. (*c*) After firmly adjusting the handle to the platinum point selected for use, the tip should be held in the flame of a Bunsen burner or of an alcohol lamp: then the nurse should attach the benzine bottle by the flange on its side to her waistband, and be ready to force air through the bulb by squeezing it with the right hand. As soon as the platinum point becomes red hot, she should squeeze the bulb gently, thereby forcing the air charged with benzine vapor through the tubing to the point where it ignites and maintains the heat. The nurse is frequently called upon by the surgeon during an operation ~~to~~ prepare and to take

charge of the cautery and keep it ready for use: to accomplish this she must squeeze the bulb gently and at regular intervals, as directed above. If the pressure is too forcibly or too quickly made, more benzine than is necessary is burned and the platinum point becomes red hot. The tips are not often used in this condition, being generally employed at black heat.

2. The therapeutic application of the cautery: As a counter-irritant it sometimes serves to dissipate effusions around or in joints, and is of great value in relieving the pain attending stiff neck and the various forms of so-called muscular rheumatism.

To produce counter-irritation with the cautery, the parts to be treated should not be actually touched, but the heated tip is passed quickly to and fro close to the surface, without, however, ever coming in contact with the skin. Such an application of the cautery is at times followed by the most gratifying results, as it will relieve pain almost anywhere, and at the same time is not accompanied by any blistering or marking of the surface of the skin.

Very frequently the actual cautery is used for controlling hæmorrhage in abdominal surgery, where surfaces from which adhesions have been separated persistently bleed; thus, for instance, where there is a broad area of oozing, the cautery lightly applied will often control the hæmorrhage.

3. *The Care of the Instrument.*—Since the cautery is an expensive instrument, great care must be taken in returning it to its case after use. The points in particular are very delicate, so that the apparatus can

be ruined much more easily than one would imagine. The following rules, then, should be observed:

First: If there should be burnt particles of tissue clinging to the platinum tip, the metal is brought to a white heat so as to consume whatever is adherent, and while the tip is still hot the handle which is attached to the rubber tubing is to be removed at once, so as to prevent any benzine from being carried into the tip while it is cooling.

Second: After the handle with the attached tip has been removed from the tubing, it should be so placed that the tip does not come in contact with any surface which might indent and thus occlude it. When it has sufficiently cooled off, the handle is unscrewed, and each part immediately placed in its proper compartment in the case.

Third: Under no circumstances is the platinum tip to be placed in water for the purpose of cooling it.

Fourth: Finally, the instrument should be carefully arranged in the several compartments in the box and the latter kept in a safe place. If the cautery is to be packed in an instrument-case, the nurse must be careful to place it securely in a position where it will not be jolted or in any way come in contact with hard surfaces, so that any chance of injury to it may be avoided.

CHAPTER XIV.

MEDICINES.—METHOD OF ADMINISTRATION.—DOSAGE.—WEIGHTS AND MEASURES.—MEDICINE-CLOSETS.—MEDICINE LISTS.

THE administration of medicines is a duty that begins early in the first year of a nurse's instruction, and is associated with more or less fear on her part lest some error be committed. To be quick and accurate at the same time is an impossibility, when attempting to give medicines at first, and there is no cause for discouragement because it takes so long to make quite sure that the quantities are correct. A beginner should first act as an assistant, being allowed to measure out any harmless doses ordered, until she has overcome her early awkwardness and is familiar with the different measures. It is necessary that each woman, who is a nurse or who wishes to become one, should know more or less arithmetic, at least enough to comprehend clearly the different standards of weight and measure, and their relations to one another. Thus it is often necessary to deal with fractions of doses and to know what is meant when the strength of a solution is stated in percentages; frequently a nurse will be required to dilute a solution of a certain percentage to another of quite different proportions. If the principles on which these processes are based be not understood, then the reckoning must be done mechanically, and with little knowledge as to whether it is correct or not, and consequently will always be attended by a certain amount of danger. If there be any one thing that must be guarded against, it is the habit of carelessness: the nurse may have become so familiar with the dosage that a mistake would seem an impossibility, but it is to be remembered that a mistake is always possible. The rule made in the very beginning, and never departed from, should be this—viz. to look at the medicine-label and dose twice before giving any drug—once before it is measured out, and a second time just before administering it to the patient. A medicine should never be recorded as given, before the patient has actually taken it. It may seem more convenient to record it a little earlier, and the intention may be perfectly good, yet this is a rule which under no circumstances should ever be disobeyed.

There are some medicines that act simply upon the surfaces with which they first come in contact—upon the skin if externally applied, or upon the mucous membrane of the stomach or intestines if given internally; but the majority of drugs when introduced into the system are first absorbed into the blood, and by it carried to the tissues and organs upon which they act, producing certain changes in them. The activity of such drugs depends largely upon the rapidity with which they are absorbed into the blood. There are five paths of entrance for medicines into the circulation: by the digestive tract, the cellular tissue, the rectum, the skin, and the lungs. The route most frequently chosen is by the alimentary tract—the most rapid, and the one therefore most often employed in emergencies, by the subcutaneous tissue.

Medicines given by the mouth are absorbed for the most part in the stomach, but also to some extent, and in a few cases almost entirely, in the intestinal tract. They are given in solution, powder, pill, capsule, or triturate. In giving solutions the bottle is first well shaken, then uncorked, and the dose prescribed poured into a medicine-glass, and diluted with as small a quantity of water as the nature of the medicine will permit. A dose is often rendered much more disagreeable and nauseating to the patient by the addition of a large quantity of water: sometimes, indeed, it is desirable to have the preparation well diluted, but when the action is to be rapid the dilution should not be great. If the medicine is very disagreeable, a small piece of ice held in the mouth just before taking it, will lessen the sensibility of the nerves of taste and render the flavor of the dose less noticeable; or if the medicine be mixed with crushed ice or seltzer water, the same effect may be obtained. Brandy or whiskey held in the mouth for a few minutes, or holding the nose while the dose is given has been recommended. A little cold fresh water or seltzer to take away the taste may be given immediately afterward. Oils and fluid extracts are readily taken in capsules: this is the most pleasant way to take castor oil, but if preferred it may be given in a little sherry, brandy, or strong coffee. Thus, two drachms of sherry may be placed in a medicine-glass, the rim and sides being moistened with it, and the oil then poured carefully into the centre; lastly, another drachm of sherry is poured on the top, and the whole taken in one swallow. Another way is to take equal parts of the oil and glycerine and flavor with a few drops of the oil of cinnamon or some other aromatic oil.

Powders and pills conceal the flavor of medicines, and are therefore much in vogue, but their action is slower than that of solutions, and patients sometimes have difficulty in swallowing them. Tasteless powders may be given mixed with a little water; those with a disagreeable taste, such as quinine, are wrapped in wafers of rice-paper or enclosed in capsules of gelatine. The wafers come in boxes ready prepared and are about two inches square. One is moistened and spread over a teaspoon, the powder dropped into its centre, and the wafer folded over it; the spoon is now filled with water, and the bolus allowed to slide well back on the tongue, and a drink of water taken. If wafers are not obtainable, a small square of thin tissue-paper will answer the purpose. Gelatine and wafer-paper are dissolved rapidly in the stomach. Effervescing powders are always given in from a half to two-thirds of a glass of cold water and taken during effervescence. Insoluble powders, such as calomel or acetanilid, should be placed on the tongue and washed down with a drink of water. If a patient be very ill or if it is difficult to get him to take his medicine, the admixture of a little milk or glycerine with it will often enable him to swallow it. In giving pills one must always be sure that they are freshly made up, as they are apt to become hard and dry from standing, and then will not dissolve if taken into the stomach, but be carried through without producing any effect. Compressed pills are free from this objection and dissolve readily. In giving a pill it is placed far back on the tongue and followed quickly by a drink of water. If the patient cannot swallow it, as happens in some cases, more especially with children, the pill may be concealed in a small piece of bread or jelly, and if this method does not answer, one has to crush it up and give it as a powder.

It is convenient to give some medicines in the form of triturates or tablets. By trituration we mean the grinding and rubbing of solid substances until they are finely pulverized. They are prepared by adding sugar of milk or sulphite of soda in certain proportions to the drug and triturating thoroughly. For convenience in pressing into tablets the powder is mixed into a paste with weak alcohol, and the latter is subsequently allowed to evaporate.

The word "subcutaneous" (from the Latin *sub*, under, and *cutis*, the skin) and the word "hypodermic" (from the Greek ὑπὸ, under, and δέρμα, the skin) are identical in meaning. By hypodermic or subcutaneous medication we mean the giving of drugs by injecting them under the skin. The advantage of this method consists in the rapidity with which absorption takes place: a drug that requires fifteen or twenty minutes to act through the stomach will require only five, perhaps, when given by hypodermic injection. Usually only solutions of the active principles of drugs are given in this way (*e. g.* solutions of morphine), but other drugs, such as whiskey, brandy, or ether, are sometimes given hypodermically when rapid stimulation is necessary. The injections are given with a fine syringe to which a hollow needle is attached. Three points must be kept in mind in hypodermic medication: First, we must have the needle absolutely clean; secondly, we must have a pure solution for injection; and thirdly, the needle should penetrate only the fleshy parts of the body, avoiding blood-vessels, nerves, and bones. If one be careless about having the needle perfectly aseptic, virulent germs may be introduced and find a suitable nidus for development in the surrounding tissues; and if they grow and multiply, the result may be inflammation and at times abscess-formation. If the solution is not sterile, of course the same danger exists. With proper care the risk with hypodermic injections may be reduced to a minimum. If injections are given in the line of superficial blood-vessels, the fluid may enter a vein, and the drug, being carried directly to the heart, may reach the nerve-centres in concentration in a few seconds, producing alarming symptoms. If injected over a bony prominence, the bone may be injured; so one always selects the outer side of the arms, thighs, or hips, or the abdomen as the place for an injection. The solutions are generally arranged so that the doses vary from one to fifteen minims, the latter quantity being usually the outside limit except in the case of stimulants (whiskey, brandy, and ether), of which a syringeful is given at one time. Before giving a "hypodermic" the skin is to be cleansed with absolute alcohol, the syringe loaded with the number of minims ordered, and all the air expelled by pointing the needle upward and gently pressing the piston until a small drop appears at the point. All being now ready, a fair-sized fold of skin is pinched up between the thumb and finger of the left hand, and the needle inserted quickly in a slanting direction deep into the tissues for at least half an inch; it is then withdrawn slightly and the fluid injected slowly and gently. The needle is quickly taken out and the thumb pressed lightly over the spot to prevent the fluid from escaping: very gentle rubbing upward assists in the distribution and consequently in the absorption of the fluid, but if at all painful to the patient, this need not be done. There are various methods in vogue for preparing hypodermic needles for use. The three principal ones are—

First: To pass the needle through an alcohol flame just before inserting it. This method undoubtedly renders the needle sterile, but it is objectionable, because it injures it, and makes its insertion more difficult, and hence more painful to the patient.

Second: To soak the needle for a few minutes in a 1 : 20 carbolic solution, and afterward in sterilized normal salt solution or absolute alcohol to remove the carbolic acid. This of course must be done before the syringe is loaded.

The third and best way is to boil the needle for a few minutes in simple water or in a 1 per cent. soda solution, taking care that after being boiled it is not touched with anything but a clean piece of sterilized gauze, with which it can be held while being attached to the syringe. If no better plan be at hand for boiling, when required for use the needle may be put in a tablespoonful of water and boiled over an alcohol or gas flame.

To clean the instrument before putting it away, it is washed in water and absolute alcohol is drawn through it. If in frequent use the syringe and needle may be kept in a 1 : 20 solution of carbolic acid.

The substance to be given must be completely dissolved and the solution freshly prepared, since one that has stood for some time is liable to be decomposed, and may have a sediment in it which will render it totally unfit for use. The principal drugs used hypodermically are now made up in the form of compressed tablets, with the help of which one is enabled to make a fresh solution at a moment's notice. A tablet should be dissolved in a sufficient quantity of distilled or boiled water. A teaspoon is probably the most convenient thing to use, as from it every drop of the solution can be easily taken up, so that no portion of the alkaloid will be lost and a smaller dose given than is ordered.

Medicines are given by rectum only when it is desired to obtain local effects or where the stomach cannot retain anything or must have its work lessened. The mucous membrane of the large intestine does not absorb quickly, and as a rule requires twice as long to do so as the stomach. For a stimulating effect medicines should therefore be given in solution, and injected as high up as possible in the manner described in the chapter on Enemata.

Suppositories are solid conical preparations, made generally of cacao butter, with which the drug is incorporated. They are firm and should not melt at the temperature of the air, but when introduced into the rectum or vagina will gradually dissolve. They are usually ordered for their local effect, the most common perhaps being those containing some preparation of opium, which is much used in this way as a local sedative. The suppository is first oiled and then slipped in without force: the patient should lie on the left side, and care must be taken that it be made to pass beyond the internal sphincter muscle; the anus may be pressed with a towel until any desire to expel the suppository has passed away.

The practice of introducing medicines into the system by inunction is now rare. But in some conditions the rubbing in of various substances is sometimes ordered; in syphilis mercurial inunctions are often indispensable; and in conditions of emaciation, such as are seen in tuberculosis and inanition from other causes, cod-liver oil used in this way is frequently of value. Before an inunction is given the circulation of the skin is rendered active by a warm bath.

To obtain absorption through the lungs it is necessary to finely subdivide the medicament and give it by inhalation, by means of atomizers or insufflators. Although the spray from an atomizer is most commonly used, the inhalation of vapor is also a favorite method. The drug should be mixed in hot water in a small steam kettle that can be kept over a lighted gas or alcohol lamp with a flame just large enough to allow a small stream of steam to pass constantly through the spout, over which the mouth is held at a comfortable distance. Or the drug may be mixed with a quantity of boiling water sufficient to about half fill a quart bottle, which is wrapped in cotton-wool to preserve the heat, and the vapor breathed in. Volatile drugs like ammonia or eucalyptus are poured on a sponge or cloth, and held near the nostrils or placed in a respirator which covers the mouth. If an irritating substance be used, great care with unconscious patients is required to see that it is not held near enough to do any injury. Nitrite of amyl is best inhaled from a small piece of fine linen or handkerchief.

It is necessary for a nurse to understand the effects of the drugs in common use and to recognize the ordinary indications for their discontinuance. She should also be familiar with the maximum and minimum doses of drugs, remembering always that variations from the rule exist for individual cases and according to special circumstances. Thus the nature of the disease, the age of the patient, his temperament and habits, the time of administration—all influence the action of remedies. Children require much smaller doses than adults, and the old have less resisting powers than the middle-aged for depressing drugs. The most generally-accepted rule by which to calculate the doses for children under twelve years of age is as follows: Make a fraction the numerator of which is represented by the age of the child in figures, the denominator by figures representing the age of the child with twelve added. This will represent the part of the adult dose which is required. Thus, for instance, for a child six years old we have $\frac{6}{6+12}=\frac{6}{18}=\frac{1}{3}$ of the adult dose. Roughly speaking, we may say that between the ages of twelve and twenty-one the dose is one-half of the full dose. Exceptions to the above rule are made in the case of purgatives like calomel or castor oil; of these half an adult dose may be given to children. With opium, however, a smaller dose than the rule calls for should be given at first, since children bear it very badly, while, on the other hand, they are very tolerant of belladonna.

As physicians cannot always speak of the details of the action of medicines to each nurse, it is necessary in giving drugs to bear in mind some of the results which may follow their use. Thus a drug may not act in the same way with every one. Some people have an idiosyncrasy in regard to a particular medicine, by which we mean that it affects them in some peculiar way that would not ordinarily be expected. This is particularly true of individuals with highly nervous temperaments; and, since such an effect cannot always be foretold, nurses should be very careful to note the symptoms following the first dose of a medicine. Where an idiosyncrasy exists, the susceptibility to the drug will probably be increased, and peculiar symptoms may manifest themselves with the first dose, which can then be reported to the physician. In such cases the dose should not be repeated without further instructions. Again, certain medicines, if given regularly for some length of time, gradually accumulate in the system until finally marked symptoms of poisoning appear. With such powerful drugs as digitalis this *accumulative* effect must be watched for. On the other hand, there are other medicines to which, when given for some time, the system becomes accustomed, so that the dose may have to be increased to obtain the desired result. When this *toleration* becomes established, the increase in the dose may go on until the *habit* of taking the drug is acquired, and the patient thinks he cannot do without it, as is so frequently seen with opium and its alkaloid morphine. Whenever unusual symptoms of any kind have become at all evident as the result of treatment, the nurse must be particular to keep the physician informed, as often only through her can such things be detected, and she should understand the symptoms which may follow the use of the various drugs. Frequently, where a habit is becoming apparent, a placebo is resorted to in order to quiet the mind of the patient, but the custom is to be deprecated from a moral standpoint, and no nurse should resort to hypodermics of water or salt solution or any of the various substitutes without direct orders from the physician.

The time to give medicines must be carefully considered. Absorption is of course more rapid when the stomach is empty, and if a prompt action be desired a time is selected when the stomach is not filled with food: for this reason purgatives, which act quickly, are usually ordered in the morning an hour before breakfast; more slowly-acting cathartics are taken at night; irritating or acid substances should only be given when there is food in the stomach, and certain other drugs only at a time when the process of digestion is most active. Alkaline tonics may be given before meals; narcotics should be given the last thing after the patient has been prepared for the night, and nothing should be done to rouse or disturb him after the drug has been taken.

Some forms of food and medicine do not combine well—that is, they are incompatible; thus, for instance, if milk and acids are given together, the milk is apt to be rejected or to cause pain. Some drugs are also either physiologically or chemically incompatible with others;

thus, corrosive sublimate is incompatible with all albuminous bodies, and should be given alone.

Medicines ordered before meals should be given from twenty minutes to half an hour before the meal-time; those ordered after meals should be given either immediately after eating or fifteen minutes later. Medicines ordered for a certain hour should be given promptly at that hour: an order given for three o'clock does not mean five or ten minutes before three or half-past three; and it is not the privilege of the nurse to administer a medicine before or after the hour marked on the schedule. One should not attempt to give an unconscious patient medicine by the mouth, for it may enter the larynx and cause suffocation.

In hospitals, accurate lists should be written out by the head nurse with the names of patients, medicines, doses, and hours conveniently arranged, and one nurse should be set apart and held responsible for their prompt and correct administration. A nurse under no circumstances should take upon herself the responsibility of suggesting or prescribing a medicine. If consulted as to what would be best to give, she should always refer the consultant to the physician in charge, whether she be in the hospital or engaged in private nursing.

Medicines for hospital use should be ordered only in small quantities—not enough to last three or six months—since it is always best to have them fresh. They are liable to evaporate, and the solutions may become more concentrated when allowed to stand on the shelves, and, as supplies can be ordered daily, there is no necessity of having too much of anything on hand. The medicine-closet is not to be converted into a small drug-shop; unused drugs must not be allowed to accumulate in it, but should be returned to the hospital pharmacy, as they may possibly be used in another ward, and thus expense be saved.

The medicine-closet for hospital use is usually made with glass doors, and should be kept scrupulously neat. If heavy glass shelves cannot be had for the bottles, it will be found of great advantage to cover the wooden shelves with sheets of ordinary glass cut to fit; these will prevent stains on the wood, and the closet with but little trouble can be made to present a neat appearance. The size of the bottles should vary according to the drugs which they contain. All extracts, active principles, and powerful drugs should be kept in very small quantities in bottles holding no more than two ounces, and each should be supplied with two labels, on one of which the name of the drug and the strength of the preparation is clearly shown, another, a bright red one, being marked "Poison." The same precaution should be used with external applications, and the bottle should be of glass of some striking color and have a rough surface, so that the moment the fingers touch it it will be recognized as one containing a poisonous substance. If the medicines be always poured out on the side remote from the label, the latter will not be disfigured and will not be so liable to be rubbed off. Where many medicines are given a small damp cloth should be kept to wipe the bottle before it is returned to the shelf; of course all bottles must be carefully corked to prevent evaporation. A small tray, a pitcher of fresh cold water, a glass rod for stirring, glass tubes for mixtures which would injure the teeth, a dropper, and plenty of graduated medicine-glasses ought to be kept near the medicine-closet. No one but a nurse should perform the duty of giving out medicines in a free ward, and a drinking-glass after having been used by one patient should be carefully washed before being given to another. After use the medicine-glasses are washed thoroughly with hot water and soap, those that have been employed for oils or emulsions being washed separately: the nurse should never entrust this work to a convalescent patient. Small medicine towels made of old linen napkins or table-cloths are necessary. The medicine-closet is to be always kept locked, and on no consideration should a patient (no matter who he be) have access to it.

Abbreviations.

āā, ana (ἀνὰ) of each.
Abstr., *Abstractum*, abstract.
Ad, up to, to amount to (the full phrase being quantum sufficit ad).
Adde, add.
Ad lib., ad libitum, as much as desired.
Alt. hor., alternis horis, every second hour.
Alt. noc., alternâ nocte, every other night.
Aq., aqua, water.
Aq. dest., aqua destillata, distilled water.
Aq. pur., aqua pura, pure water.
Bis. ind., bis indies, twice daily.
C., *Cong.*, congius, a gallon.
c., cum, with.
cc., cubic centimetre.
Cap., capiat, Let him take.
cm., centimetre.
Comp., compositum, compound.
Conf., confectio, a confection.
Contin., continuatur, Let it be continued.
Decub., decubitus, the lying-down position.
Det., detur, Let it be given.
Dil., dilutus, dilute.
Dim., dimidius, one-half.
Div., divide, divide.
Div. in p. æq., dividatur in partes æquales, Let it be divided into equal parts.
Drachm., drachma, a drachm.
Emp., emplastrum, a plaster.
Enem., enema, injection.
F., Fahrenheit.
F., fac, make.

Fl. Fld., fluidus, fluid.
Ft., fiat or fiant, Let there be made.
Garg., gargarisma, a gargle.
Gr., granum or grana, a grain or grains.
Gtt., gutta or guttæ, a drop or drops.
Guttat., guttatim, drop by drop.
Inf., infusio, an infusion.
Inject., injectio, an injection.
Lb., libra, a pound.
Liq., liquor.
Lot., lotio, a lotion.
M., misce, mix.
Mist., mistura, a mixture.
N., nocte, at night.
No., numero, in number.
O., octarius, a pint.
Ol., oleum, oil.
Ol. res., oleoresina, oleoresin.
Ol. oliv., oleum olivæ, olive oil.
Ov., ovum, an egg.
Pil., pilula, a pill.
P. r. n., pro re natâ, as occasion arises.
Pulv., pulvis, a powder.
q. s., quantum sufficit, as much as is sufficient.
℞., recipe, take.
Rad., radix, root.
S. or *Sig.*, signa, write—*i. e.* Give the following directions.
Sem., semen, seed.
Sp. gr., specific gravity.
Sp. or *Spir.*, spiritus, spirit.
Ss., semissis, a half.
S. V. R., spiritus vini rectificatus, alcohol.
S. V. G., spiritus vini gallici, brandy.
S. F., spiritus frumenti, whiskey.
Syr., syrupus, syrup.
T. i. d., ter in die, three times a day.
Tr., *Tinct.*, tinctura, tincture.
Troch., trochisci, lozenges.
Ung., unguentum, ointment.
♏, minimum, minim, the 60th part of a drachm by measure.
ʒ, drachma, a drachm.
℥, uncia, an ounce.
℈, scrupulum, a scruple.

Apothecaries' Weight.

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

Apothecaries' Measure.

60 minims	= 1 fluidrachm.
8 fluidrachms	= 1 ounce.
16 ounces	= 1 pint.
2 pints	= 1 quart.
8 pints or 4 quarts	= 1 gallon.

Approximate Measures.

1 common teaspoonful of distilled water contains about

60 minims	=	1 fluidrachm.
2 tablespoonfuls	=	1 fluidounce.
1 wine-glassful	=	$1\frac{1}{2}$ ounces.
1 teacupful	=	4 fluidounces.

CHAPTER XV.

SURGICAL NURSING.—ASEPTIC AND ANTISEPTIC SURGERY.—PREPARATION OF PATIENTS FOR OPERATIONS (CAPITAL AND MINOR). — CARE OF PATIENTS AFTER OPERATION.— INFLAMMATION.— WOUNDS.—METHOD OF HEALING.—SURGICAL ROUNDS.

IN order that a nurse may appreciate the technique of modern surgery and the importance of carrying it out in its minutest details, she must try to understand the underlying principles which have been established by scientific research in the field of bacteriology.

It has already been stated that decomposition or putrefactive changes cannot occur in the albuminoid tissues of the human body without the presence of some form of microscopic life, and that the organisms that produce such changes in the tissues are of different varieties, the most important being cocci and bacilli. The *micrococcus* is a spherical, the *bacillus* a rod-like, organism, and there are many varieties of each, which can be distinguished by differences in shape, motility, growth on culture media, and the pathogenic effects resulting from their introduction into animals. In abscesses the organism most frequently found is a coccus, groups of which are seen arranged in the form of little grape-like bunches, and which produce a bright-yellow color when grown on the surface of a boiled potato. Hence it has been named the staphylococcus pyogenes aureus (golden pus-producing coccus in grape-like clusters).

For acute septicæmias, which cause death in a few days, usually without pus-formation, a coccus is also often responsible, but this kind, instead of growing in grape-like clusters, generally forms chains, and has been named streptococcus pyogenes (pus-producing chain coccus).

Wound-infection cannot occur without the presence of some organism, and wounds, whether operative or accidental, afford favorable conditions for the reception and development of germs, for in them micro-organisms find nourishment, moisture, and a suitable temperature, the three essentials necessary for their growth. The ways by which they may enter are numerous. In an accidental wound, germs may be introduced by the instrument causing it, by the clothing, or by dirt which has been allowed to enter before the surgeon sees the case. In operation cases, if infection takes place, the organisms have been introduced into the wound by the surgeon, by his assistant, or by the nurse through some fault in technique; thus the instruments, dressings, and hands may not have been completely sterile. There is one exception, however, to this rule, since it is impossible to thoroughly disinfect the skin, and wound-infection may arise from organisms which have their habitat there.

Although, as has been proven, chemical agents are capable of causing pus-formation, yet, clinically, they never do so. Chemical antiseptics, however, if used in strong solution, are very irritating, and may injure or destroy the tissues, lessening their normal resistance, and forming a favorable medium for the growth of germs. Wounds, then, which have become the seat of bacterial growth are called infected wounds, and are in a condition of sepsis, poisons being produced which are carried into the circulation by the lymphatics and blood-vessels, causing an inflammation in the wound and septic fever—a condition usually indicated first by a rise of temperature and an increased pulse-rate. Occasionally not only the poison enters, but germs themselves get into the blood-current; then we have to do with a general blood-*infection*, and not simply with a localized wound-invasion with secondary blood-*intoxication*.

Modern surgery aims at the prevention of wound-infection by bacteria, and attempts the destruction or inhibition of the growth of germs already present. Two expressions commonly used with reference to the treatment of wounds are *asepsis* and *antisepsis*. By an aseptic wound we mean a clean wound, free from germs, while antisepsis refers to the measures employed to destroy organisms which may be present either in the wound or on the skin, hands, and instruments, all of which must be sterilized and made free from germs before coming in contact with any, but more especially with a clean wound. Hence the most minute precautions must necessarily be taken by both surgeons and nurses in preparing themselves or anything that will come in contact with a wound during an operation.

The terms "clean" and "surgically clean" have, then, two widely different meanings, since "surgical cleanliness" should signify a complete absence of germs. To secure this aseptic condition, both chemical and natural agents are depended upon, and with the patient the first steps are taken some hours previous to the operation by rendering the skin of the body over and around the seat of the operation as clean as possible. Practically, "surgical cleanliness" of the skin in the strictest sense of the term, is at present impossible, for in spite of all known methods of disinfection, in the glands of the skin certain bacterial forms are constantly present.

The preparation of a patient should be begun the night before, from fifteen to eighteen hours before the time appointed for the operation. A general bath should first be given with hot water and soap. Next, not only the part where the incision is to be made is shaved, but also a large area around, which perhaps will be touched by the operator's hand; the skin should be left smooth and quite free from hairs, and then scrubbed with green soap (a soft potash soap very strong), and a green-soap dressing applied and left on for at least two hours. If the surface be thick and hard, like that over the patella, it should then again be well scrubbed and the green soap reapplied for another hour, when it is to be sponged off with 1 : 3000 bichloride solution and enveloped in a sterilized dressing securely put on. This may be saturated with 1 : 3000 bichloride solution or carbolic solution 1 : 80, about three hours before the operation. A purgative should be given the night before, and be followed by a simple enema in the morning, and, unless a stimulant or a cup of hot beef-tea is ordered early in the morning, nothing should be given by mouth after midnight. The urine should be either voided or drawn off by catheter just before the patient is sent to the operating-room, and she should be attired in a fresh night-gown, warm wrapper, and stockings.

If the nature of the operation will permit, a flannel undervest should always be worn or a loose flannel jacket. The hair should always be well brushed and braided, earrings taken out, and any artificial teeth removed. The same preparations apply for a minor operation if there is time, but the purgative may be omitted unless an anæsthetic is to be given. It is necessary to do many minor operations at very short notice, and in these cases the preparation should consist in scrubbing the surface with green soap and hot water, shaving the part, and washing it with warm permanganate-of-potash and oxalic-acid solutions; finally, it is sponged with ether and alcohol and covered with a dressing saturated in bichloride solution 1:1000, and the patient is ready for the operation.

In general surgery the after-care of the patient is, as a rule, very simple, unless complications arise, and good nursing will do much toward a rapid restoration to health. The preparation of the bed for such patients has been mentioned before: immediately after the operation is over, the patient is placed in bed and a nurse detailed to remain beside her until the effects of the anæsthetic have worn away. If there be much nausea, water should be given sparingly at first, as it only aggravates the trouble: small pieces of ice or sips of soda-water are better. A condition bordering on collapse or a complete prostration of the vital forces may follow a severe operation, the pulse being very small and feeble, the face and lips pale, and the body covered with a cold perspiration. Such a patient should be wrapped in warm blankets, with plenty of hot-water bags about her, the body rubbed with alcohol, and a stimulant, either whiskey or brandy, must be at hand ready to be given if ordered. After major operations hæmorrhage should be watched for during the first twenty-four or forty-eight hours; indeed, the possibility of such an occurrence should be borne in mind until the wounds have perfectly healed, as secondary hæmorrhage may occur several days after the operation. The nourishment ordered at first is usually in the form of fluids or a light diet—milk, eggs, and broths—but, as a rule, full diet is allowed very soon after the operation. The pulse and temperature are to be recorded twice daily, unless the symptoms require that this should be done more frequently. As soon as ever her condition justifies us in doing so, the patient should be lifted out of bed into an invalid chair, or carried out of doors into the fresh air and sunshine, as it is important in every way to keep up the general good condition of the system while the process of repair or healing is taking place. Unless a serious rise of temperature necessitates an early change, a first dressing is usually kept on for a week or ten days, or even for a fortnight, according to the nature of the operation.

But the healing of wounds depends first upon the kind of wound, and secondly upon its aseptic condition. A wound may be defined as a solution of continuity of the soft parts. Wounds are classified as—

Incised, such as are made with a sharp instrument;
Contused, such as are made with a blunt instrument;
Lacerated, when the tissues are torn and ragged;
Punctured, when made by a pointed instrument—*e. g.* stab wounds.

Wounds are also spoken of as infected or non-infected, according as they do or do not contain pathogenic or disease-producing organisms in sufficient numbers to disturb the process of healing.

With a wound there may be pain, gaping of the edges, and bleeding. Pain varies in different people and in different parts of the body.

A lacerated wound beneath the skin, where the surface of the latter is not broken, is called a contusion or bruise. Contusions are caused by direct violence. The symptoms are discoloration or ecchymosis, indicating an extravasation of blood, pain, and swelling. In a contusion or bruise, the object in treatment is to prevent further effusion of the blood, to control the pain and inflammation, to preserve the vitality of the tissues, and to promote absorption. Heat applied at some distance from the bruise relaxes the surrounding vessels and promotes absorption. Cold has the opposite effect; it contracts the blood-vessels and prevents absorption.

Until recently it was thought that the healing process in an incised wound differed from the repair that went on where a cavity had to be filled up by means of granulations, and the healing of a clean incised wound was called healing by first intention, or primary union; where the process was brought about by the filling up of a cavity, this was called healing by second intention, or secondary union; and wounds where two granulating surfaces came together were classified under those which healed by third intention. It is now taught that the process of repair that goes on in wounds under any circumstances is precisely the same, the only difference being that in an incised wound, little injury having been done, only slight reparative processes are necessary, while, where there are large cavities which must be filled up by granulation-tissue, much more extensive regenerative changes are needed.

The healing of wounds should therefore be divided into only two divisions—aseptic wounds, in which the healing is not retarded by bacterial poison and growth, and infected wounds, where there is delayed healing due to the action of bacteria. In wounds that heal by first intention, as in a clean incised wound, no granulations are visible. The two edges are kept in close apposition, the blood and lymph on the cut surfaces join them together, the healing process takes place rapidly, and there is very little opportunity for the entrance of germs.

Wounds which heal by granulation, or by second intention, are much more difficult to keep quite free from infection, although every care should be taken to do so. Healthy granulations are small red elevations which spring from the fixed cells of the connective tissue. They gradually fill up a wound, starting from the sides and the bottom. Granulations may grow too rapidly and increase beyond the desired point, in which case they must be reduced and kept in check by the application of some astringent: nitrate of silver, either in pencil form or in solution, is the one most frequently used. On the other hand, the granulations may be pale and flabby and need stimulating: balsam of Peru is then most often applied. Where there are very large granulating surfaces, as after large burns, skin-grafting is resorted to to hasten the healing. The entire surface is covered with thin layers of skin as large as can conveniently be shaved from some other portion of the patient's body, the leg, thigh, or arm being generally chosen. To prepare skin for grafting purposes, the same antiseptic precautions must be rigidly carried out as in preparing a patient for operation. When all is ready the skin is shaved off with a large-sized knife with a very keen edge; the graft is at once transferred to the wound, and spread over it, unless it becomes doubled up, when it is first floated out in normal salt solution. Strips of rubber tissue should be laid in salt solution in readiness to cover the wound before applying the pads of gauze. The tissue prevents any disturbance of the newly-formed skin surface, and the granulations are not torn when the dressing is removed.

A cavity formed by the removal of a quantity of tissue may be filled by blood, which forms a clot, and this blood-clot gradually becomes organized, the fibrin forming a delicate scaffolding upon which new blood-vessels and granulations find support. This is now regarded by many surgeons as the best method of filling up cavities and dead spaces.

Where granulating wounds have a tendency to heal over from the top they may be kept open by means of drains or gauze packing. Sterilized rubber tubing of various sizes and strips of plain or iodoformized gauze or rubber tissue are kept for this purpose. The iodoformized gauze is considered rather more suitable for granulating cavities.

Inflammation is sometimes found in connection with wounds, and is a condition of great importance. All diseases the names of which terminate in "itis" are inflammatory in character. Inflammation comprises those changes in the tissues which result from the action of certain irritants. The causes are—

1. Mechanical—blows from different sources;
2. Chemical—various corrosive poisons;
3. Physical—heat, cold, or electricity;
4. Infectious inflammation (caused by micro-organisms).

The phenomena of inflammation are dilatation of the blood-vessels, increased flow of blood to the part, the appearance in the tissues of leucocytes or white blood-corpuscles, and of red blood-cells which have passed through the walls of the vessels, and the exudation of blood-plasma.

An inflammation is said to be fibrinous, serous, or purulent according to the nature of the exudate. The symptoms are heat, redness, swelling, pain, and tenderness.

The object in treatment is to remove the cause, or, if this cannot be done, to protect the tissues as far as possible from further irritation. If the inflammation subsides, resolution has taken place, but if the inflammation continue, the termination is usually in abscess or suppuration. Inflammation in connection with wounds is most often due to infection, and if it results in suppuration, the abscess should be opened up freely and allowed to drain thoroughly.

For the regular surgical dressings (or, in hospital parlance, for "surgical rounds") one nurse should be especially appointed, for a certain length of time, to make the necessary preparations, and before the hour for rounds the head nurse should see for herself that nothing has been forgotten. There should never be anything wanting in the form of a dressing or appliance that may be asked for by the surgeon; it shows either lack of management or carelessness.

Dressing-carriages or trays are of many styles, but should be made with regard to cleanliness as well as to convenience. The accompanying figure shows the one used in the Johns Hopkins Hospital, and is made of hard wood, the top shelf being covered with glass. (See Plate VII.) There are others made almost entirely of glass. If dressings are made from bed to bed, a portable washstand is also convenient, as the surgeons wash their hands before each dressing. The articles that should always be ready for surgical rounds in a ward are—

The dressing-carriage, fully equipped with solutions, bandages, etc.

A portable washstand, with plenty of hot and cold water, soap, and brushes for scrubbing the hands.

White-rubber sheets, from six to twelve in number.

A covered granite-iron pail for soiled dressings.

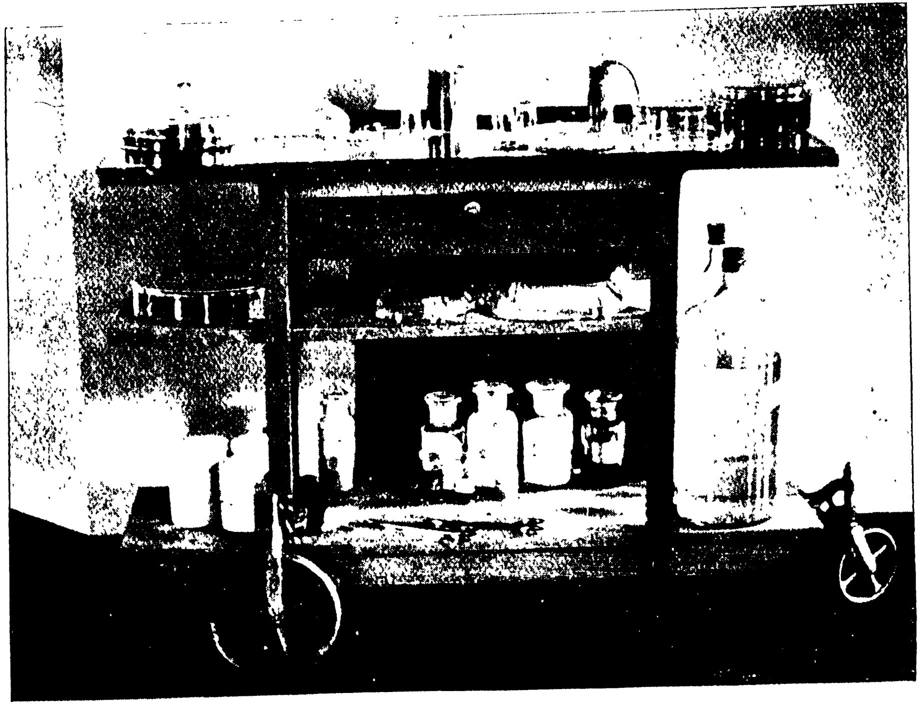
One dozen granite-iron basins.

Irrigation-bags.

An Arnold sterilizer filled with sterilized dressings.

Besides the head nurse there should be two assistant nurses, one to go ahead and prepare the next patient, the second stationed near and ready to wait upon the head nurse, whose duty it is to see that the surgeon is promptly supplied with whatever he requires. It does not do for a nurse to wait to be told what the surgeon will use next; she must train herself to anticipate his

PLATE VII.



SURGICAL CARRIAGE.

wants and have everything in readiness. Nothing should be done in a hurried or excited manner, but coolly and collectedly. Talking at rounds should be limited to necessary questions and answers, and a quiet dignity observed in accordance with the seriousness of the work engaged in. To do good work a nurse must give it her undivided attention, and laughing or chatting before a patient, who perhaps is in pain, is quite out of place.

Where practicable, it is better to do all dressings in a room of medium size adjoining the ward, since the appliances can be kept more easily in a surgically clean condition than when they must be carried about. Other patients are then not disturbed by the sufferings of the one who is being dressed, and the ward can be kept free from soiled dressings and the accompanying disorder. Patients can be transferred from their beds to a wheeled stretcher and rolled into the dressing-room, or else, if the bed is on casters, it may be wheeled to the dressing-room door, and the patient lifted directly from his bed to the dressing-table.

CHAPTER XVI.

GYNÆCOLOGY.—GENERAL AND SPECIAL PREPARATION OF PATIENTS FOR EXAMINATIONS AND OPERATIONS.—POSITIONS.—INSTRUMENTS AND DRESSINGS.—CARE AFTER ABDOMINAL SECTION AND MINOR OPERATIONS.—GYNÆCOLOGICAL TERMS AND DEFINITIONS.

NOW-A-DAYS the treatment of gynæcological patients is so largely made up of operative procedures, that the preparation of such patients for operation and the after-care of them by the nurse require some especial teaching over and above what she has had on the subject of general surgery. The anatomy of the pelvic organs, their functions and relations to each other, should be well understood by a nurse, in order that she may have an intelligent comprehension of the features peculiar to this work. She must be able to recognize the importance of any physical change that may take place in her patients during treatment, whether before or after operation, and she must be familiar with the nomenclature used in this department of surgery. Education in this branch of nursing can hardly fail to impress a woman with the importance of using her influence among other women to bring about a broader knowledge of their physical construction, so that they may have a better appreciation of the general laws of hygiene, and more especially of those applying to the pelvic organs.

Treatment in gynæcological cases may be general, local, or both general and local, but in the majority of hospital cases some operative measure in addition is generally indicated. The general treatment consists in putting the patient to bed and keeping her perfectly quiet, both mentally and physically. The nurse's duties under such circumstances are to surround her patient with a quiet, cheerful atmosphere, to keep from her any causes for excitement, and build up her system by special attention to the diet, giving milk in abundance and plenty of simple nourishment in an attractive form. Such a patient should have plenty of sleep; all arrangements for the night should be finished by 9.30 P. M., the lights turned low, and the patient left undisturbed, when, as a rule, she will quickly go to sleep. If she awake during the night, a glass of hot milk, cocoa, or broth should be given. Frequently with this form of treatment are combined some local measures, such as the making of applications by the surgeon. When this must be done, a well-trained nurse should know just what is necessary to have on hand, and she must avoid any awkward delay, which may be very trying to the patient, especially if it be her first experience of the kind. It will also fall to the lot of the nurse to make proper preparations for the examination of the patient and assist the surgeon, all of which should be done in a quiet, dignified, and thoroughly professional manner. The nurse's deportment will go far toward reassuring the patient and helping her to restrain any signs of nervousness that she might otherwise be inclined to show, and which would prevent the surgeon from proceeding with his work. The nurse should always be present during the doctor's professional visits unless there should be any special reason to the contrary.

Before either an examination or application it is the nurse's duty to see that her patient is first in a presentable condition. The rectum should be empty and a general sponge-bath or tub-bath and a vaginal douche given, the latter consisting usually of a 1 per cent. carbolic-acid solution. A fresh night-gown, stockings, and a wrapper are to be put on unless the examination or application is to be made in bed, when the wrapper is not necessary. For a digital examination all that is required, if the patient is in bed, is to have her moved over to that side of the bed which the surgeon prefers, where she is made to lie on her back with the knees drawn up. The covering should not be too heavy. A chair is placed at the bedside for the doctor, and a towel and some vaseline must be ready. A basin containing water should be placed on the washstand.

For applications the patient is to assume the most convenient position.

The several positions necessary to know are the left lateral, the dorsal, the knee-chest, and the upright position. In the lateral, usually called the "Sims position," the patient lies on her left side and chest, with the left arm drawn behind her and her head and right arm rather toward the right corner of the table, the buttocks resting well over toward the left lower corner; the legs should be flexed and the right knee drawn up above the left. This is the position usually ordered for examination or for applications requiring the use of the speculum, as the uterus and anterior wall of the vagina are well forward and a better view is obtained.

The dorsal position is the one generally adopted in operations, whether capital or minor. The patient lies flat on her back, and the knees are flexed or the legs otherwise arranged according to the nature of the operation.

In the knee-chest position the patient must lie upon the side of her face, with her arms outstretched and her hands grasping the upper end of the table. She lies flat on the chest, with the hips elevated, the back being bent in opposite the lumbar region, and the weight of the body resting chiefly on the knees. This position is usually chosen for replacing a retroflexed uterus and for making applications to the uterine cavity or to the vault of the vagina. The Sims speculum is the one generally used.

For the upright position, the clothes of the patient are adjusted by folding the skirts about the waist, then wrapping a sheet about the waist and lower extremities, allowing an opening at the side. The patient stands with the right foot resting on the rung of a chair or on a low stool. In this position pessaries are sometimes inserted and examinations made.

Sheets or blankets, in addition to the patient's own clothing, are generally used as coverings, and should be arranged so that the patient is quite covered until everything is ready, when only the part to be operated upon should be exposed. For vaginal operations two or three thicknesses of gauze of sufficient size to extend from above the pubes to below the perineum may be wrung out of a disinfectant solution and spread over the parts: the operator works through a slit in this, the opening being made sufficiently large so as not to interfere with his movements. Although this plan has not yet been generally adopted, the idea seems to be a good one. Long canton-flannel stockings reaching to the thighs should be worn under the sheets that are used to throw over the legs. For examination under anæsthesia it is necessary in addition to have plenty of towels, a good supply of hot water and vaseline, ether or chloroform with inhaler, basins, specula, uterine dressing-forceps, cotton, and disinfectant solutions.

Frequently the nurse is required to hold the Sims speculum: she should stand on the left side of the patient, allow the left arm to rest lightly on the patient's hip, and with the hand separate the buttocks near the vaginal opening; with the right hand she grasps the speculum, holding it steadily and firmly as directed by the operator. The speculum should be placed in some warm solution or in warmed vaseline before being introduced.

The local dressings generally in use consist of packings of gauze and tampons of various kinds. The gauze is made in strips about sixteen inches long and two inches wide. The plain sterilized gauze may be all that is needed for this purpose; at times iodoformized gauze or gauze prepared with certain other chemicals may be desirable. Such packings are usually left in from twenty-four to thirty-six hours, and are then removed with forceps, care being taken to make sure that every piece has been taken away by ending the procedure with a digital examination, as any gauze left in will decompose and may set up an inflammation.

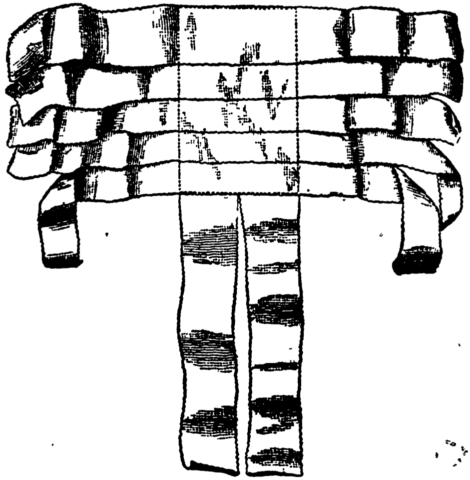
Tampons are made of absorbent cotton or of lamb's wool. The cotton is cut into strips about eight inches long, four inches wide, and half an inch thick: each strip is then doubled, the ends are rounded off with the scissors, and the whole is tied securely in the middle, where it is folded, with a piece of stout linen thread, leaving a length of thread of about six inches, with the ends knotted together, by which the tampon may be removed. Tampons are used as supports to take the place of pessaries, and for applying local antiseptics, powders and soothing drugs in inflammatory conditions. Lamb's-wool tampons are used when the walls of the vagina are to be kept apart, as they are non-absorbent and do not become sodden like absorbent cotton. They are made by twisting around three fingers a piece of wool 30 cm. long and 3 cm. wide, so as to form a loop; a piece of linen thread is tied around the centre of the loop, leaving long ends to the threads as described above. The wool is then spread out flat. Usually an order is given to remove a tampon after twenty-four hours, and to follow its removal with a warm-water douche.

If a Hodge pessary, or one of a similar type, is to be removed, two fingers of the left hand are introduced into the vagina, and the index finger, being hooked over the anterior bar of the pessary, which rests against the upper portion of the symphysis pubis, gives it a half turn: this frees it from the cervix, and it only remains to remove it from the vagina. The pessary should be placed, after removal, in a 1 : 40 carbolic-acid solution for five minutes, then well washed off and dried.

For making the general dressings in a gynæcological ward, the necessary instruments to have ready are a

Sims speculum, uterine and ordinary dressing forceps, a uterine sound, probe, tenacula, curettes both sharp and dull, bullet forceps, applicators, cotton-holders, and a pair of straight scissors. These should be sterilized ready for use, and in addition there should be a dressing-basket or carriage containing a roll of sterilized gauze and absorbent cotton, also the various disinfectant powders, such as iodoform, and boracic acid, and astringents. Rubber strapping wound in strips on glass rods, perineal and the modified Scultetus bandages (Fig. 13), should be ready to hand, and plenty

FIG. 13.



MODIFIED SCULTETUS BANDAGE.

of basins, warm solutions, and towels are among the things required.

For minor operations the preparation of the patient, with a few modifications, is practically the same as for an abdominal section. Twelve hours before the operation, the physician usually orders a tub-bath or a sponge-bath and the administration of a cathartic; on the next morning the patient must take no breakfast: she should receive a simple soapsuds enema, which should be repeated until effectual. The parts must then be shaved: it may be necessary to go over the surface with the razor two or three times, in order that the finest hairs may be removed. When this has been done, the parts must be thoroughly scrubbed with green soap and water, washed off with alcohol and afterward with ether, and finally sponged with a 1 : 5000 bichloride solution. A compress of sterilized gauze wrung out of warm bichloride 1 : 5000 is next put on, and held in place with a sterilized abdominal binder to which are attached perineal straps, to keep it from sliding out of place.

The After-care of an Abdominal Section Case.

In the care of a patient after an abdominal section, for the first twenty-four hours, very little can be done except keeping her quiet, watching the pulse, looking out for hæmorrhage, and allaying the excessive thirst, as much as possible, by rinsing out the mouth with soda-water or plain water and moistening the lips from time to time. As a rule, the patient is not allowed to drink water, as it induces and prolongs nausea, which would defeat our main object, which is to keep her in every way as quiet as possible. Nourishment by the mouth may not be ordered until next day, and then probably only in very gradually increasing quantities. Stimulants should be kept near at hand, and if the patient is in an exhausted condition, a nutritive enema may be ordered at once, so that the necessary articles for giving one should be ready for use at a moment's notice. Unless the patient voids urine within eight hours after the operation, the retention should be reported and a catheter prepared. If urine is voided, the quantity should be carefully noted. The bowels will nearly always need attention by the morning of the second day, and it is important that the nurse should record and report accurately the result of the enema which is generally ordered. If there be no result after several repetitions, she should be particular to report the fact immediately, as failure on the part of the bowels to move may indicate an obstruction, and the surgeon may wish to institute further treatment at once. For the first week or ten days a record-sheet should be neatly and accurately kept by the nurse. For uneasiness and pain in the back, small flat pillows and the knee-pad must be adjusted and changed whenever necessary.

Unless otherwise specified by the doctor, the diet should consist of liquids until after the sixth day or until the stitches are removed, when soft food may gradually be added.

The After-care of a Case of Perineorrhaphy.

For the first twenty-four hours the treatment is practically the same as for cases of abdominal section, but soft food is generally ordered on the second day, and the bowels should move freely at least once daily: an enema should be given previous to the movement, to soften it and to prevent straining. When a patient is having a movement of the bowels, great care must be taken that the stitches are not torn apart, and, if there be any straining whatever, the nurse should hold the parts together: this is a good plan to follow, at any rate for the first few days. Usually catheterization is ordered during the first forty-eight hours. Antiseptic precautions must be carefully followed, the parts should be bathed before using the catheter, and the greatest care employed to prevent any drops of urine from falling upon the stitches: if, however, some escape us, the surface should be washed off with a little sterilized cotton held with forceps and dipped in a 1 per cent. solution of carbolic acid; it should then be wiped quite dry with bits of cotton held in the same way, and powder or the dressing ordered reapplied. The hands should be scrubbed clean and disinfected before beginning the work. These precautions should be taken each time the urine is voided and after every movement of the bowels. Usually a little gauze packing is put just within the vagina at the time of the operation to absorb any oozing from the stitches, and this should be removed the next morning. A douche should never be given after a perineorrhaphy without an order from the surgeon, and then the greatest care should be taken to see that no water is left lying against the stitches within the vagina, as is likely to happen unless one swabs it out and makes it quite dry, which may be done with the aid of forceps covered with cotton. For the first forty-eight hours the knees should be bound together to prevent any sudden movement, which is apt to tear the stitches.

Hæmorrhage is liable to occur after operations upon the cervix or after a perineorrhaphy, and the nurse should be able to control it until the doctor arrives. For bleeding from the cervix a hot alum douche is generally all that is necessary, but if this does not answer, then the vagina should be cleaned out with cotton applied by means of the forceps, and tightly packed with plain sterilized gauze or gauze medicated with some such astringent as tannic acid in powder or solution. For hæmorrhage from the perineum, the parts may be elevated and pressure made with a pad of cotton or gauze against the bleeding surface.

Lavage of the bladder, or bladder-washing, in gynæcological cases is usually ordered for a cystitis which may be either acute or chronic. Boracic-acid solution is most frequently used. Three pints should be put into a fountain syringe and the end of the rubber tubing attached to a glass catheter which is introduced into the bladder: the urine is first drawn off and then a pint of the boracic solution allowed to run gently in; the tubing is then slipped off the catheter, half the water is drawn off, the tube replaced, and the other pint, if necessary, introduced. The third time this is done the water should be clear when emptied from the bladder. If a double catheter can be obtained, there will be no necessity for removing the tubing, as the fluid will run out as quickly as it is introduced. If no tubing can be procured and we have no fountain syringe, a rubber catheter may be introduced to which a small glass funnel is attached, and the solution be poured slowly and gently through this, a pint at a time. Some patients cannot bear so great a distension of the bladder, and as soon as any complaint is made one should allow the fluid to escape. The vessels and catheter used must be surgically clean, and all precautions taken as in an ordinary catheterization.

As nurses are constantly hearing difficult and unfamiliar words used in connection with gynæcological work, and as it is important that they should in many cases understand something of the nature of the operation performed, a synopsis of gynæcological operations and the terms applied to them will be introduced here:

Metritis. From the Greek *metra*, uterus, and the termination *itis*, signifying inflammation. Inflammation of the uterus. This condition may be due to any inflammatory condition existing in the pelvis; more commonly it comes on as a consequence of post-partum infection (after labor), and is known as septic metritis.

Endometritis. From the Greek *endon* (or *endo*), meaning within, and *metritis*, inflammation of the uterus. Inflammation of the lining membrane of the uterus. For this the operation of *curettement* or curetting is performed, which means the removal of the inflammatory products by means of a dull or sharp curette.

Stenosis of the Os Uteri or Cervical Canal (*stenosis*, a narrowing; *os*, mouth). A contraction or narrowing of the cervical canal. For this the operation of dilatation is performed, which means the stretching or dilating of the cervical canal by the use of instruments called dilators, or by sponge tents.

Laceration of the Cervix Uteri. A tear of the neck of the womb. The tear may be unilateral—*i. e.* confined to one side, bilateral—taking in both sides;

or stellate—*i. e.* irregular or star-shaped. This condition is generally caused by childbearing. For this lesion the operation of trachelorrhaphy (from the Greek *trachelus*, neck, and *rhaphia*, a sewing) is performed, in which the torn lips of the womb are brought together by sutures. When this is done immediately following childbirth, it is called the "immediate operation;" when performed after the first week, it is called the "secondary operation."

Relaxed Vaginal Outlet. The relaxation of the tissues that form the entrance to the vagina. This is caused by over-distension of the parts during childbirth. The operation performed for this is known as perineorrhaphy (*perineum*, and *rhaphia*, a sewing or suturing), and has for its object the bringing together of the relaxed tissues by dissecting away a portion of the mucous membrane of the vagina, and then uniting the denuded parts by sutures.

Laceration of the Perineum. A tearing of the tissues forming the perineum. There are several grades. When the laceration extends through the sphincter ani, it is known as a complete laceration; when it does not extend so deep, it is known as an incomplete or partial laceration. The operation performed for remedying this condition is also known as perineorrhaphy, and, as the name implies, means the bringing together of the parts by sutures. In cases of complete laceration special care must be used, in giving enemata for some time after the operation, to do it in such a way as to avoid disturbing those sutures which are passed through the fibres of the sphincter ani.

Excision of a Bartholinian Cyst. The cutting out of a cyst formed by dilation of the duct coming from one of the glands of Bartholinus. The gland becomes swollen as the result of the accumulation of its secretions due to the closure of some portion of the duct.

Uterine and Cervical Polypi. These are tumors which occur in the mucous membrane, and are made up of the same kind of tissues as the membrane from which they grow. They are generally attached to some portion of the cervical canal or fundus of the uterus by a long pedicle or root. They are removed by being twisted off with forceps, by incision, by ligature and incision, by means of the cautery (Paquelin's), or by the *écraseur.*

Carcinoma of the Cervix Uteri. Cancer of the neck of the womb. Its most prominent symptom in the majority of cases is hæmorrhage. The treatment of this condition is either palliative or radical. By *palliative* treatment is understood the removal of as much as possible of the cancerous mass by means of the finger and curette, and the destruction of the tissue, which it is impossible to remove by this procedure, with the thermo-cautery (Paquelin's). By the *radical* treatment is meant the total extirpation of the cancerous tissues. This is performed either by amputating the diseased portion or by completely removing the cervix and uterus by performing a vaginal hysterectomy (from the Greek *hystera,* the uterus, and *ectomia,* cutting out).

Cystocele (from the Greek *cystis,* bladder, and *cele,* a tumor). A prolapse of the anterior vaginal wall, which brings down with it the bladder.

Colpocele. Gr. *colpos,* vagina, and *cele,* tumor. Descent of the vaginal wall. Every cystocele is a colpocele. The condition is frequently a consequence of labor. The operation performed for its relief is known as anterior colporrhaphy (*colpos*, vagina, and *rhaphia*, a suturing), which means the bringing together of the relaxed vaginal tissues by sutures.

Rectocele. A mixed word from the Latin *rectum* and the Greek *cele*, tumor. A prolapsus or relaxation of the posterior wall of the vagina, which brings with it the rectum. This occurs in most instances as a consequence of childbirth.

Amputation of the Cervix Uteri. The removal of the cervix. This is performed for prolapsus of the uterus; also, for hypertrophic elongation of the cervix, or for cancer of the cervix.

Pelvic and Abdominal Operations and Diseases.

Cœliotomy or *Laparotomy* (the latter from the Greek *lapara*, lit. the flank, and *tomia*, a cutting), and *Abdominal Section* are synonymous terms employed to describe the incision through the abdominal walls.

Cœliotomy is the proper scientific term, *cœlia* being the Greek for the *abdomen*, and *tomia*, meaning "cutting."

Ovaritis. *Ovarium*, ovary, *itis*, inflammation of. Inflammation of the ovary.

Salpingitis. *Salpinx*, the tube, and *itis*, inflammation of. Inflammation of the Fallopian tube.

Salpingitis and Ovaritis. Inflammation of the Fallopian tube and ovary.

Abscess of the Ovary. A purulent collection (pus) in the ovary.

Pyosalpinx. Greek *pyon*, pus, *salpinx*, the Fallopian tube. A collection of pus in the Fallopian tube.

Hydrosalpinx. *Hydrops*, dropsy, *salpinx*, Fallopian tube. A collection of watery fluid in the Fallopian tube; dropsy of the Fallopian tube.

Hæmatosalpinx. *Hæma* (gen. *hæmatos*), blood, *salpinx*, Fallopian tube. A collection of blood in the Fallopian tube (most frequently due to extra-uterine pregnancy).

Ovarian Cystoma. A cyst of the ovary.

Hæmatoma of the Ovary. A blood-tumor of the ovary.

Dermoid Cyst of the Ovary. A cystic tumor containing skin, teeth, hair, etc. Dermoid cysts are congenital tumors.

Ovariotomy. *Ovarium*, ovary, *tomia*, section. Removal of an ovary.

Oöphorectomy. *Oöphorum*, ovary, *ectomia*, excision. A better term to signify an operation for the removal of an ovary.

Salpingo-oöphorectomy. *Salpinx*, the Fallopian tube, *oöphorum*, ovary, *ectomia*, excision. Removal of the Fallopian tube and ovary (as for myoma of the uterus). When the tubes and ovaries on both sides are removed, the operation is called a double salpingo-oöphorectomy.

Myomectomy. *Myoma*, lit. a thing made of muscle, a muscular tumor; *ectomia*, excision. The removal of a myoma from the uterus. Such a growth is commonly spoken of as a fibroid tumor, but myoma is the more correct term.

Hysterectomy. *Hystera*, the uterus, *ectomia*, excision.

The complete removal or extirpation of the uterus. This may be done either through the vagina (vaginal hysterectomy) or through an incision in the abdomen (abdominal hysterectomy). It is generally performed for carcinoma (cancer) of the cervix or uterus.

Hystero-myomectomy. The removal or extirpation of the uterus for myoma.

Hysterorrhaphy. Hystera, the uterus, *rhaphia,* a suturing. The fixation of the uterus to the anterior abdominal wall by sutures.

Parovarian Cyst. A cyst developing from the parovarium of the broad ligament (between the ovary and Fallopian tube).

Extra-uterine Pregnancy. A pregnancy going on outside the uterus, generally in some portion of the Fallopian tube, in which case it is called "tubal pregnancy." It may also occur in the ovary or even in the abdominal cavity.

Cæsarean Section. The removal of the fœtus from the uterus by means of an incision through the abdominal and uterine walls of the mother. It is resorted to only when the pelvis is deformed, or when the fœtus is still living after the death of the mother.

CHAPTER XVII.

SURGICAL OPERATING-ROOMS.—NURSES' TECHNIQUE.—HOW TO PREPARE FOR OPERATIONS IN PRIVATE HOUSES.

As the technique of the operating-room has come to have such an important bearing on surgical operations, and as the nurse is frequently depended upon to prepare everything required, and to see that everything in the room is in a condition of cleanliness and order, her duties in this special work will be dwelt upon in detail. To ensure thoroughness in the antiseptic preparations, one nurse should be given the responsibility of the care of the operating-room—a task which is usually sufficient to occupy her whole time. Any further assistance, which is needed, should be rendered by the pupil nurses of the school, who receive their operating-room training in this way. The pupil nurse thus works under the direction, observance, and criticism of the nurse in charge, upon whom devolves the responsibility of rendering surgically clean everything in the operating-room that is likely in any way to come in contact with a wound. This duty includes the care and sterilization of instruments, the preparation of solutions, ligatures, dressings, and operating-room linen (including surgeons' operating suits and nurses' dresses), the antiseptic care of the room, and involves a thorough knowledge of the details of the preparation for any kind of operation.

For sterilizing purposes an Arnold steam sterilizer is all-sufficient, as it is quite large enough to hold bottles of salt solution, dressings, or instruments; in a general operating-room not less than two and sometimes three or four of these sterilizers are needed, each supplied with a Bunsen burner and gas tubing. The dishes needed for operations vary in size and shape. They are used to hold the various solutions for the disinfection of hands and instruments, and some should be reserved for the reception of specimens: they should, where it is possible, be of glass, but if glass ones are not obtainable, those of white porcelain or porcelain-lined ware are the next best. When the porcelain begins to chip off a basin, the latter should be replaced by a new one, as it is impossible to be sure that a chipped dish is surgically clean. All such dishes, after an operation, should be washed in hot soapsuds, then in clear hot water, and allowed to drain instead of being wiped off, as bits of lint from the linen would be apt to cling to the surface. The instruments are placed in dishes filled with a 1 : 40 carbolic-acid solution, or, what is still better, the dishes are filled an hour before the operation with a 1 : 1000 bichloride solution, and just before the operation are emptied, rinsed out with sterilized water, and again filled with sterilized water, in which the instruments are received.

An operating-room nurse should familiarize herself with the names of the instruments ordinarily used in surgical operations, and be able to select the sets used for the different cases. To prepare instruments for use, they may be wrapped in a towel or put into a bag, which is placed in an Arnold sterilizer and steamed for half an hour: just before they are needed, they are lifted out (after the hands have been disinfected) and placed at once in the basins of solution prepared for them. The objection to sterilization by steam is that the instruments must be nickel-plated, otherwise they will rust, and even if but a small portion of the plating has worn off and they are left standing for any time at all, this is likely to happen. A second method is to place the instruments in a porcelain-lined kettle filled with a 1 per cent. solution of carbonate of soda, which is allowed to boil for five minutes, after which they are lifted out and at once transferred to the dish containing the solution. This is a very convenient method of preparing instruments quickly for a second operation. After an operation, to prevent rust, the instruments should be cleaned at once. They are first washed and scrubbed very carefully in warm soapsuds, and then, after being rinsed off in clear warm water, are carefully dried.

In addition to the regular disinfectant solutions (carbolic acid and bichloride of mercury) other cleansing agents are now used in operating-rooms for various purposes, particularly salt solution and distilled water.

Normal salt solution—so called since it contains approximately the same proportion of salt as is found in the blood-serum, *i. e.* $\frac{6}{10}$ of 1 per cent.—is made according to the following formula:

℞. Sodium chloride, gram. vj (circa ʒiss);
Distilled water, litre j (circa Oij).

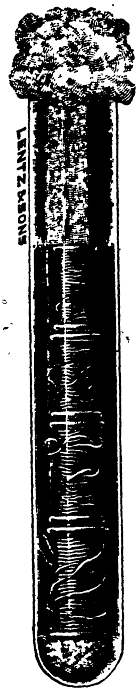
Mix thoroughly with a glass rod and filter through filter-paper into a sterilized flask or bottle of a capacity of about two litres; stopper the bottle with sterilized common or absorbent cotton, keeping the plug in place with a few turns of gauze bandage, which also prevents any accumulation of dust upon the lips of the bottle. The flask is then heated over a gas flame

FIG. 14.

FLASK FOR CONTAINING SALT SOLUTION.

and the solution allowed to boil, after which it is placed in the sterilizer to be steamed for half an hour. This process is repeated three times at intervals of twenty-four hours, the solution in the mean time being kept in a room at a temperature of about 30° C. The solution is sterilized in this way because it has been found by experiment that after the first sterilization the spores are not destroyed; the intervening twenty-four hours allow for the development of any spores which may have been present, so that they can be destroyed by the second sterilization; the steaming on the third day kills any which may possibly still remain, and the solution is thus rendered completely sterile. Before the operation it is reheated and used at whatever temperature is desired.

Fig. 15.



Tube containing Ligatures on Glass Reels.

Salt solution is used for irrigation or for sponging exposed tissues, to keep ready for use rubber tissues, which are to be used for covering skin-grafts, and to wash out the abdominal cavity after abdominal operations. Besides its cleansing properties, it has been proved to act as a stimulant to the tissues, and the red corpuscles are preserved in it, whereas they are destroyed by plain water.

Distilled water, when used in large quantities, can be most readily obtained from a boiler-room, as it is easily made by turning on the steam in the boiler and allowing it to condense. It is frequently used now instead of disinfectants for covering instruments, for sponging, and, instead of boiled plain water, for preparing salt solution.

Ligatures.—Ligatures are of various kinds and sizes. They are made of silk, silkworm gut, catgut, and silver wire.

To clean the glass reels or spools (see Fig. 15) upon which ligatures are wound, a good scrubbing with green soap and water and placing in a 1 : 500 bichloride solution for twelve hours is effectual.

Silk Ligatures.—The heavy silk ligatures are cut into lengths of 100 cm., the intermediate size into lengths of 40 cm., and the "carriers," or those of fine quality, into lengths of 50 cm. Four strands of the heavy silk are wound together on one reel, ten of the intermediate on a second, and eight of the fine on a third reel. For sterilizing these, a test-tube large enough to hold four reels is used, and a little cotton placed in the bottom of it. The tube is then plugged with cotton and steamed in the sterilizer for three successive days—for one hour on the first, and half an hour on each of the two following days. They are to be kept dry, and the plug must never be removed until the ligatures are required for use.

Catgut Ligatures.—Half a bunch, or six strands are wound on a long glass reel and immersed in a bottle of 95 per cent. alcohol, making sure that the alcohol more than covers the reel, to allow for evaporation; the bottle is then plugged with cotton and placed in a water-bath until the alcohol boils, when it is removed. The boiling must be repeated on two successive days, great care being taken, since the alcohol is very inflammable. To prevent evaporation the jar is sealed by being covered over with protective and then paraffined. When required for use, the gut is cut in lengths of 40 cm., wound on reels, and placed in 95 per cent. alcohol, which is boiled in a water-bath just before the operation.

Silkworm gut is cut into lengths of 30 cm., doubled, placed in tubes, and sterilized in the same manner as silk ligatures. Silver wire is treated in the same way.

When working with any of these prepared ligatures, thorough antiseptic precautions must be observed: the hands must be carefully prepared, as if for an operation, before touching them, and nothing which is not sterile should be allowed to come in contact with them. This is one of the instances where the nurse must be depended upon to be absolutely accurate in the observance of the most minute details.

For drainage, rubber tubing of various sizes is used, as are also strips of gauze and glass tubes. The gauze should be cut "by drawn thread" into strips of about a yard long and an inch wide, each of which is made into a little roll: four or more of such rolls should be enclosed in a glass tube and sterilized in the same way and for the same length of time as silk ligatures. For the same purpose strips of iodoform gauze should be kept ready cut in proper widths. When using tubes or gauze drainage at a dressing, all handling of them should be avoided. They should always be handed to the surgeon by means of a pair of sterilized forceps. Rubber drainage-tubes are prepared by scrubbing them well with soap and water and rinsing them in boiled water. They are then soaked in a 1:1000 bichloride solution for twenty-four hours, after which they are placed in a carbolic-acid solution 1:20 for twenty-four hours, and finally kept in a 3 per cent. carbolic-acid solution, which is to be changed weekly or at least every ten days. Glass tubes are boiled and kept in 1:20 carbolic-acid solution, and washed off in alcohol before using. It has been found that rubber tubes can be sterilized, without suffering any injury, by being boiled in soda solution for five minutes, just in the same way as instruments.

Dressings are now-a-days chiefly furnished in the form of rolls of gauze, common or absorbent cotton, or pads. The gauze is probably used most and should always be kept ready, rolled in six-yard lengths, and folded so as to have a width of about nine inches; pieces of any size required can then be readily cut off. Pads are made of various substances, such as pine-fibre, Virginia moss, or wood-wool, and may be of any size or shape according to the special requirements of each case. All forms of dressings must be sterilized for half an hour before being used.

Sometimes gauze is used as a medium for holding chemical substances, such as iodoform or permanganate of potassium. To make iodoformized gauze,

Take of

Salt-solution soapsuds,	6 ounces;
Iodoform powder,	10 drachms;
Sterilized gauze,	3 yards.

Mix thoroughly. Fold the gauze lengthwise with a width of nine inches and dip into the mixture. Rub the solution well into the meshes. When the gauze is thoroughly impregnated, place it on a clean rubber cloth and roll it up loosely. Keep in colored glass jars.

Permanganate Gauze.—Plain gauze is cut into suitable lengths and sterilized for an hour, then dipped into a solution made with

Permanganate of potassium,	10 grammes (grs. cl);
Hot water,	1 litre (Oij).

It is then rolled like the iodoform gauze, and kept in a porcelain or dark jar. In preparing gauze the hands should be sterilized as for operations.

Sponges are to be made of gauze, small squares being cut and the corners folded in, so as to form small round puffs.

Sea-sponges, when used, should be prepared by first pounding them well to remove the sand, and then washing several times in water. Afterward they are soaked in a saturated solution of permanganate of potassium, decolorized in oxalic acid (sat. sol.) or dilute sulphurous acid, and again washed thoroughly in warm water and placed in a weak solution of hydrochloric acid (acid. hydrochloric. dil. ʒij, aquæ ad Oj) for twenty-four hours. They are then to be washed in water until the washings are clear, placed in a bichloride solution 1 : 1000 for twelve hours, and finally washed in hot water and kept in a 3 per cent. solution of carbolic acid.

Besides these, a nurse may be expected to prepare iodoformized glycerine or oil, and celloidin solution. The two former are generally mixed in the proportion of 5 parts of iodoform in 100 parts of glycerine or oil:

Iodoformized Glycerine.

Iodoform,	5 grammes (grs. lxxv);
Glycerine,	100 cc. (℥iij circa).

Mix and place in a wide-mouthed, thin glass flask, and sterilize for one hour in the Arnold steam sterilizer, plugging the flask afterward with sterilized cotton. When glycerine is used alone it is sterilized in the same manner. These solutions are used for injections into tuberculous joints and in preparing gauze packings.

Celloidin Solution (bichloride 1 : 16,000).

Ether (Squibb's),
Absolute alcohol, *āā.* 200 cc.
Of a solution of bichloride of mercury (grm. 1 dissolved in absolute alcohol 40 cc.), 1 cc.
Mix, and add of Anthony's "snowy cotton" sufficient to make the consistency that of simple syrup.

It is used chiefly for sealing wounds after abdominal sections.

For iodoform celloidin, the bichloride is omitted and 25 grammes of iodoform powder used instead; the powder and alcohol are first mixed together, the ether is then added, and finally the cotton.

The operating-room linen list calls for sheets, small pillow-cases, towels for general purposes, small crash towels for the ether cone, linen half-sheets, blankets and rubber sheets. Some towels should always be kept in a 1 : 1000 solution of bichloride of mercury. A number of linen half-sheets are to be prepared in the same way for spreading over the rubber which protects the blanket covering the patient; for this purpose they are much more convenient than a number of towels. In addition, the nurse should see that the white cotton suits worn by the surgeon are kept in repair, and that clean ones are ready on each operating day. Her own dress should be of the same material, made with plain waist, skirt and belt, and with the sleeves cut off just above the elbow.

The walls of the room, as well as the woodwork, are to be brushed down once a week and washed frequently; the floor, if not tiled, may be paraffined, and wiped up with a damp cloth and freshly rubbed after the work on each operating day. Everything should be kept in perfect order and quite clean. The methods here outlined are largely those used in the Johns Hopkins Hospital: every surgeon, however, has his own methods, and the nurse must of course carry out his directions. Those given here are useful and may be followed when no others are ordered.

In large general hospitals it is, as a rule, found necessary to have two operating-rooms—one for general surgery and another for gynæcology. When this is the case, the technique of the two rooms may vary somewhat. In the latter, for instance, the supply of dressings is confined to those required for this special work. There should be a full supply of perineal and abdominal bandages, other kinds being but rarely called for; long stockings made of canton flannel should be made to put on the patient during minor operations. For abdominal operations, the half linen sheet should be made with an opening down the middle long and wide enough to allow of the exposure of the surface where the incision is to be made. Sometimes squares of sterilized gauze slit in the centre are used for this purpose and thrown away after one operation, but the sheet can be washed, and is therefore more economical, and it also stays better in place; besides, it covers a larger area, and so fewer towels are required.

As an abdominal section may be done in either operating-room, we shall use it as an example of the steps to be taken in actually preparing for an operation.

Preparations should be begun a good while before the operation, so that everything may be in readiness at the hour appointed. The temperature of the room must be regulated either by means of the steam coil or an open fire, so that it may be 80° F. at the time of the operation. On the table should be placed a felt pad sufficiently large to cover it; next to the pad (for which, if necessary, a folded blanket may be substituted) comes some rubber sheeting, and over this, again, a white sheet is spread. A small air-pillow or one stuffed with hair is put where the head will rest.

The operating-room dress is first put on, then the hands and arms are vigorously scrubbed with soap and hot water, and after this the regular preparations are begun. The instruments, ligatures, and dressings are put in the sterilizer; the various basins for the solutions and instruments are conveniently arranged on extra tables round the operating table; the salt solution is heated in its flask over a Bunsen burner; large granite-ware vessels of distilled water are put on to heat; and then the hands are again prepared, so that the nurse may be ready to sponge a wound or assist the surgeon in other ways in his manipulations. This preparation is important, and consists in first scrubbing the hands and forearms for ten minutes with warm water and borax soap or green soap, paying particular attention to the finger-nails; they are then immersed in a saturated solution of permanganate of potassium for one minute, subsequently decolorized by being soaked in a saturated solution of oxalic acid, rinsed off in distilled water, and finally immersed in a solution of 1 : 1000 bichloride of mercury for five minutes. Constant vigilance should after this be exercised that nothing whatever is touched that is not sterile; the assistant nurse or the orderly must be called upon to do any lifting or carrying.

Just before the operation, the instruments are lifted from the sterilizer into basins containing the solutions. After the patient has been arranged on the table, properly protected with blankets and rubber sheets, only the parts to be operated upon being exposed, the articles for final preparation should be handed to the surgeon by the assistant nurse. These consist of a basin of warm water, green soap, and hand scrubbing-brush, together with the permanganate-of-potassium and oxalic-acid solutions: after the parts have been treated with these, ether or 95 per cent. alcohol is poured over the field of operation, which is finally washed off with a 1 : 1000 bichloride solution. Plenty of dry sterilized towels must be at hand, and basins filled with towels previously sterilized and then soaked in a 3 per cent. carbolic-acid solution will be required to replace those in the proximity of the wound, which have become soiled during the operation.

To Prepare for an Operation in a Private House.

Of course difficulties will be met with in carrying out antiseptic preparations for an operation in a private house, which are never met with in a hospital, but a well-trained nurse should be able to overcome the majority of them with a little tact and ingenuity. A nurse should have at least a few hours' notice, so that she may have sufficient time to make her preparations: she should select the room, if the surgeon has not already done so, with a view to securing proper light for the operation. It must be convenient to the patient's bed-room, and carpets, hangings, and all unnecessary furniture should be cleared out of it, the walls brushed down, and the floor washed. If household vessels must be depended upon, then all pitchers, basins, and towels should be boiled for an hour in a 2 per cent. solution of carbonate of soda or a 1 : 40 carbolic-acid solution. The table is usually the pine one from the kitchen, and must be scrubbed off with green soap and hot water. Two or three smaller tables for basins are needed, and if they must be protected they may be covered with sterilized towels. These, together with two or three plain chairs, are all the furniture necessary. There should be plenty of hot and cold water, soap, and towels. The cold water must first have been boiled and then kept in a thoroughly clean vessel. There should be plenty of jars or pails to receive the water that has been used. The surgeon usually brings his own dressings and instruments, and other details should be carried out according to his directions.

CHAPTER XVIII.

HÆMORRHAGES.

HÆMORRHAGES might properly be classed under the head of emergencies, as they very frequently occur when least expected, and their treatment requires prompt action coupled with presence of mind and calmness. By word, sign, or look, a nurse should never inform her patient that anything unusual or dangerous has occurred: her manner should be quiet and reassuring, though she should fully realize that the bleeding must be controlled as quickly as possible, and adapt her procedures to the necessities of each case.

Hæmorrhage may be defined as the "escape of blood from any part of the vascular system, with or without rupture of the coats of the vessel." Hæmorrhages are arterial, venous, or capillary, but in severe cases the bleeding may be from all three sources at once. When a hæmorrhage occurs in connection with wounds, it is called *traumatic* (relating to a wound or injury); when, however, it occurs as the result of a diseased condition, and is not directly attributable to violence, it is said to be *spontaneous*. The loss of blood may present more or less danger according to the size of the injured vessel and its distance from the heart. Hæmorrhages may be external or internal, and are to be combated by local or constitutional treatment, or by the two combined.

The means by which the arrest of hæmorrhage is brought about are of two kinds: (1) natural and (2) artificial.

Hæmorrhage from any of the large arteries is always serious, and, unless checked promptly, sometimes results fatally in a very short time. It is to be recognized by the color of the blood, which is bright red, and by the fact that it comes out in spurts or jets corresponding in time to the contractions of the left ventricle, which force the blood through the arteries.

A venous hæmorrhage differs from one which comes from an artery, in that the blood is of a dark and purplish color, and flows in a steady, slow stream; it is more easily controlled and less dangerous than an arterial hæmorrhage, unless a large vein has been severed.

In a capillary hæmorrhage the bleeding comes from the capillaries, which intervene between the end of the arterioles on the one hand and the beginning of the veins on the other. In this case there is no spurting of the blood, but rather an oozing, which, however, at times may be very troublesome to control.

The constitutional symptoms of a severe hæmorrhage are well marked, and, where the bleeding is internal or comes from a wound covered by a large dressing, they may be the first signs to appear, and should therefore be carefully watched for. The pulse, which varies in frequency and tension according to the amount of blood lost, will give us valuable information as to the condition of the heart, and enable us to form some idea of the imminence of the danger. Where the hæmorrhage has been severe, the lips have a pale, drawn look, and the whole face is pallid and wears an anxious expression; the pupils are dilated; there are signs of restlessness; the body is bathed in a cold perspiration and the extremities are cold and clammy; the nails and finger-tips look blue, and the respirations gradually become weaker and shallower, until finally they are sighing; the patient complains of dizziness; the speech becomes thick and unintelligible, or may even be entirely lost. These symptoms are followed by unconsciousness, from which, if the loss of blood has been very great, the patient is never aroused, but dies in a state of collapse. Syncope is a desirable condition if it comes on early enough, as the bleeding ceases with it, and an opportunity is thus afforded for the blood to coagulate, by which means the mouths of the bleeding vessels are closed before the heart's action regains its normal strength. The coagulum which forms when the blood-current is slow and the bleeding surface is exposed to the air, acts as a natural plug at the ends of the ruptured vessels. In the case of a vein, where there is no such propelling force to dislodge the clot, the vessel, as a rule, quickly closes, but in arterial hæmorrhage the plug formed is liable to be dislodged from the end of the artery with the next heart-beat. Fortunately, however, Nature has provided for this, since the arterial walls have the power to contract and retract, thus lessening the size of the outlet and preventing the displacement of the clot.

In the arrest of hæmorrhage by natural means the following factors are concerned:

1. Clotting of the blood;

2. A weakened action of the heart, sometimes shown by fainting;
3. Changes in the vessels themselves.

By artificial means hæmorrhage is arrested by—

1. Position (elevation of the limb or part);
2. Pressure directly on or above the vessel, including acupressure;
3. Forcible flexion;
4. Ligaturing or tying the ruptured vessel;
5. The application of heat or cold;
6. Cauterization;
7. The use of astringents or styptics, besides heat and cold;
8. Torsion or twisting.

Pressure is of two kinds—provisional and permanent. In provisional compression, the finger is placed on the bleeding point, or, if it is an artery that has been ruptured, just above it, and kept there until aid comes. Permanent compression may be made by means of compresses and bandages fastened tightly over the wound, or by the Esmarch rubber bandage, or the tourniquet applied at any point in the line of the artery between the wound and the heart tight enough to stop, or at least to much impede, the circulation.

Acupressure is now but rarely employed. This method is carried out by passing a pin or needle through the tissues over the artery, and again through the tissues on the other side, thus making pressure on the vessel. The pin is kept firmly in place by twisting silk or a fine wire over the point and head of the pin in the form of the figure 8. The pin is usually removed in six or eight hours, after the clot has become firm.

Ligatures are sometimes used in cases of accidental hæmorrhage, as well as for tying the ends of vessels which have been severed during operations. The nurse should, therefore, have ready for the surgeon, when he arrives, artery forceps, scissors, sponges, ligatures, and so forth.

Cold is frequently employed, as it causes the arterial walls to contract. Ice is the most convenient form in which to apply it: sometimes douches of ice-water are used, or cloths wrung out of ice-water and placed over the bleeding part are sufficient where the hæmorrhage is slight. An ice-bag half filled with pounded ice, laid over the parts in the neighborhood of the bleeding vessel, will sometimes serve the same purpose. Heat is seldom applied except in the form of a very hot douche for uterine hæmorrhage, the temperature of the water being from 115° to 120° F. The actual cautery is, however, sometimes used during operations to check oozing, especially in abdominal surgery.

Besides heat and cold, there are other styptics or agents for the arrest of hæmorrhage, which are applied either in powder or liquid form. Monsel's solution of iron is very efficient: it can be applied with a camel's-hair brush or on a pledget of cotton or gauze. Sometimes the powdered perchloride of iron is thickly sprinkled over the bleeding point. Alum and tannic acid are also well-known styptics, and in an emergency vinegar or common salt often does good service.

Torsion is performed by catching the end of the vessel with the forceps and twisting it two or three times.

Position, flexion, and rest are material aids in stopping bleeding, and where the hæmorrhage is not very extensive, elevation and perfect rest may be sufficient. By elevating the limb or the part, the force of the blood-current toward that point will be lessened, and the amount of blood lost will be thus reduced. This is something a nurse can always do at once. If the bleeding be from the abdomen, the foot of the bed is lifted on to a low table or placed on two chairs, stools, or bricks according to the height desired. If it be from the leg, this should also be supported in an elevated position by pillows or by some other device. If it be from the forearm or hand, the part is to be raised above the head, or flexion of the forearm on the arm will often answer. A firm pad is put in the hollow of the elbow, and the forearm is bent tightly against the arm and held in place by a stout bandage. If the hæmorrhage comes from the leg or foot, the thigh is flexed upon the abdomen and the leg upon the thigh, and held firmly in this position as long as is necessary.

Rest during and after hæmorrhage should be maintained, as any movement will increase the heart's action and thus augment the flow of blood, or where the bleeding has stopped it may bring it on again by displacing the blood-clot which is forming or has already formed at the mouth of the vessel.

Traumatic hæmorrhages are classed as (1) primary, and (2) secondary. Primary hæmorrhage is that which occurs at the time of the injury or operation. Secondary hæmorrhage may occur at any time from twelve hours up to ten days or two weeks after the operation or injury. It may be due to the slipping of a ligature or to the separation of sloughs. After an amputation or a serious operation of any kind, where many large arteries have been severed, a constant watch should be kept for hæmorrhage during the first forty-eight hours. A little oozing does not necessarily mean a serious hæmorrhage, but if the stain on the dressing continues to grow larger and is of a bright-red color, instead of becoming paler, then hæmorrhage is taking place, and the nurse must decide for herself whether or not the surgeon should be summoned at once. If she is doubtful, it is always better to be on the safe side. The pulse is probably the best guide, and in a case of severe hæmorrhage the dressings may have to be removed and the vessel tied. The nurse herself should never leave a patient who is having a hæmorrhage, but should send some one else at once for the surgeon, and in the mean time she should do what she can to control the bleeding by first making pressure over the bleeding point or in the line of the main artery leading to it. The part should be kept elevated, and, later on, permanent compression can be applied by means of an improvised tourniquet. This is made by placing a firm pad, such as a roller bandage, over the wound or just above it in the course of the artery, and then tying a bandage or a handkerchief, folded diagonally, loosely around the limb; a short stick is next slipped under the knot above the compress, by the help of which the bandage can be twisted as tightly as we desire.

Sometimes after severe hæmorrhage it is necessary, in order to keep up the required blood-supply to the brain and respiratory centres, to lessen the amount in the extremities by bandaging them either with Esmarch's rubber bandage or by ordinary bandages tightly applied.

Whiskey or brandy is given, and heat applied externally after the hæmorrhage has ceased. The patient should be kept quite free from excitement and in ignorance of the amount of the bleeding or the degree of the danger to which he has been exposed. The responsibility of giving the patient information on either of these points rests entirely with the doctor, not with the nurse.

Hæmaturia, or blood in the urine, may have its origin in the kidneys, ureters, bladder, or urethra. If the blood be from the kidneys, it will be diffused throughout the urine, giving to the whole amount a uniform reddish color. Hæmorrhage from the ureters most frequently results from the passage of a renal calculus which has torn the mucous membrane. When the bladder is the source of the bleeding, most of the blood comes away at the end of micturition in small clots, and one does not see the intimate admixture of blood and urine which occurs in renal hæmorrhage. When the hæmorrhage is from the urethra, the blood precedes the flow of urine. These conditions should be noted by the nurse and reported, and it may be laid down as a general rule that when an evacuation of an unusual nature comes from any internal organ, it should be kept for the inspection of the physician.

Epistaxis, or nose-bleed, is a very frequent form of hæmorrhage which is rarely dangerous; it may, however, be difficult to check. The onset is not infrequently preceded by a sense of fulness in the head, accompanied by more or less vertigo. The chin should be kept elevated and the head not allowed to drop forward, as it is so often allowed to do. If the bleeding is from only one nostril, the arm on that side is to be elevated and ice-water or ice applied to the back of the neck and forehead. Ice-water or strong salt solution (1 drachm of salt to 4 ounces of water) may be injected; finally, where all other methods fail, the nares must be plugged. A small soft rubber catheter, a piece of linen thread, or cord, and a small roll of lint or a sponge are needed. The thread is passed through the eye of the catheter, and the catheter introduced through the nostril into the throat: the string is then caught with forceps and drawn out of the mouth, so that the plug or sponge can be attached; the catheter is then withdrawn from the nose and the pledget pulled into position. The two ends which come from the nostril are tied over a second plug which fills the opening. It is usual to have the string long enough, so that after tying around the sponge we can leave an end to come out through the mouth on to the cheek, where it may be fastened with a bit of adhesive plaster. This facilitates the removal of the plug. The nurse is seldom called upon to adopt these measures, as the procedure is at times quite a difficult one, requiring the experience of the surgeon, and the foregoing description has been inserted here chiefly that everything, which may possibly be required may be ready in case of necessity.

Ecchymoses are due to extravasations of blood from a small vessel into the surrounding cellular tissue, and chiefly follow blows and contusions.

To pack the rectum for hæmorrhage a piece of gauze or lint is inserted, pressure being applied at the centre, so as to make a sort of bag which is packed with cotton, strips of gauze, or compressed sponges, the ends of the bag being allowed to project from the anal orifice. Within the sphincter the rectum forms quite a large natural pouch, which requires a considerable mass to fill it. This arrangement of the packing makes its removal easy when it is no longer needed.

Uterine hæmorrhage may occur from many causes—*e. g.* during pregnancy or after delivery, in various pelvic diseases, or as a consequence of operations. Those occurring previous to labor are called ante-partum hæmorrhages. The patient should be at once put to bed, kept perfectly quiet, and the physician sent for. Post-partum hæmorrhage will be considered in the chapter on Obstetrics.

Hæmorrhage from the genital tract after gynæcological operations may usually be controlled at once by packing the vagina. Strips of gauze are prepared, the necessary instruments are sterilized, and the packing is done by the surgeon: until his arrival the nurse may give hot douches, as hot as 115° to 120° F.; the foot of the bed is to be elevated, and the patient kept quiet. If the bleeding be profuse and the services of a physician cannot be obtained, no valuable time should be lost, and the nurse must undertake the packing herself.

When a patient has fainted after a profuse hæmorrhage, the head is to be lowered, but no stimulants or hypodermics are to be given without a direct order from the surgeon, since they increase the force and frequency of the heart's beat and tend to dislodge the clots, which may be forming at the mouth of the bleeding vessels. In rare instances, and where there is danger of collapse, the surgeon may think it best to order stimulants as being the lesser of two evils.

Arterial hæmorrhage, as we said, is best arrested by pressure or by ligature. If the artery is imbedded deeply in the tissues and cannot be reached with the fingers, a graduated compress of gauze or lint is packed firmly into the wound and held in place by a bandage. The amount of hæmorrhage from an artery will depend upon its size and the manner in which it has been cut. An incised wound or one caused by a sharp instrument bleeds more than one made with a blunt instrument, where we have a contused or lacerated wound, because the ragged edges of the torn artery and surrounding tissues retard the escape of the blood, so that clots tend to form more quickly.

To be able to control hæmorrhage from arteries by pressure it is necessary to know the location of the principal arteries and how to reach them. The student nurse is expected to familiarize herself with the larger arteries during her study of anatomy, and with the manner of compressing them: the latter can only be learned by practising the methods after they have been demonstrated.

Venous hæmorrhage is arrested by pressure below the wound—that is, on the side distant from the heart. Large veins, like the jugular, should be compressed both above and below the wound. This is necessary for two reasons: first, because the vein may bleed from both ends; and secondly, because (what is held by many to be even more dangerous) air may enter at the proximal end and cause sudden death. Unless it be a large vessel which has been ruptured, the danger from a bleeding vein is not so alarming as that from the rupture of an artery of the same size, and compression will usually suffice to check the hæmorrhage. When varicose veins of the leg rupture, the limb should be elevated in addition to making compression.

To control bleeding from the capillaries the wound should be exposed to the air, the part, if possible, elevated, and compression made. This is not a dangerous form of bleeding, but is sometimes troublesome to control.

A hæmorrhagic diathesis is a predisposition to hæmorrhage caused by an abnormality in the structure of the walls of the vessels: in persons who have inherited this abnormality, the slightest wound may result in fatal bleeding. Sometimes one will see whole families of these "bleeders."

Nurses may meet with bleeding from the umbilicus in new-born infants: powdered perchloride of iron or alum may be applied.

Internal hæmorrhages may result from various causes: the most common ones are those from the lungs, stomach, intestines, and pelvic organs.

The blood in hæmoptysis, or bleeding from the lungs, is characterized by its bright-red color and the frothy appearance which it has from being mixed with air-bubbles; a spasm of coughing usually precedes it. If the bleeding is slight, there may be some doubt whether it is from the lungs or not, since it may have come from the mouth or throat. This symptom is always more or less grave, but unless large blood-vessels are involved it is not necessarily dangerous. The patient should at once be placed in the recumbent position and kept perfectly quiet and free from excitement. Small pieces of cracked ice may be swallowed whole or allowed to dissolve in the mouth, and a light ice-bag should be laid over the chest. The patient must be warned not to speak or to attempt to swallow food, since even these movements may increase the hæmorrhage. The physician should be called at once, and he will probably, if the hæmorrhage be marked, order a dose of morphine.

Hæmatemesis means the vomiting of blood. The blood is generally dark red in color, often resembling coffee-grounds, and is mixed with particles of food. The patient should lie down and keep quiet; if the bleeding continue, bits of ice may be given, and ice-water compresses or an ice-bag applied over the stomach. The nurse should try and make sure that the blood has not originally come from the nose and been swallowed and afterward vomited.

Hæmorrhage from the intestines, or *enterorrhagia*, may come from various causes, frequently from ulceration of the coats of the intestine, as in typhoid fever, in dysentery, acute or chronic, from internal hæmorrhoids, or from carcinoma of the intestine. Cold in the form of cold-water injections or a piece of ice introduced into the rectum, ice-cloths or an ice-bag applied to the abdomen, are sometimes ordered, with elevation of the foot of the bed and perfect rest. Ergot is of no value, but the physician may order opium, not only to control the peristaltic action of the intestines, but to allay the pain (if any be present), and also quiet the fears of the patient.

CHAPTER XIX.

BANDAGES.—SURGICAL EMERGENCIES.—SHOCK.—FRACTURES.—DISLOCATIONS.—SPRAINS.—CONTUSIONS.—BURNS AND SCALDS.—FROST-BITE.—FOREIGN BODIES IN THE EYES, NOSE, EARS, AND LARYNX.

THE principles of bandaging, the variety of bandages, and indications for applying any particular form may be taught theoretically, but only a great deal of practice will enable a nurse to become expert in bandaging. A beginner must not set out with the idea that the first essential in applying a bandage is to have it look well. The chief points to be taken into consideration in bandaging are—

1. The object of the bandage;
2. The kind of bandage and the material of which it is made;
3. The part of the body to which it is to be applied;
4. The best method of applying it.

Bandages are used in surgery to keep dressings and applications in place, to make compression, to prevent motion, and to act as a support and protection. They are made of different materials according to the use to which they are put. For hospitals, the substances chiefly in use are surgical gauze, bleached or unbleached muslin, flannel, and rubber. For private practice it may be sometimes more convenient to use old linen or muslin. These bandages vary greatly in the matter of pliability: the unbleached muslin, for instance, is not so adjustable and does not lie so snugly as gauze or flannel, and therefore more skill is required to apply a muslin bandage, so that it will stay in place, and while being comfortable may also look well, than when gauze is employed. When we have a bandage to put on, we must always take into consideration the part of the body to be covered. This is important, not only because it will influence us in our choice of the bandage, but because we must always have some idea of the degree of pressure that will be comfortable, since some parts are more elastic than others. Any excessive tightness should be avoided, though allowance must be made for some loosening of the bandage later, caused by the moving about of the patient. The maintenance of an even pressure, sufficient firmness, and comfort should always be kept in mind. We shall stand convicted of a disregard of this rule if when a bandage is removed from an arm, for instance, the flesh of the arm lies here and there in little ridges separated by distances which just correspond to the width of the bandage; for the presence of these show that the compression has not been made evenly, and that the bandage has been in some places perhaps uncomfortably tight and in others too loose.

Bandages are classified as simple and compound, the former being made of one piece, the latter of two or more pieces. The roller bandage is made in six, eight, and twelve-yard lengths and of various widths. As gauze stretches more and is less bulky, bandages of this material should be made both wider and longer than the muslin bandages used for the same purpose.

The average widths of muslin bandages are about as follows:

For a finger, 1 inch;

For the arm or head, 2½ inches;

For the leg, 3 to 4 inches;

For the body, 6 to 8 inches.

Gauze bandages for the head, arm, or leg are made 3½ inches wide;

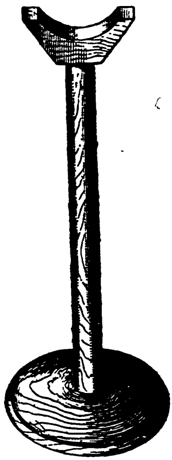
For the fingers, 1½ inches;

For the body or for large dressings, 6, 8, or 9 inches.

Muslin bandages are to be torn, and, the ravellings from the sides having been removed, are to be wound tightly and evenly either by hand or on a bandage roller. The end of a piece of muslin with the stamp of the maker in blue letters should never be used, unless it has been first washed, and a bandage should not be handed to the surgeon with ravellings of thread hanging from it. Some gauzes can be torn when wet, and rolled after they have been allowed to dry, but, as a rule, gauze bandages have to be cut. Usually a thread is drawn out as a guide to follow in cutting out each bandage, which is then rolled by itself; but where very many are used this procedure takes too long, and, although bandages made in this way do not look quite so neat, a broad piece of gauze may be rolled on a large roller and then cut with a sharp knife into the requisite widths. For the wider bandages, such as the 7-inch and 8-inch widths, and for those which must be wetted, and for plaster-of-Paris bandages, it has been found very convenient to roll them on small round hard-wood sticks about three-eighths of an inch in diameter: this prevents them from doubling up and makes them more easy to apply.

Flannel bandages when used to reduce swelling or œdema are best cut on the bias, as made in this way they will be more elastic and it will be possible to make firmer pressure. The rubber bandage is used to control hæmorrhage, for varicose veins, or for reducing swelling. For holding dressings or applications in place on a limb the simple roller is used, and should be put on firmly enough to prevent the dressing from slipping: the tension should be uniform throughout the course of the bandage. The spiral and *figure-of-8* are the forms used for bandaging the limbs. The bandage should always be put on from the extremity of the limb toward the trunk. It should be held firmly in one hand, and applied with the outer surface next to the skin, and as it is unwound the roller should be held close to the part. The bandaging of the leg of a patient who is sitting is much facilitated by using a heel-rest (Fig. 16).

FIG. 16.



HEEL-REST FOR BANDAGING.

The single and double recurrent bandage (or capeline) and the *figure-of-8* are used for the head. The Barton bandage is employed to keep the jaw in place. A recurrent bandage is also the one generally used for the stump after an amputation. For the axilla, shoulder, or groin the spica (either double or single) is used. For a fractured clavicle the Velpeau or

Desaults is employed. The *figure-of-8* is particularly adapted for applying to the breasts, and for the abdomen some modified form of the bandage of Scultetus is largely used. The T-bandage keeps dressings in place on the perineum. Bandages intended to prevent all motion are usually made of plaster of Paris, starch, or crinoline, and of these the plaster-of-Paris bandage is the most frequently used. To make plaster-of-Paris bandages it is necessary to have the plaster of an extra fine quality, without any lumps in it, and to select either crinoline or gauze, since the meshes of these substances are large, retain the plaster well, and are readily moistened. The dry plaster is to be spread evenly on the gauze with a knife and smoothed over it by means of a tightly-rolled flannel bandage, and as the plaster is rubbed in, the bandage is rolled loosely on a small round stick. When finished they are wrapped in paper, and kept in a tin box away from the air and moisture, though at best they are apt to deteriorate soon. Such bandages are much used in fracture cases. When they are to be applied, the limb is first bathed and powdered, then wrapped in folds of gauze, or, better still, covered with rolls of sheet cotton of a sufficient thickness to protect the skin from the plaster. Instead of gauze or sheet cotton cut into strips, a flannel bandage is sometimes used, but it is liable to be unpleasantly warm and may cause irritation. A basin of warm water, a can of plaster, salt, and large rubber sheets to protect the bed and floor, are required. The plaster bandages are put into the water and allowed to remain till the little bubbles of air cease to rise. This is a sign that they are thoroughly soaked, and they should now be wrung out moderately tightly. For the foot and leg the surgeons usually begin by putting on two 4-inch bandages, and then for the thicker parts of the leg and thigh two 6 inches and one 7 inches wide. After the bandages have been applied some plaster is stirred into the basin of water until the consistency is that of thick cream, and this is rubbed smoothly over the whole dressing. The addition of salt to the water in the proportion of about two drachms of salt to a quart of water will materially hasten the hardening of the plaster; but this is not always used, for frequently the difficulty is to keep the plaster from hardening too rapidly. When it is necessary to remove a plaster bandage it should be cut off with a stout sharp knife or scissors, and the process will be found less difficult if the line of incision from time to time be moistened with dilute hydrochloric acid from a medicine-dropper.

Crinoline bandages are used to keep dressings immovable: they should be rolled on sticks, wetted in warm water, and not too tightly wrung out, just before being used. To make them even stiffer, starch is sometimes incorporated into the crinoline. The starch should be boiled as for laundry use, the crinoline bandage dipped into it, wrung out, and applied. Such a bandage should be exposed to the air until dry: hot cans placed about it will hasten the process.

In addition to the spiral and *figure-of-8* bandages and their various modifications, we must speak of the triangular bandage, which is rarely employed in hospital practice except as a sling, but is very serviceable in surgical emergencies, as it can be more readily improvised than any other kind. Two opposite corners of a large square of strong muslin measuring a yard or 40 inches each way are brought together, and the square cut into two equal triangular pieces. These bandages are used for the same purposes as the roller bandage—namely, to keep dressings in place, to fix splints, and for protection and support. A large uncut handkerchief can be made to answer as well. The various methods of applying the triangular bandage are fully demonstrated in the ordinary books on bandaging.

Where small dressings are to be put on or applications are to be held in place, and a bandage would be too large or cumbersome, strips of rubber adhesive plaster are used. Splints on arms or legs are sometimes held in place by this means, and in cases of fractured ribs, where the movements of the injured side are to be restricted, straps of rubber plaster are applied halfway round the chest, thus dispensing with the necessity of having a bandage. The rubber adhesive plaster is very convenient, as it is always ready, and needs no special preparation beyond being torn into the required widths and lengths and then rolled on glass rods. When rubber plaster is to be removed, it should first be soaked with alcohol, which loosens it somewhat and renders the process less painful. Any remains of the rubber adhering to the skin can be easily washed off with alcohol or ether.

For practising bandaging the best opportunities are afforded by minor surgery cases in dispensary work, to which the nurses are usually detailed in turns as assistants. In connection with this, a good book on band-

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aging, in which the various steps are all carefully demonstrated, should be obtained, and the methods studied out and practised on fellow-nurses and patients until the requisite skill is acquired; but it must be remembered that it is not so necessary to keep to a prescribed figure as to have the bandage put on smoothly, firmly, and evenly.

Next to that of the physician, the presence of a trained nurse should be most valuable at the time of an emergency. While others are standing shocked and helpless, her presence of mind will not desert her, and she will at once suggest the right thing to do, and will proceed to do it in a cool and collected manner. The example she sets, in keeping her own nerves well under control, will go far toward steadying those about her and making them of some help to her. An emergency may be of greater or less importance: if it be only a minor accident, a nurse may be able to do all that is necessary for the time being, but in any case, except it be very trivial, medical aid should be summoned at once, and if possible this should be done in writing, so that the surgeon may know what to expect and may be enabled to save time by bringing with him whatever is necessary. So much will depend upon the nature of the emergency that only general rules can be given, and a nurse must be guided by these, together with the result of her own experience. If a hæmorrhage should be the worst symptom of an injury, it should be controlled at once before anything else is done, and if the patient is in a condition ~~of~~ shock, steps should be taken to revive him.

By "shock" we mean a general depression of the whole system produced in some obscure way which is at present imperfectly understood. This condition occurs after severe frights, accidents, and operations, or may be brought about by some strong emotion. "Collapse" and "prostration" are used to express similar conditions. Symptoms of shock should always be watched for after slight as well as after grave injuries. It is always the safest plan to keep a patient quiet for a time after any kind of injury, and the pulse should be taken at intervals, because sometimes changes in it may be recognized when no other symptoms are apparent. The symptoms to be looked for in shock are a weak, rapid pulse, a subnormal temperature, a cold skin, pallor, a pinched look of the face and about the lips, feeble or sighing respiration, and sometimes nausea. The patient must be placed with his head low, and stimulated by being enveloped in blankets, while hot-water bags, bottles, or cans are placed along his sides, between the legs, and to his feet, the effects of these being supplemented by friction and by the use of whiskey or brandy internally. If the patient is unconscious, these may be given hypodermically. When they can be administered by the mouth, a teaspoonful may be given in half an ounce of hot water every ten or fifteen minutes. Strong hot tea or coffee are also valuable stimulants. An electric battery should be ready for use, as a surgeon sometimes asks for it; and ether and a solution of strychnine may also be required.

If the injury be to the head, alcoholic stimulants are generally contraindicated, and should never be given without a special order.

Fractures.—Fractures are very frequent emergencies, but when unaccompanied by a wound they do not, as a rule, require the same degree of haste as cases of hæmorrhage. The first thing to be done is to place the fractured part in as comfortable a position as possible for the time being; then the clothing is gently removed, the seams being ripped rather than cut, beginning with the uninjured side first. A fractured limb must be handled as little as possible, as there is always danger of injuring the surrounding tissues or of lacerating blood-vessels with the sharp points or fragments of the broken ends. In lifting a fractured limb one should never take hold of it from above, but should slip the hands underneath, and, taking firm but gentle hold at two points a short distance from the fracture on each side, and all the while making slight extension with the hand on the distal side, so as to keep the ends from rubbing together, should lift with both hands at the same time slowly and evenly until the limb is in the position required.

Fractures may be recognized by the following signs, some of which, however, belong to dislocations as well:

1. Pain;
2. Inability of the patient to move the limb naturally;
3. Deformity or displacement, either seen or felt by passing the fingers over the seat of pain;
4. Crepitus, the grating sensation felt on rubbing the broken ends together;
5. Abnormal mobility in the course of a bone;
6. Swelling and discoloration.

Fractures are classified according to the nature and extent of the break and of the accompanying injuries. A fracture is said to be *simple* or *complete* where the entire continuity of the bone is severed with but little injury to the surrounding parts; it is called a *compound* fracture if not only the bone is broken, but a wound is made which extends from the seat of fracture to the outside. Such wounds may be caused by the injury itself or may occur secondarily from the protrusion of pieces of bone through the skin.

A *comminuted* fracture is one in which the bone is shattered into a number of fragments. The term *impacted fracture* signifies that the broken ends have been forcibly driven into one another, and are thus fixed.

Fractures may be *multiple*—*i. e.* where the bone is fractured at two or more different points or where different bones are broken.

A *complicated* fracture is one associated with a serious injury to some important adjacent part—*e. g.* a large vessel.

A *green-stick* or *incomplete* fracture occurs where the bone is soft and bends, and is only partially fractured; it is most frequent in children.

Fractures are also described as *transverse*, *oblique*, or *longitudinal* according to the direction of the break.

The process of repair of fractured bones, while not coming directly into a nurse's work, is one of very great interest. At the time of the fracture and for a little while after, much blood is poured out in close proximity to the injury; this subsequently coagulates, and forms a framework upon which new tissue-cells may grow and divide. New blood-vessels enter, line salts are deposited, and in a few days the so-called callus is formed. The quieter the ends of the bones are kept, the less will be the amount of callus. This first callus has for its chief function the keeping of the ends of the bones at perfect rest until they become firmly united. The union of bone requires from four to six weeks, and then the provisional callus becomes in part absorbed. Still, the injured part is somewhat weak, and is not to be depended upon too much, and care should be exercised for another month, while for the process to be thoroughly complete from six months to a year are needed.

In considering the treatment of fractures, we shall first speak of the care of the patient when he has to be moved some distance before the part can be properly attended to. The principal point to bear in mind is to keep the fractured part immovable, and in such a position that it may give as little pain to the patient as possible; and if this be done, there need be no hurry about having the fracture set at once. The limb should be supported with something stiff and smooth, such as thin, narrow pieces of board or shingles, stout pasteboard, or the bark of trees, padded with something soft, such as cotton, wool, hay, straw, or leaves, which can be held in place by triangular bandages made of handkerchiefs or by strips of linen, muslin, ribbon, or whatever is at hand. For the forearm two padded splints, long enough to take in the hand also, should be applied, one to the front and the other to the back of the limb, slight extension being made by pulling gently on the patient's hand. The splints should be tied on in two or three places, and the whole forearm suspended in a sling which should reach from the finger-tips to beyond the elbow. If it be the upper arm that is broken, it may be bound tightly to the side. For a fractured leg slight extension should be made from the foot, and the leg lifted on to a pillow which is tied firmly about it, or broad strips of wood may be padded and placed one on either side of the leg and tied securely. If the thigh is fractured, the splint should extend from under the arm to the ankle, being bound to the body and to the leg by means of long towels or pieces of sheeting applied at intervals.

For a fractured clavicle or collar-bone the patient is to be placed flat on the back, and when moving him a firm pad should be introduced into the axilla, and the arm bound to the side, with the forearm flexed across the chest: this will prevent the broken ends of the clavicle from rubbing together.

For fractured ribs a broad body bandage applied tightly, so as to prevent motion and deep breathing, is all that can be done besides keeping the patient quiet. The chief danger in the case of a fractured rib is that one of the sharp ends of the bone may pierce the pleura or the lung.

For a fractured jaw the teeth should be closed upon one another and a Barton bandage applied. Food should be given with a spoon or through a tube placed behind the last molar tooth.

Pott's and Colles' fractures are named after the surgeons who first described them. The Colles' fracture is a fracture of the lower end of the radius within about an inch of the wrist-joint. A Pott's fracture is one in which the fibula is broken about an inch and a half above the malleolus. It is accompanied by a turning of the foot outward, owing either to rupture of the internal lateral ligament or to the breaking off of the tip of the internal malleolus.

Fractures of the skull are dangerous in proportion to the injury to the brain resulting from them, and cerebral symptoms should be watched for. Little can be done by the nurse except to keep the patient in a quiet, dark room, with cold applications to the head: no stimulants are to be administered, but the surgeon should be sent for at once.

The wound of a compound fracture must be treated antiseptically. If there be much swelling about a fracture, to reduce it lead-and-opium lotion or fomentations are sometimes ordered. After the swelling has subsided, a permanent dressing is usually put on. Before applying this dressing the bones are placed in the normal position by manipulation, and displacement is prevented by rendering the parts immovable.

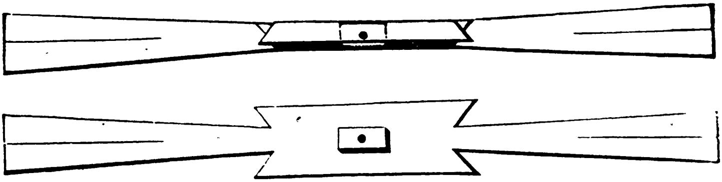
To be able properly to assist the surgeon in the putting up of fractures, the nurse must be familiar with the necessary appliances, including splints and the different kinds of apparatus for making extension. Splints are made of many different materials. Wood and plaster are considered the best and are most generally used, although for certain cases leather, wire, or splints made of hard rubber are better.

Wooden splints are made of varying thicknesses and sizes; white pine, poplar, and willow are best adapted for this purpose. Before being used, the splint should be well padded with cotton-wool, or layers of gauze may be strapped to it in two or three places with strips of adhesive plaster. The splints should be long enough to include the joints above and below the fracture, and are held in place with bandages, which in turn are frequently covered by one made of crinoline. Splints are spoken of as anterior, posterior, and lateral; we have also straight, angular, and curved splints.

Whalebone or strips of gutta-percha of varying widths are sometimes padded and placed in dressings to give them additional firmness and strength.

For fractures of the leg between the knee and ankle the plaster-of-Paris splint is used very often as a permanent dressing. For fractures of the femur it is generally necessary to employ some means by which constant traction upon the leg can be kept up, in order to overcome the contraction of the muscles, which tends to displace the two ends of the fractured bone. One means of applying this is by the use of Buck's extension apparatus, of which several modifications have been introduced. The materials required for this extension are moleskin adhesive straps, bandages, a modified Volkmann slide, the combined bed-cradle with pulleys, weights, and blocks for elevating the foot of the bed, so as to obtain counter-extension by utilizing the body-weight. These appliances the nurse should have ready when the surgeon comes to put up the fracture. The straps should be cut as in Fig. 17, and slipped through the small cross-bar of wood; each strap should be two inches wide, and long enough to extend up the side of the leg and to include at least the lower third of the thigh. The entire limb should also be prepared by being shaved and freshly bathed. The straps may be heated for application by holding them over an alcohol flame or by pressing the

FIG. 17.



ADHESIVE STRAPS FOR BUCK'S EXTENSION.

non-adhesive side of the strapping against a hot-water can just before they are to be used.

Where the movement of a limb is to be restricted, sand-bags are used: they are made of ticking of different lengths and covered with rubber sheeting.

Dislocations.—A dislocation is the displacement of one or more of the bones of a joint. A dislocation may be simple, complete, compound, or complicated.

A *simple* dislocation is one in which displacement has taken place, with a minimum of injury to the surrounding tissues.

It is *complete* where the bones which enter into the formation of the joint are entirely separated from each other.

In a *compound* dislocation the tissues and skin are torn apart, as in compound fractures. Besides these, the terms *recent* and *old* are used; in the latter, inflammatory changes have, as a rule, taken place, which interfere with reduction. A dislocated joint will present a deformed appearance, and the displaced bone will form a projection near by. Dislocations are very painful accidents, and in most cases there is little that a nurse can do beyond supporting the part and applying cold applications to keep the inflammation in check until the surgeon arrives. Simple dislocations are usually reduced by manipulation or by extension; where there is much muscular resistance, chloroform or ether is given to complete anæsthesia. When a dislocation has been reduced, the part should be supported with bandages until the relaxed or torn ligaments become firm and strong again. A dislocated jaw may be reduced by protecting the thumbs well, and then placing them in the mouth on the lower molar teeth on each side, and pressing firmly downward and backward, when the bones will slip into place.

Sprains or wrenches of joints are caused by a twist or by a blow which may be direct or indirect; the injury consists in the rupture of a greater or less number of the fibres of the ligaments. The symptoms are severe pain, inability to use the joint, discoloration from effusion of blood, and swelling.

For minor sprains the treatment consists in giving rest to prevent increase of the inflammation, and in the use of hot applications, friction, and a firm bandage. Where there is not much swelling a plaster-of-Paris bandage is sometimes applied in order to secure absolute rest. Lead-and-opium lotion is frequently ordered. Gauze may be soaked in it and applied to the part being covered with oiled silk to prevent evaporation.

Strictly speaking, a scald is an injury to the tissues produced by contact with moist heat, whereas a burn is caused by dry heat. Burns are classified as of the first, second, and third degree respectively, according to the depth to which the tissues are involved. This classification, however, does not teach us much, as a burn of any degree may prove fatal through shock if a large surface of the body has been injured. A superficial burn, for instance, involving a third of the body, more especially if the patient be a young child, will almost certainly prove fatal, while a very deep burn, provided it be localized, may not be so serious, unless important nerves or vessels have been destroyed. Where symptoms of shock are present, constitutional treatment should at once be instituted, as the danger to life is great.

A burn of the first degree is one in which only the superficial layer of the skin is reddened with slight vesication; burns of the second degree extend through the true skin; while in those of the third degree the injury goes beyond the subcutaneous and involves the deeper tissues.

After treatment of the shock, the next important thing to remember is to *exclude the air*, as this will tend much to allay the pain. In superficial burns, where the skin is not broken, bicarbonate of soda in powder should be sprinkled thickly over the burn, the part wrapped in moist gauze, lint, or linen, over which a layer of common cotton is applied and held in place with a bandage. Flour may be used instead of the bicarbonate of soda. These two remedies are easily obtained, and are efficient. The objection to powder of any kind where the skin is broken is that it forms into hard cakes and is difficult to remove. Applications in liquid form are therefore better, or gutta-percha tissue, perforated here and there, may first be laid over the burn, and then over this a layer of cotton, which can be kept in place by a bandage or by a coating of celloidin or collodion. If there are vesicles, they should be snipped open with sharp scissors or knife at the lower edge, and the fluid absorbed with gauze or cotton sponges; gauze or lint pads may then be wrung out of a saturated solution of bicarbonate of soda or boracic acid and applied. The various oily dressings most frequently used are Carron oil, ointments of zinc oxide, bismuth, or boracic acid, and simple or carbolized sweet oil. The ointments are best spread on sheets of lint or protective, and changed before the odor becomes offensive. Carron oil, which is made of equal parts of lime-water and linseed oil, becomes exceedingly disagreeable, and the oil in it stains the bed-linen. It is not so much in vogue as formerly. To prevent deformities from contraction, splints and bandages are used. Where the burn heals by granulation, if the granulations become exuberant and we have the so-called "proud flesh," they may be touched with a stick of nitrate of silver.

The system should be supported by a liberal light diet, particularly where there is much discharge. In connection with burns there may be brain disturbances, as delirium or a meningitis; pneumonia and bronchitis are also complications to be watched for, and inflammation or ulceration of the intestines, particularly of the duodenum, is not uncommon. The fæces should be examined, especially if there be any pain in the abdomen. When the air-passages have been scalded by steam or hot liquids, the result is generally serious; the steam from lime-water, not too hot, may be inhaled to soothe the injured tissues.

In Germany continuous warm-water baths are now being used with very good results where the deep tissues are involved and sloughs and charred material are to be removed. Where convenient, we may begin with a warm tub-bath, with boracic powder added to the water, which is excellent for its stimulating effects, for relieving the pain, and for cleansing the surfaces before applying dressings.

For burns from acids, plenty of water is poured over the surface to dilute the acid and thus render its action less harmful. Alkaline solutions are applied, and the main treatment is like that of other burns.

The nurse may meet with cases of severe exhaustion due to exposure to intense cold. The symptoms are something like those of the later stages of intoxication from stimulants. An intense drowsiness may result in coma, from which the patient never awakens. In a case of frost-bite the vitality may be only partially destroyed. The patient should be kept in a cold atmosphere or put into a cold bath, and the part rubbed with snow or ice until sensation is felt and the color returns: the rubbing is then discontinued and ice-water compresses are applied. Stimulants, brandy, coffee, and hot drinks, are given, but external heat is only gradually permitted, since the restoration of the circulation can only come about very slowly in the frost-bitten parts, and in trying to hasten it too much we run the risk of producing, or at any rate increasing the tendency to, gangrene of the tissues.

Foreign bodies in the nose are seldom found except in children, and consist of buttons, stones, or anything small and round that they can push in: they are not generally dangerous, although they are apt to produce inflammation if not removed at once. Peas or beans become enlarged after a short time by imbibition of water, and cause pain by pressure. It will probably be necessary to call in a surgeon, but simple means may first be resorted to, such as making the child sneeze, or by telling it to take a breath and then to close the empty nostril and mouth tightly and force the air out through the obstructed nostril. If these means do not dislodge the object, a small piece of wire may be looped around it or it may be syringed out.

Foreign bodies between the eyeball and one of the lids will cause a great deal of irritation, and in fact will soon set up inflammation. If the particle be sharp, like a sliver of glass or steel, it may become lodged upon the surface of the eyeball, and can only be extracted by a surgeon; but when it moves loosely under the upper lid, as a rule, it may be removed by taking the upper lid between the thumb and index finger and drawing it well down over the lower lid, pressing it there for a moment, and then letting it slide back: the particle will generally be left on the cheek. If not successful the first time, the procedure may be repeated, or the upper lid may be everted by turning it up over a pencil or any small rod and exposing the inner surface, when the object may be seen and wiped off with soft linen or a camel's-hair pencil. Any irritation may be allayed by dropping in a few drops of a solution of boracic acid; with children a few drops of a 1 per cent. solution of cocaïne are used to prevent them from shrinking during the process of extraction.

Another place into which foreign bodies find their way is the external ear. They should be removed at once, as they are liable to cause inflammation. If a physician cannot be found at once, the nurse may attempt the removal by syringing out the ear, but unless she has had a great deal of experience she should never use a probe or forceps, since special skill is required in these manipulations lest the tympanum be injured or the object be pushed in still farther. If an insect should become lodged in the ear, a piece of cotton-wool should be saturated in a strong solution of salt or vinegar and the opening completely filled with it. The patient should then lie on the ear with the cotton in it, at the same time pressing the hand firmly over it: the plug may be withdrawn after a short time, when the insect will probably be found on the cotton. Another way is to place the patient on the other side, with the affected side upward: the tip of the ear is drawn up to straighten the tube, and then warmed oil is poured in, when the insect will probably float on the surface of the oil. To syringe out the ear the patient holds the ear downward and the water is allowed to run in very gently, being directed toward the upper and posterior part of the canal.

Just here earache may be mentioned, as it is of frequent occurrence in children, and is an ailment that may be met with among adults. Heat will usually relieve the pain, and may be applied in the form of hot hops or salt-bags or hot flannels, or by means of a little device called a "Japanese hot-box."

An obstruction in the throat is not very easily removed. The first efforts usually made are to try to dislodge the object by striking the patient forcibly between the shoulders with the palm of the hand, or the patient may be inverted, head downward, and the slapping repeated. If the object is in the œsophagus or gullet, a drink of water or a swallow of bread may push it down. If not too far down in the throat, an attempt to remove it with finger, forceps, or umbrella probang will probably be made. Anything in the air-passages may be coughed up. Fish-bones, if imbedded in the mucous membrane, must be removed with instruments by the surgeon. Even when a pin or bone has been swallowed, it may have scratched the mucous membrane on its way down, and may leave the patient with a sensation which makes him believe that the foreign body is still present in the throat, so that even after a careful laryngoscopic examination has proved its absence he may still decline to be convinced that it has been gotten rid of.

If any hard foreign substance has been swallowed, it is best to let it alone, as it will be carried through the alimentary canal. For anything sharp, such as a pin or a piece of glass, purgatives should not be given, but, instead, the patient should be made to eat solid foods, in which the object may become imbedded and be carried off without injuring or perforating the coats of the intestines.

CHAPTER XX.

MEDICAL EMERGENCIES.—ARTIFICIAL RESPIRATION.—DROWNING.—POISONS.—MEDICAL APPLIANCES.—MEDICAL ROUNDS.

UNDER the head of medical emergencies may be classed conditions of unconsciousness, such as syncope, hysterical, epileptic, and apoplectic attacks, acute alcoholism, sun-stroke, drowning, and poisoning.

Syncope, or unconsciousness, is often seen in a mild form, in what is commonly called a "fainting fit." The condition is generally due to some disturbance in the circulation, and often follows a transient anæmia of the brain. It comes on suddenly as a rule, and is not a serious condition unless the attacks are often repeated, in which case one would suspect the existence of some disease of the heart or blood-vessels. The patient should be put in the recumbent position, with the head lower than the rest of the body, so that the blood may flow more quickly to the brain: this, in addition to loosening the clothes about the neck and upper part of the body and allowing the free access of pure air, is usually sufficient. The respiratory movements may be stimulated to action by holding for a few seconds aqua ammonia or some smelling salts near the nose, although here we must warn against the danger of holding strong ammonia too close to the nostrils of an unconscious patient. If recovery does not almost immediately take place, external warmth should be applied and medical aid sent for.

Care should be taken not to confuse fainting with that form of hysteria in which the patient lies apparently unconscious: the latter may be recognized in that the pulse-rate will be normal, and if an attempt is made to raise the eyelid the patient will resist and close it again; the body will feel warm, and there will be little if any change in the color of the face. For hysterical patients it is best to remain with them while the attacks last, but to leave them undisturbed until they recover.

Epilepsy is another form of unconsciousness which may be mistaken for hysteria. Epilepsy should properly be discussed under nervous diseases, as it has its origin in the brain. Since it is of such frequent occurrence, and may come on at any time or place, one may be almost certain of somewhere being confronted with a case, and it is very necessary to know what to do and what not to do for the sufferer. The attack is characterized by well-defined symptoms: the patient, sometimes after uttering a peculiar cry, but often without giving the slightest indication to the bystanders that anything is wrong, suddenly falls to the ground, where he lies unconscious. The muscles become rigid (tonic spasm), the eyes are fixed, and the pupils often dilated. In some but not in all cases there is frothing at the mouth. After a few seconds the muscles become relaxed, and the tonic spasm is followed by twitchings and jerkings of the whole body (clonic spasm). The attack lasts only three or four minutes, after which the patient either becomes completely conscious, or on coming to seems drowsy and goes off into a deep sleep. The only relief that an on-looker can give is to place the patient on his back with the head slightly raised, loosen any tight clothes, and see that he does not hurt himself: he should be allowed a free supply of air, and something should be placed between the teeth to keep him from biting his tongue. A piece of lead pencil or wood wrapped in a handkerchief can always be obtained, and will serve every purpose. No attempt should be made to stop the movements.

The so-called *apoplectic fit* is usually caused by hæmorrhage into the brain-substance. A person suddenly or after some slight premonition falls and becomes unconscious, the face takes on a deep purplish flush or grayish-pale color, the pulse is full and slow, and the breathing stertorous. The patient should be put in a semi-recumbent position, all tight clothing should be loosened, especially about the neck, and cold applications should be made to the head, while dry heat in some form is applied to the trunk and extremities. Stimulants must not be given, and the room should be kept cool, dark, and quiet.

Owing to the flushed face and unconscious condition which occur in both, apoplexy and the stupor of *alcoholic intoxication* may easily be confounded. In intoxication, however, the alcoholic odor of the breath may be a guide; the pupils are more often dilated evenly, and the patient can often be partially aroused from the condition of stupor, although he may sink again into it at once. In acute alcoholism an emetic may be given, and after he has vomited freely the patient may be turned on his side and left to sleep off the effects. A nurse must never take the responsibility of these cases upon herself, as a condition of coma not unfrequently simulates so closely that of alcoholism that even physicians of wide experience may be unable to decide at first as to the correct diagnosis. This is more particularly true in cases in which no history of the onset of the attack is obtainable. Many of the cases which die suddenly, and for years back have been classified as instances of sudden death from heart disease or apoplexy, have now been shown to be due to diseases of the coronary arteries of the heart.

By *coma* is meant a condition of deep unconsciousness. It may be due to any one of many various causes; thus we may have a uræmic, a diabetic, and a post-epileptic coma.

Sunstroke, or insolation, as the name indicates, sometimes results from prolonged exposure to the sun's rays, but it more often comes on not from any direct exposure, but from staying too long in a continuously high temperature. There are two forms—one in which the temperature is high, and the other in which it is subnormal. Cases in which there is no elevation of temperature are classified under the head of "heat exhaustion."

In sunstroke, or thermic fever, the patient has an extremely high temperature, from 106° to 110° F., or even higher. He is unconscious, the face is deeply flushed, and the breathing deep and labored. The first thing to do is to reduce the excessive temperature, which should be done in hospitals by immersing the patient at once in a cold tub-bath at 70° F., while iced compresses are applied to the head, or he may be stretched on a bed covered with a long rubber sheet and freely sponged with ice-water and rubbed over with ice. If in a tent, the patient may be placed on the ground and water from a hose or pails poured over him, care being always taken to make sure that the head is kept quite cool and wet.

In heat exhaustion the symptoms may be quite the opposite, and resemble more those seen in a condition of shock: the temperature is subnormal, the pulse small and rapid, the extremities cold, and consciousness may be entirely lost. Stimulants are given until the pulse improves, the patient being kept quiet and in a dark room.

Artificial respiration is resorted to when a patient has ceased to breathe, and the employment of mechanical means promises a restoration of the act of respiration. In asphyxia from chloroform, in narcotic poisonings, and suffocation from gases, with the newborn infant, and in cases of drowning, it is often necessary.

Sylvester's method is considered the best. The patient is placed on his back with a pad just under the shoulders to assist in the expansion of the chest-walls; the tongue must be caught with forceps and drawn out, the forceps being left on to prevent it from slipping back, or after being drawn out it may be held in place by a dry handkerchief or strip of cloth tied to it, the ends of which are crossed at the back of the neck, brought around, and fastened under the chin. The operator stands or kneels at the head, and, grasping the forearms at a point about halfway between the elbow and the wrist, carries the arms steadily over the patient's head until the hands touch behind. By these means the chest-cavity is expanded. After being held there for two seconds, until sufficient air has entered the lungs, the arms are carried back and pressed against the sides of the chest in order to expel the air; after an interval of a few seconds the process is repeated. This is continued, the movements being made steadily and slowly at the rate of sixteen to the minute, corresponding to the number of normal respirations. Much perseverance is necessary, as we may often have to work for two hours or more before any signs of life or breathing become visible. It is to be remembered that there is always a tendency to perform the movements altogether too rapidly.

Marshall Hall's method is to roll the patient over on his face and make gentle pressure on the back in order to expel the air from the lungs. In order that it may enter them, he is rolled over on his side and these movements repeated at the same rate as in Sylvester's method.

To restore a person who is apparently drowned, one must lose no time, but begin at once by removing the clothes as far as the waist. The mouth is pressed open, wiped out, and the back of the throat cleared of any mucus that may have collected there. The patient is next turned with his face downward, the abdomen being allowed to rest on a folded coat or shawl or over the knee of the operator, and pressure is made on both sides of the thorax, so that any water which may have entered the air-passages may be forced out. When this has been accomplished, the patient is again turned on his back and artificial respiration started. In the mean time some one should have been sent for stimulants and blankets. Hot and cold water alternately dashed on the chest may assist in exciting the respiratory movements. As soon as possible the patient should be enveloped in blankets and surrounded with hot cans, and even after he has begun to breathe fairly well he must still be watched until there is no further danger of the respiration again ceasing.

Poisons, as the term is popularly understood, are substances which when taken into the body in small quantities endanger or terminate life. They may be taken accidentally or with suicidal intent, and it is usually under such circumstances that a nurse is called upon to act with promptness in order to counteract or check the action of the poison. If a poison have been administered by accident in the presence of a nurse, she should relieve her patient, as far as possible, from anxiety or nervous shock by making any necessary statement as little alarming as possible, and by taking prompt steps to remedy the evil. A physician should at once be sent for, and in the mean time, according to the nature of the poison, remedies may be administered which act either by removing the substance or by preventing or counteracting the action of the poison. Such remedies are termed antidotes. An antidote may act in one of three ways: *mechanically*, by preventing absorption or by emptying the stomach; *chemically*, where one substance, combining with another, produces a comparatively harmless third substance; or *physiologically*, where the substance administered counteracts the effects of the poison upon the system. When one has to act upon general principles without knowing what the poison is, an emetic is perhaps the best thing to give first. An emetic which can nearly always be obtained in a moment is mustard and warm water. For an adult half an ounce, and for a child two drachms, of mustard to a cup of water may be given, and the draught repeated every ten or fifteen minutes until free vomiting is produced. Salt and warm water may be used in the same way, or vomiting may be produced reflexly by tickling the pharynx with the index finger.

The other common emetics ordered are—sulphate of zinc (10 to 20 grs.) in a cup of water, repeated every fifteen minutes; powdered ipecacuanha (15 to 30 grs.) or fl. ext. ipecac (15 to 30 mins.).

The washing out of the stomach may sometimes be the quickest and best thing to do if the patient is not insensible or if the mucous membranes have not been too much injured by the action of the poison.

Poisons may be divided, according to their action, into corrosives, irritants, narcotics, and narcotico-irritants.

A *corrosive* poison is one that is likely to eat or burn through organic tissue instantly, while an irritant poison is one which acts more slowly upon the tissues, producing inflammation which may result in suppuration and perforation.

For these violent poisons the antidote should be one which will act chemically upon the poison, either rendering it harmless or at least reducing the violence of its action. An emetic is, as a rule, not indicated, the action of sulphuric acid, for instance, being usually so rapid that the tissues would be injured long before an emetic could be given, and the latter would only add to the irritation. The stomach-pump should not be used, as its introduction may assist in the destruction of the mucous membrane and produce perforation. Demulcent drinks (mucilage) may be given, and if possible some chemical antidote.

In the after-care of patients suffering from poisoning from irritants, great care should be taken with regard to the diet; only the soft, non-irritating foods should be given, such as finely-strained gruels, milk-porridge, egg albumen, etc.

In narcotic or narcotico-irritant poisoning the action is systemic, and the antidote may be a combination of all three forms.

Below we have tabulated some of the more important poisons, together with the treatment to be followed when they have been taken into the stomach:

Corrosive Poisons:		*Immediate Treatment.*
The Acids	Acetic. Citric. Hydrochloric. Nitric. Oxalic. Sulphuric.	Give magnesia mixed with milk or water, chalk-powder, or an alkali, such as soda, diluted, followed by mucilaginous drinks.
	Carbolic acid.	Give lime-water and milk or syrup of lime. No oil, as it aid absorptions.
The Alkalies.	Ammonia. Caustic potash or soda. Potassium nitrate (saltpetre). Calcium (lime).	For any alkali give a mild acid, such as vinegar or lemon-juice, carbolic acid mixed with water, sour cider. With fixed oils, such as sweet oil or castor oil, the alkalies form emulsions. Bland drinks, albumen, etc.

Irritants:

Antimony	Tartar emetic. Wine of antimony. Syrup of squills.	Produce emesis. Give as antidote tannic acid or very strong tea. Follow with demulcent drinks.
Arsenic	Fowler's solution. Paris green. Rough on Rats. Arsenious acid.	Give an emetic of mustard and water. The antidote is the hydrated sesquioxide of iron, made freshly by adding a sufficient quantity of aqua ammonia or of a solution of carbonate of soda to the tincture of iron to form a heavy red precipitate. Strain and wash the precipitate and stir it in milk or water, and give freely and frequently.
Mercury (hydrargyrum).	Bichloride of mercury (corrosive sublimate). Calomel. Blue mass.	Albumen (white of egg) is a chemical antidote, one egg to 4 gr. of the mercury. Milk may also be given and then flour paste. Vomiting is to be induced after the antidote has been given.
Iodine	Tincture of iodine.	Starch or flour, mixed into a paste with water, should be given, and be followed later by an emetic.
Iron	Tincture. Syrup of the iodide. Monsel's solution of the subsulphate.	Antidote, magnesia. Plenty of water to drink. Produce emesis.
Lead	Acetate of lead (sugar of lead).	Antidote, sulphate of soda or of magnesium (Epsom salts), or white of egg or milk. Use emetics or stomach-pump.
Phosphorus	Matches. Phosphide of zinc. Pill. Various kinds of hypophosphites.	Wash out the stomach in recent cases. As an emetic sulphate of copper answers well. Oil must never be given, as it dissolves phosphorus and hastens its absorption.
Gases	Carbonic oxide gas (illuminating gas). Chlorine.	Fresh air. Artificial respiration. Stimulants.

Narcotics and Narcotico-irritants:

Aconite	Fluid extract. Tincture.	Emetics or stomach-pump, external and internal stimulation; atropine or digitalis.
Alcohol	Brandy. Whiskey. Wines, etc.	Stomach-tube, cold applications to head, heat to extremities, inhalation of ammonia (cautiously).
Belladonna	Tincture. Fluid extract. Atropine (alkaloid).	Emetics or stomach-tube, tannic acid, and morphine. Artificial respiration, heat.
Digitalis	Tincture. Fluid extract.	Emetics, tannic acid in large quantities. Hot external applications.
Chloral	Chloral hydrate. Croton chloral.	Wash out the stomach with tea or coffee. Alcoholic stimulants. Artificial respiration. External heat, mustard plasters, mustard foot-bath, etc.
Hyoscyamus.	Tincture. Extract. Sulphate of hyoscyamine.	Same treatment as for belladonna-poisoning. Fresh air. Cold-water affusions.
Chloroform		Artificial respiration. Stimulants. Strychnine hypodermically. Counter-irritants.
Nicotine	Alkaloid of tobacco.	Prompt emetics. Tannic acid. Artificial respiration.
Nux vomica	Tincture. Fluid extract. Strychnine.	Emetics. Tannic acid or tincture of iodine. Morphine or chloral for the convulsions.
Opium	Laudanum. Paregoric. McMunn's elixir. Morphine (alkaloid).	Emetics, such as sulphate of zinc or mustard. The stomach-tube. Cold-water affusions. Strong black coffee by mouth and rectum. Artificial respiration. Keep the patient awake.

Poisoning may also follow the use of certain kinds of mushrooms, tainted meats, fish, cheese, milk, and ice-cream. In such case prompt emetics, followed by purgatives and stimulants, internal and external, should be employed.

Except in the case of mushrooms the poisonous properties of these substances are often the result of bacterial growth.

For medical nursing but few appliances are needed in proportion to those required in surgery; still, there are certain things which are necessary and which should be kept on hand ready for use.

The same conveniences for applying heat externally, such as hot cans and bags, with their canton-flannel covers, are required. Pneumonia cotton-jackets, flannels with oiled-silk covers for stupes, should be kept made up, since they may be needed at any moment.

An *auscultation towel* should be a yard square, and made of cambric or Victoria lawn or of some other thin white material: it is used by the physician during the examination of the heart or lungs when he wishes to listen with his ear directly against the patient's body. It should be thrown by the nurse over the patient's face and chest. When laundried no starch is used, as it must be soft and noiseless.

Cupping-glasses, an aspirator, one or more stomach-tubes, and catheters should be included among the permanent ward supplies.

The *aspirator* is an instrument used to withdraw serous or other fluids from the pleural or abdominal cavity; by means of it suction is possible without the introduction of air.

In preparing for aspiration the needle should be sterilized in the same way as that of a hypodermic syringe, and the part of the body where the needle is to be introduced washed off first with bichloride solution, and afterward with absolute alcohol. Besides these, there must be a basin of carbolic-acid solution, towels and sponges, a hypodermic syringe, a solution of cocaïne, stimulants, and, if the amount to be drawn off is very large, an extra receiving vessel should be ready. A small dressing of absorbent cotton and celloidin will be necessary for application after the operation.

If a patient is to be tapped for ascites, a rubber sheet and an abdominal bandage will also be needed.

For venesection the same antiseptic precautions are taken as in aspiration, and in addition to the things mentioned above, artery forceps, dressing forceps, scalpel, scissors, needles, and ligatures (all sterilized) must be ready. The dressing necessary for a minor operation will also be required.

In some diseases *lavage* of the stomach is ordered: a long rubber stomach-tube is used and the stomach washed out with lukewarm water or a warm boric-acid solution. The tube is inserted as far as the back of the pharynx, and, the patient being told to swallow, is passed down the œsophagus, its extremity having been previously dipped in water or oil. The mouth of the tube is slightly elevated, and half a pint of the irrigating fluid poured gently in through a funnel. The outer end of the tube is to be lowered before all the fluid has run into the stomach, and in this way the gastric contents may be siphoned off into a basin. The process is repeated until the washings become clear. After the stomach has been thoroughly cleansed, nourishing food is sometimes introduced through the stomach-tube. This latter procedure is known as *gavage*.

On medical morning rounds the head nurse should always have with her the book containing the night report, an auscultation towel, a tongue-depressor, a measuring-tape, and a thermometer. She should anticipate as far as possible anything that may be asked for, and be prepared to answer questions regarding any of the patients under her charge.

CHAPTER XXI.

DIET.

THE importance of diet and its application to the needs of the system, whether in health or disease, can hardly be overrated, and to properly appreciate it one should have at least a general idea of the constituents of the different varieties of food. The doctor orders what food a patient shall have, but the nurse has much to do with its preparation and administration. It is unfortunate that so few nurses understand anything about food-composition and the principles underlying food-preparation, since for invalids these are of paramount importance. In hospitals it not infrequently obtains in the nurse's mind that if any one part of her duties may be neglected, it ~~is~~ the attention given at meal-time. It is pretty well understood among nurses that medicines are to be given promptly at the time they are ordered, and any neglect of this duty is considered a grave misdemeanor; but it has not yet become clear to all women who nurse in hospitals that it is equally important that the patient's food should be given at stated intervals, in correct proportions, and in an inviting form. Fresh air, pleasant surroundings, and good food will do much toward restoring health or improving a patient's condition; and with these a nurse has much to do. In the free wards of hospitals it is not an uncommon thing to leave the distribution of the food to the ward maid, with but a very hasty or superficial supervision on the part of the nurse; the result is that an overloaded plate of food of various kinds may be carried to a patient who has not even the appetite or inclination for the daintiest morsel; the plate is put down and left during the time prescribed for the meal, and then carried off again by the maid; and it may only be quite by accident that the nurse learns afterward that the patient has eaten nothing. Nor can it always be expected that women coming into hospitals, new to the work and to illness, should realize the importance of this part of their duties unless the fact has been thoroughly impressed upon them. Skill and intelligence in this, as in the other departments of nursing, require that the theory and practice should go hand in hand: theory alone will not do, nor will it answer to depend upon chance opportunities to put theoretical teaching into practice. Lectures and demonstrations are better than nothing, but being talked to and seeing the demonstrations of some other person will help the nurse but very little toward performing the work skilfully herself, nor will the principles upon which they are based appeal to her then so forcibly as when she can actually see certain results follow in her own experience. But, if she once understands the principles, her attention to the nourishment of the patients under her care is less likely to be a mere perfunctory duty, and, knowing the results which she wishes to obtain, she will be interested in watching for the success of her efforts. Fortunately, the increased attention given to domestic science in its various branches makes it now possible for training-schools to secure competent instructors in cookery for invalids—a fine art worthy of being studied not only in theory, but in practice as well. This study calls for a knowledge of elementary chemistry as far as it applies to the effects of heat, cold, air, and water on food, the classification and composition of the principal food-substances, and the process of selecting and preparing such foods in simple palatable forms for invalids. Of the preparations there should be a good number to choose from, and the pupil should go over the tests and actually prepare each dish at least three times.

1. She should assist the teacher in making it, and be taught the principles to be observed in preparing such a dish;

2. She should prepare it under the observation and criticism of the teacher;

3. She should prepare it, as a test of her ability, quite alone.

As the primary idea is to instruct, the time allowed for such a course should be devoted exclusively to teaching, and since the preparation of large quantities would take too long, and thus hinder systematic instruction, it cannot be expected that all the delicacies for daily use in the hospital can be prepared in the cooking-school. Most of the beef-tea, however, and of the broths needed for the hospital may be made daily, and in addition the dishes prepared during the instruction of the day may be contributed as extra dishes to the wards. The time required for such a course is at least one month: the class may consist of two, or probably the school might spare from the regular ward work even more than two pupils at a time. A course of this kind gives a nurse an intelligent comprehension of the value of certain kinds of food in disease, and of the best and most wholesome methods of preparing them, so that she will afterward be able to explain to others how the work should be done when she has not time to do it herself. She will have at her command a varied and extensive list to select from, and will be taught the correct manner of serving. If she becomes a district nurse, she will be able to advise the housekeepers or mothers how they may spend small sums of money for food in the most profitable way, and give valuable instructions how to prepare it.

As a preparation for the position of head nurse in a hospital, such instruction gives her a practical regard for economy, and teaches something about household arrangements—qualities very desirable in a woman who is responsible for the careful ordering of a ward. In the ward a nurse should be detailed in turn for a certain length of time to have charge of the nourishment of the patients: in this way she knows just what each one is getting, and, after serving each patient's food herself, she should then go round to all the bed-patients, encouraging some to eat, finding out their likes and dislikes, feeding the helpless ones, and then making an accurate report to the head nurse of those who have no appetite and do not eat well.

The cleanliness of the refrigerator where the butter, milk, and extra food for the patients are kept should be under the supervision of the nurse in charge of the meals; the work must be done thoroughly to ensure keeping things sweet and free from fermentative bacteria. The milk-jugs and cans require to be daily washed out carefully, and left standing full of boiling water for an hour. The greater the pains taken to instruct the nurse as to the reasons why such continuous and strict attention to these details is necessary, the greater the responsibility on her part to see that the proper conditions are maintained.

All dishes used for diphtheria patients or, in fact, for those with any infectious disease, should be kept apart from others, and not put into common use again until they have been boiled in a 2 per cent. solution of carbonate of soda for one hour.

Sometimes, when a patient is not inclined to eat, a little judicious management on the part of the nurse will result in a fairly good meal being taken: she may do this by assisting the patient to take it, encouraging him to try a little more, or by diverting his mind with conversation that will be of interest, and keeping his attention off what he is doing, so that sometimes he will unconsciously eat a great deal more than if left to himself. Considerable skill is required in administering food to helpless patients. If it has to be given with an ordinary cup or glass, the vessel should never be more than half full, and the head should be slightly raised and supported firmly; care should be taken not to throw the head so far forward as to make swallowing difficult. A napkin is to be folded under the chin and the fluid given gradually, and an occasional stop should be made, so that the patient may not have to swallow during inspiration. If feeding-cups are used, glass ones are preferable, as the amount given at one time can be more easily measured. For patients who must lie flat on their backs, a favorite way to give fluids is through a glass tube: an ordinary pipette may be bent at any angle desired by heating it in an alcohol flame, and through it the patient may suck his nourishment without having to be raised. The fluid may be taken in this way as slowly or as rapidly as he wishes, and there is no danger of any running down the outside of the cup on to the clothing; if a glass tube cannot be procured, a small piece of clean rubber tubing will answer, but it should be washed thoroughly after use and kept in fresh water. Where the favorable termination of a disease depends upon keeping up the patient's general strength, it is important to give nourishment as regularly at night as during the day unless orders are given not to waken him. Frequently a patient will awaken just enough to take what is held to his lips, and at once drop off to sleep again. Patients are apt to lie awake toward morning, when a cup of hot milk, cocoa, or broth should be ready to be given, as this often sends them to sleep again for two or three hours. It is also good practice to give a glass of milk or some light form of nourishment the last thing before a patient is settled down for the night.

Food given to patients in small quantities and at short and regular intervals will digest better than when the same daily quantity is taken in heartier meals at longer intervals, as the function of the digestive organs is weakened, and sympathizes, so to speak, with the condition of the general system. Food of any kind should never be left in a sick-room after a patient has finished with it, nor should it be allowed to remain on the bedside stand in the hope that a little may be taken later. This applies to milk particularly, which is so much used, for it perhaps more readily than any other kind of food absorbs impurities from the air. The drinking-water is not infrequently a source of disease, and intestinal irritation has often been traced to this source, although the water itself may be apparently clear and may look perfectly pure. Where intestinal disturbances cannot be traced to any direct cause, one suspected agent may be excluded by boiling all water used for drinking purposes, and keeping it in clean vessels. The same dangers arise from the use of impure ice. Where there are epidemics of fevers, intestinal diseases, or cholera, drinking-water should never be taken unless it has previously been boiled. It is safer, where one suspects the water, to use some of the well known table-waters—*e. g.* Apollinaris or Seltzer water.

In private nursing the nurse usually has to make arrangements for keeping small quantities of food or milk for night use near at hand and fresh. Where a small refrigerator is not obtainable, a large dish-pan is a good substitute: the ice used may be kept for a long time if wrapped in a piece of flannel and not allowed to come in contact with the water that drips from it. This can be arranged by turning a smaller basin upside down in the pan and putting the ice on it; then the milk, fruit, etc. may be arranged about it, the whole being covered over with a fresh napkin and kept near an open window.

Food-constituents may be grouped as albuminoids, or proteids, fats, carbohydrates, inorganic constituents, and water. A diet to be perfect must contain all these in certain definite proportions. The diet in illness will depend largely upon the nature of the disease, the amount of waste of the tissues, and the forms of food best suited to repair as much of the waste as possible.

The patient's strength is to be kept up, so that he may utilize food to the greatest extent possible to repair or prevent tissue-waste; no food should be given that cannot be readily assimilated.

In diseases accompanied by fever, wasting of the albuminous tissues takes place, while at the same time there is a disturbance of the processes by which food-substances are digested and absorbed. Albumen is often found in the urine, and the amount of water in the body is diminished. In the weakened state of the powers of digestion which accompanies fevers, the food which contains those substances which are most readily assimilated, and leave a minimum amount of residue, is desirable, and it should be in liquid form.

Milk is considered the perfect food in these cases, as it contains albumen, fat, sugar, and water, besides inorganic salts of lime and potash. If it disagree with the patient, and curds appear in the stools or vomiting ensue, it may be given boiled, or may be diluted with plain or effervescent water in the proportion of 3 parts of milk to 1 of water, and given in smaller quantities and more frequently. If it still disagree, it may be diluted one-half, or lime-water or bicarbonate of soda (10 grains to the pint) may be added to it. Where these fail, peptonized milk may be given. When milk is the exclusive diet, the amount usually ordered is from 3 to 5 pints in the twenty-four hours; this should be divided up into equal parts, and given once every two or three hours according to circumstances. Occasionally milk cannot be taken at all, and where there is much depression the albumen of egg in increasing quantities may be ordered. To prepare this, only the white of the egg is taken, beaten to a froth, strained, and, a few drops of lemon-juice being added, it can be given with equal parts of water.

Other substitutes for milk are meat broths, soups, and meat extracts, but they are all weak solutions and do not contain the same amount of nutriment as milk. Unless the process of preserving the albuminoids in the broth is understood and carried out, it is of little value as a food. The broths commonly in use in hospitals serve more as a warm, slightly stimulating drink than as a form of nourishment; the extracts are more stimulating, but are only nourishing to a small extent. Meat-jellies may also be used for administering albuminous foods in an easily-digested form. Farinaceous foods are not usually ordered in fevers, as they readily ferment, and no starchy food is suitable in fever, such as typhoid, where the lesions are in the small intestines, since the stomach, upon which we have mainly to rely in this disease, does not digest starch.

The importance of giving plenty of water in febrile diseases is now generally insisted upon by medical authorities. If a patient does not ask for it himself, it should be offered to him, and he should be induced to take it frequently: some advocate giving it as often as every hour during the day if it does not interfere with digestion. Frequent draughts of cold water will lower the temperature somewhat, flush out the kidneys, and assist in carrying off waste products from the alimentary canal. It may be alternated with effervescing waters, lemonade, rice-water, or barley-water.

Tea and coffee are sometimes ordered in fever as slight stimulants. Alcoholic stimulants are ordered when it is necessary to assist in checking tissue-waste; when the pulse becomes dicrotic, rapid, and irregular, the tongue dry and parched, and the nervous symptoms marked, alcohol may be the only thing which will bring the patient through.

A convalescent fever patient is allowed to return to solid food by degrees, beginning with so-called light diet, under which head we include baked custards, jellies, soft-boiled eggs, and milk-toast; then extra diet is allowed, when fowl, chops, baked potatoes, etc. may be cautiously given. The above course of diet is that usually prescribed in typhoid fever. In some forms of febrile disease, as pneumonia and tuberculosis, where no part of the alimentary tract is involved, the "light" form of solid diet may be given even when there is pyrexia; in tuberculosis, in fact, any food that is nourishing and easily digested is usually allowed.

In diseases where fever is not a prominent symptom, and where the effects of certain foods upon the disease must be taken into account, special forms of diet are prescribed.

In acute gastritis the giving of food by the mouth may be stopped entirely, so that complete rest is afforded to the stomach, while the nourishment is administered by nutritive enemata. In the milder forms peptonized milk is often ordered or egg-albumen diluted with water, and the way is paved to solid food by the use of scraped raw beef in small quantities. Fats, starchy foods, highly-seasoned foods, and stimulants are to be avoided, and may only be given with the physician's orders.

In dyspepsia easily assimilated foods are ordered in small amounts and at fixed intervals: hence the importance of giving them promptly and in the precise quantities directed.

In diseases of the kidney a diet consisting of milk and vegetables, together with plenty of water, is prescribed as a rule. In diabetes, sugar and starchy foods, fruits, and sweet wines are not allowed. Gluten bread is ordered instead of white bread, as, if properly made, it contains a minimum of starch.

It need hardly be added that we have always to take into consideration the exigencies of the particular case with which we are dealing, and, while following general principles, be prepared for such modifications in details as may be indicated.

CHAPTER XXII.

THE ADMINISTRATION OF ANÆSTHETICS.

A NURSE is often called upon in private practice to administer an anæsthetic, as it is not possible at every operation to have sufficient medical assistance. She can never feel herself competent to do this unless she has taken advantage of her opportunities in the hospital for watching and herself practising the administration, and for informing herself thoroughly of the principles and methods involved, of the dangers to be watched for, and of the proper way to guard against them. Every time she is present when a patient is being anæsthetized gives her another opportunity for following each step in the process, and when a fitting occasion for asking questions regarding any point presents itself, she should not neglect to do so.

Anæsthesia means a condition in which there is an absence of sensation. The agents used to produce this condition are called anæsthetics, and may be either local or general in their effects. The general effect is produced by inhaling the anæsthetic in the form of vapor or gas into the lungs, whence it is carried by the blood to the nerve-centres, upon which it acts.

Local anæsthesia is produced either by the injection of the proper agents in liquid form into the subcutaneous tissues or by applying them externally.

Anæsthetics are largely employed in surgery, their principal uses being to do away with pain during operations and to produce insensibility and a relaxed condition of the muscles when a thorough examination is necessary. In obstetrics the inhalation of chloroform or ether is a great boon, and in medical treatment anæsthetics are sometimes given to control convulsions. The general effect of an anæsthetic may be either partial or complete. The two substances most frequently used for inhalation are ether and chloroform; in dentistry nitrous oxide or laughing gas is used, as its effects pass off rapidly and the patient need not be put in the recumbent posture.

To Prepare a Patient for Anæsthesia.—No solids should be allowed for six hours previous to the administration of an anæsthetic, but light, easily-digested food, such as a cup of coffee, beef-tea, or a very little bread and milk, may be taken three hours before. If an anæsthetic is given very soon after a hearty meal, vomiting almost invariably follows, and may delay the operation; moreover, there is danger of solid portions of food being drawn into the trachea and producing suffocation, or the throat and pharynx may become filled up and the obstruction only with difficulty be removed.

If the patient be very weak and delicate, the physician may order stimulants, usually half an ounce of either brandy or whiskey half an hour before the administration of the anæsthetic: this should not be given without orders.

The forenoon is the best time to select for giving an anæsthetic, as the vital powers are in better condition if the patient has had a good night and has not been exhausted by nervous strain, pain, or work. The clothing should be light and warm, but loose about the neck and chest, and no corset or tight waist should be permitted, because the respiratory organs must have freedom of movement. The urine should be voided or the catheter passed. If there are false teeth, they should be removed. If the patient be a child, care should be taken to see that the mouth is quite empty, as there may be coins, buttons, or other articles stowed away in the mouth. The patient is placed in a recumbent position, with the head low or resting on a small air-pillow, and should be covered with warm blankets, the hands being left free, so that the pulse may be easily reached; a towel is to be laid across the chest under the chin. An extra towel and basin should be ready. The nurse must also have at hand a hypodermic syringe (sterilized and in good order), whiskey or brandy, tincture of digitalis, a solution of strychnine, morphine, atropine, and aqua ammonia, as any of them may be called for. There should be, besides, a liberal supply of both chloroform and ether, towels, inhalers, and vaseline; the latter is applied about the lips and nose to prevent irritation from the vapor. The pulse should be taken before starting. The anæsthetic may be given to the patient either in bed, after which she will have to be carried to the operating-room, or in a room near the latter where there will be nothing suggestive of the operation. The room should be quiet, and no talking is to be done beyond what is absolutely necessary, and that in a low tone; otherwise it takes longer to get the patient under the influence of the anæsthetic. Besides the anæsthetizer, if the patient is a woman the nurse should always be present to give any necessary assistance, but a second or even third person may be needed if there be much struggling. Ether is probably given in this country oftener than any other anæsthetic, as there seems to be little danger to life under ordinary circumstances when it is carefully administered. The contraindications to the use of ether are chronic diseases of the bronchi and of the kidneys. Speaking generally, chloroform is preferable for very young or very old patients.

If lights are used near ether, they should be kept above the neighborhood of the can or inhaler, as ether vapor is heavier than air and very inflammable.

There are various styles of ether-inhalers, but one that is easily made and can always be had fresh and clean is the so-called "ether cone." It is prepared by folding two or three layers of paper (not too stiff—newspaper answers the purpose) together to make a thin pad about 16 inches long and 9 wide, and stitching to this a small, loosely-made crash towel or a piece of linen large enough to cover it entirely; the whole is then twisted into the shape of a cone and held in place with pins, a small opening being left at the top. A small sea-sponge or some absorbent cotton is put inside upon which to pour the ether.

About half an ounce of ether is poured upon the sponge at first, and the cone held at a short distance from the patient's face, or for a few moments he may be permitted to hold it himself if inclined to be nervous or to think that he is going to be suffocated.

After these first few moments, however, when the feeling of irritation has passed, the cone should be held closely over the mouth and nose, and the patient encouraged to take deep breaths or to blow out. The first stage is the most disagreeable, owing to the irritation produced on the mucous membrane of the mouth, throat, and bronchi, which may give rise to coughing and a sensation of suffocation. When the patient struggles, talks, or cries out, the pulse and respiration are quickened and the face flushes. The ether is kept up steadily, a few drachms being added from time to time, until finally the patient quiets down, the muscles become relaxed, and sensation is lost; this stage is called that of primary anæsthesia. This, however, is only transient, and may in its turn be followed by struggling and excitement, after which there ensues a condition of complete anæsthesia in which there is absolute relaxation of the muscular system, the conjunctival reflex is abolished, the face and skin are moist, and the patient lies as if in a deep sleep. The pulse is full and quickened and the respirations are slow and regular; these, as well as the reflexes, should be watched constantly. The reflex to light should remain active; that is, when the eyelid is opened the pupil should contract. A rapidly-dilating pupil is a sign of imminent danger. The time required to produce complete anæsthesia, differs with different individuals, and may vary from five to twenty minutes. It is also modified by sex and age, women and children being influenced more readily than men. Patients who have been alcohol habitués usually struggle violently; during the struggling the anæsthetic must be pushed, but great care must be taken when the struggling begins to cease, as they then pass with great rapidity into the stage of complete anæsthesia.

In the early stage of the administration of ether the patient may suddenly stop breathing and the face become cyanosed; the cone should be at once removed, and pressure made upon the chest and sides once or twice, when the breathing will recommence. After the patient is ready for operation, the etherizer continues to keep a constant watch upon the pulse, respiration, reflexes, and general condition, and a few drops of ether in the cone from time to time will suffice to maintain the unconsciousness. To prevent the tongue from falling back into the throat and thus obstructing the air-passages, the lower jaw should be pushed forward and upward. It may be held in this position by two or three fingers placed behind the angle of the jaw, while the others keep the cone in place. Any accumulation of mucus in the mouth should from time to time be wiped out with a towel. If we are warned by contractions of the abdominal muscles (retching) that vomiting is threatened, it may be averted by pushing the ether; if the patient does vomit, the head is to be quickly turned to one side, and the mouth cleaned out before an inspiration can be taken, otherwise some of the solid particles vomited may be drawn into the larynx. If the breathing ceases, the head and chest should be lowered to send more blood to the brain, and artificial respiration should be begun at once and maintained until breathing is re-established; aqua ammonia may be held at a little distance from the nostrils. The pulse may be conveniently counted in the temporal or in the facial artery, and if it grows weak and fluttering, the attention of the surgeon should be at once called to the condition. Ether is very irritating to the kidneys, and the amount of urine should be accurately measured for some days before and after the administration.

A patient should be watched until consciousness is restored, which usually takes place within half an hour or an hour: with some the effects are slept off, while others may be very excitable and hysterical. Nausea and vomiting frequently follow ether narcosis, and basins and towels should be kept at hand, so that the clothing may be protected. The head must be low, no pillow being used. If the vomiting is persistent, frequent drinks of water only aggravate it; Seltzer water in sips or a little cracked ice is better. The extreme thirst may be somewhat relieved by hot tea or hot water, a teaspoonful at a time. If there be pain from accumulation of gas, a drop of the tincture of capsicum in a little hot water will often give relief. For headache an ice-cap or ice-cloths may be applied and the patient kept quiet; no visitors should be allowed.

Chloroform ranks next to ether as a systemic anæsthetic. It has some advantages over ether, as it is more pleasant to take, its vapor is not so irritating to the mucous membranes of the mouth and throat, and its action is much more rapid, while its after effects are less disagreeable. The danger to life where the administrator has not had a wide experience is much greater than with ether. Children and old people bear it better than the middle-aged. To prepare a patient to inhale chloroform the same points are observed as with ether: anointing the lips and nose with vaseline or ointment is here even more essential, as chloroform-vapor is very irritating, and if applied to the skin for any length of time may produce vesication.

Chloroform-inhalers are of many kinds: the small wire frame covered with flannel is perhaps among the simplest and best, but in the absence of any special apparatus a towel or napkin may be used. Half a drachm of chloroform is poured upon the towel, which at first is held some little distance from the face, and gradually brought nearer until it is within two or three inches of the nose and mouth; this allows for free dilution with air—an absolute necessity. The patient should be induced to breathe quietly and gently, in order to avoid any irritation or sense of suffocation; the time required to produce insensibility is about five minutes, and when this is complete there will be no contraction of the eyelids when the conjunctiva is touched. The pulse, respiration, pupil, and color of the face should be constantly watched, as, while the patient is in apparently good condition, the breathing or the pulse may suddenly cease and the face take on a livid hue or become ghastly pale. These are indications of danger. Artificial respiration is at once resorted to if the respiration ceases. If it be the pulse that stops, no time must be lost, and the patient must be partially suspended, with the head lowered, and artificial respiration at once instituted. A nurse will probably seldom, if ever, be entrusted with the administration of chloroform.

Chloroform is almost exclusively used instead of ether with obstetrical patients: it is administered generally during labor in the second stage when the pain is very severe or when forceps are applied.

The agents used as local anæsthetics are the hydrochlorate of cocaine, carbolic acid, ether, alcohol, nitrous oxide, methyl chloride, and ice.

Cocaine is a powerful local anæsthetic; it is used in solution in strengths from 1 to 20 per cent. For the surface of mucous membranes a piece of cotton saturated with the solution is held to the surface for a few moments until insensibility is produced. To produce anæsthesia of the skin it is used hypodermically. Before injections are given the skin and syringe should be antiseptically prepared. Cocaine is particularly valuable in operations upon the eye, ear, throat, and nose, and also in making examinations of these organs; it should never be used, however, except by a physician's order, as individual susceptibility to the toxic influence of the drug is sometimes marked, and death has more than once followed its use even in weak solutions. Some surgeons prefer using a weak solution of cocaine, combined with carbolic acid; so it is well to have both drugs in readiness.

To produce insensibility of a part by means of carbolic acid, the pure acid (liquefied) is painted over the skin; this first causes some pain, but is followed by numbness, when an incision may be made without its being felt. It is little employed, owing to its caustic action upon the tissues.

To produce local insensibility by means of alcohol, a vessel containing the alcohol is placed in a larger one which is filled with ice and salt, and when intensely cold the part (a finger or hand) is either placed in it or compresses kept very cold with the alcohol are laid over the part until insensibility is brought about. Ice and salt held in contact with the tissues into which the incision is to be made will also render them less sensitive to pain.

The ether spray directed upon the surface for a few seconds will also bring about a condition of local anæsthesia.

CHAPTER XXIII.

How to Observe, Report, and Record Symptoms.

It is essential for a nurse from the beginning of her hospital work to cultivate the faculty of observation, and not only should this quality extend to the particular symptoms of her patients, but to every detail of the work pertaining to their welfare. In her first month in a hospital the beginner will probably only succeed in becoming familiar with her surroundings, a few nursing appliances, and some of the minor steps in nursing; and with the multitude of new duties which press upon her it is unlikely that she will be able to get any very clear ideas about the individual patients and their diseases. In her second and third months a clearer conception of her duties to the patients will gradually open up to her, and any general symptoms or conditions common to all sick people will one by one present themselves to her notice, to be followed gradually by symptoms or conditions peculiar only to individuals or to particular diseases. Not all the observations concerning patients that a nurse must necessarily be conversant with can be grasped immediately; they are only acquired through constant contact with illness, much practice, and the application of the principles which have been taught to her with reference to diseases and their phenomena. To some, who are endowed with quick instincts and keenness of perception, this knowledge comes much more readily than to others, who can acquire habits of observation and accuracy of statement only by patience and perseverance. In the observation of symptoms there are three rules that a nurse should never lose sight of:

1. She should always observe minutely and accurately the condition of her patient;
2. These observations should be made according to a regular system and method;
3. She must learn to express the results of such observations in a clear and concise form, either orally or in writing.

It is very important that these three principles should be daily carried out in practice, as it is upon the nurse that the physician must for the most part depend for accurate statements regarding the condition of the patient during his absence. Frequently such observations will assist him materially in making a correct diagnosis and in the treatment of the disease. As we said before, the reports should be given in a systematic, clear, and concise form; they should contain a simple statement of facts as they present themselves, without an attempt at offering any opinion or suggestion. A well-trained nurse is never guilty of attempting the diagnosis of a disease, even when invited to do so. Her manner should be quiet and matter-of-fact, and she should not be too ready to take unto herself any undue credit for doing only that which it is her duty to do. Her own work will also be made easier for her in proportion to her ability to distinguish grave symptoms from unimportant ones, since she will frequently be placed in a position where she must decide whether the symptoms are sufficiently serious to require the calling in of a physician at an inconvenient time, or whether the instructions already given are sufficient to meet the requirements of the case.

Symptoms are either *objective*, those outward indications observed independently by the physician, nurse, or any one under whose notice the patient comes; or *subjective*, those complained of by the patient or elicited by inquiry from him. Both subjective and objective symptoms must be remembered, but the patient's statements cannot always be fully relied upon, as ill people sometimes imagine their condition to be worse than it really is, and exaggerate their ailments, while clever malingerers, who are only feigning illness, are never at a loss for a pain or an ache. These statements, however, must be reported just as they are given by the patient, as it is for the physician to decide which of the symptoms are real and which are simulated.

In a hospital the observation of a case should begin immediately after a patient comes under the nurse's care, and be continued during all the time he remains under it. The time may be divided into three periods: (1) that immediately following his admission; (2) that during which he is confined to bed; and (3) that of convalescence.

The first thing to be noted is the general appearance, whether the patient seems very ill and in great suffering, or whether the indisposition is apparently only slight and not alarming. Besides this, attention is given to the sex, color, and approximate age, then to the manner or disposition, whether the patient seems to be quiet and orderly or rough and inclined to be troublesome; any indications of weakness, such as inability to walk, awkwardness, or peculiarity of gait, should be noted, as well as any signs of deficient power in the trunk or in the arms. In examining into the condition of the mind we note whether the patient is conscious or unconscious, rational or irrational, depressed or hilarious, or whether he show any signs of intoxication or delirium. The speech, too, should be observed: it may be "thick" or "clear," or there may be hoarseness; again, the patient may mutter or give vent to loud screams, according to the form of the delirium. The face and special senses are also very interesting; thus the color of the skin may be bluish (cyanosis), pale, or jaundiced; the expression may be one of pain; and the eyes are to be looked at particularly to see whether the pupils are dilated or contracted, and whether they are equal or unequal in size.

The pulse and temperature may be taken while these symptoms are being observed, and it should be remembered that all these points are to be noted in a quiet, unobtrusive manner, and as far as possible without the patient's knowledge. When the patient first enters the hospital any peculiarities of manner are apt to be exaggerated, and, as we said before, the registered pulse and temperature may not, owing to excitement and fear or to the unusual exertion necessitated by travelling, give us entirely reliable information. A nurse should do everything in her power by gentleness and attention to put a new patient at his ease, and in doing so she may very soon gain his confidence and learn important facts about his previous history that might not otherwise be learned either by herself or the physician. These first observations occupy only a few minutes, as a nurse familiar with her duties can pass from one detail to another with rapidity.

Further observations are made during the patient's bath, whether given in the tub or in bed, but before he is put to bed his weight should be taken. When in bed the general condition of the body is ascertained, and the existence or extent of any deformity of obesity, emaciation, or œdema is noted; the condition of the skin is next observed, whether it be hot and dry or cold and clammy, etc., or whether there are signs of any eruption, of bed-sores, ulcers, or of old or recent scars. Where such an examination is possible we should not fail to look for any peculiarities relating to the thorax or abdominal organs. The position the patient assumes, the extent and seat of any pain complained of, nausea or vomiting, cough, expectoration (its nature and amount), are all important. Some information on these points must be ready for the physician on his first visit if he asks for them. In an hour or so after a patient has been put to bed and is quiet and composed, the pulse, temperature, and respiration should again be taken, as they are now likely to afford more reliable information than on admission.

The daily symptoms of a bed patient that must necessarily be noted may be best observed in connection with the different systems of the body, particular attention being paid to those which are more especially involved, but all incidental symptoms must also be taken into account. The position which the patient assumes, the expression of his face, restlessness, complaints of pain, the occurrence of hæmorrhage, rigors, any elevation of temperature, the condition of the pulse and respiration, as well as signs involving any of the special senses,—all must be recorded. It may not be necessary, of course, to mention all these symptoms in connection with a disease, but it is necessary that a nurse should understand something of the significance of each when unusual symptoms make themselves manifest.

The position in bed is of importance, as often by it our attention is drawn to the organ affected, since the patient usually chooses, sometimes involuntarily, the position which causes the least pain and discomfort. In diseases of the heart or respiratory organs, where there is difficulty in breathing, a sitting posture will be preferred, or if one lung is affected the patient will sometimes lie on that side in order to give the normal lung as much freedom as possible, so that it may be better able to meet the increased work it is called upon to perform.

Dyspnœa, or shortness of breath, occurs in various conditions, particularly in diseases of the lungs and bronchial tubes, and almost always in diseases of the heart, when the circulation in the lungs is impeded; shortness of breath is often a prominent symptom in certain stages of Bright's disease, and relieved breathing is usually indicated by the patient's ability to lie down without a sense of discomfort or distress.

In abdominal diseases the patient may lie on the side, with the knees drawn up to relax the abdominal muscles, and thus relieve pressure; for this reason where there is severe pain from peritonitis the patient will generally prefer to lie on his back with the knees drawn up, keeping as still as possible, since every motion causes intense pain; in colic the patient is restless and turns frequently, preferring, however, for the most part, to lie on the abdomen, since he finds that pressure relieves the pain. Usually in fevers, as in typhoid fever, the patient if not delirious lies quietly on his back, and is passive when turned from side to side; any attempt to move himself of his own accord is to be regarded as a favorable symptom. Where there is very great pain the patient is apt to be quiet, fearing the slightest movement, and in conditions of great weakness no effort is made to change the position. In some nervous diseases there may be continued restlessness, and no position is comfortable for any length of time. As the fatal termination of disease approaches, there is also very often extreme restlessness, shown more especially by movements of the head, hands, and feet; but this is quite different from the ordinary restlessness of illness, and is accompanied by other more important symptoms.

Pain.—Where there is a complaint of pain, it should be inquired into, and as far as possible its nature and seat should be determined. Pain may be general or strictly localized; it may be continuous or come on in paroxysms. It may be dull and boring or sharp, shooting, and throbbing. At the same time, as we have said, the condition of the pulse, the expression of the face, the position of the patient in bed, should be noted and any further symptoms recorded.

The appearance or expression of the face, to which we have more than once referred, should become a study to the nurse, for, coming as she does in contact with so many different people, she will find it of great use to be able to interpret correctly the different expressions of the countenance both in health and disease. Paleness of the face in an invalid, coming on suddenly, may be associated with faintness from hæmorrhage or some other cause, while a more or less gradually increasing bluish appearance about the nostrils, lips, and cheeks is indicative of imperfect oxygenation, depending on some interference with the respiration or circulation. Its duration and degree should be noted. A "drawn" appearance about the lips and mouth accompanies nausea, and excess of blood in the head is shown by a deeply-flushed, almost purplish-red color of the face. In pulmonary diseases there may be a characteristic flush or red spot on one cheek, not infrequently on the same side as the affected lung. Besides these, there are tints peculiar to certain diseases; so we have often a waxy-white hue in Bright's disease, the yellow skin in jaundice, the sallow complexion of opium habitués, and the dry, flushed face in fevers. The rash of some eruptive fevers appears first on the face, and its general appearance, extent, and color should be observed.

The expression may be indicative of marked changes in the course of disease. A pinched, anxious expression is often associated with a grave prognosis, and a dull, apathetic, expressionless countenance, like that so often seen in typhoid fever, is often significant of a serious illness. On the other hand, after the crisis of the disease is passed the patient will often show by his calm and placid look that a marked improvement has taken place. Where there are any signs of paralysis or impairment of the mental faculties, it should also be noticed whether both sides of the face are alike, or if the mobility is confined to one side or if one corner of the mouth is puffed out during expiration.

Rigors or chills are sometimes the first indications of an oncoming illness, and are important symptoms. The duration and intensity of the chill may vary greatly, from a slight subjective feeling of cold, lasting only a few minutes, to a pronounced fit of involuntary shivering, which may last for half an hour or more, and during which, in spite of all efforts to keep his body still, the patient is shaken, sometimes so violently as to move the bed on which he is lying. During this time the body may be externally cold and the face, lips, and finger-tips blue. The temperature should always be taken during a chill, when it will usually be found above normal, and again after the chill has ceased; during a severe chill there will probably be hyperpyrexia. These paroxysms occur in malarial fever (when they may be severe and recurrent), at the beginning of other fevers, and in acute inflammations. When they occur in the course of any illness except malaria, they are of importance, as they indicate the probable existence of some complicating suppurative process. Notice should be taken when they occur, how long they last, and if they are repeated, the degree of their severity, and the temperature of the body during and after the chill.

In a case of hæmorrhage the source of the bleeding should be investigated, as well as the appearance of the blood, its color, whether it is fluid or coagulated or mixed with other substances, such as food, and the quantity of blood lost should be estimated.

The number of hours a patient sleeps should be recorded in the written report, as the administration of narcotics will depend upon the amount of sleep observed by the nurse; a patient's own statements are often very unreliable on this point. One should describe whether the sleep is quiet or disturbed and restless, whether the patient sleeps lightly and is easily wakened, or whether he is only aroused with difficulty.

The temperature, pulse, and respiration are always the chief guides, however, and they have been considered by themselves elsewhere.

The condition of the tongue is an important symptom, as almost all diseased conditions have some action direct or indirect upon it. It may be pale and flabby, having marks of the teeth upon it, or bright red, or, again, it may present the appearance which is described as the "strawberry tongue" of scarlet fever. If the tongue is coated with fur, the color may be whitish or of varying shades of brown or black. The darker shades of fur are often present in the continued fevers. The tongue usually cleans first at the edges, the process gradually advancing toward the centre. When it cleans in patches, this is held to be no good indication. We should notice whether it be dry or moist: the dry tongue occurs most frequently in fevers and in mouth-breathers; any swelling or soreness is also to be watched for. In observing the tongue the teeth and gums should not be forgotten; if there be any accumulation of sordes about the teeth, or if they be loose, or the gums are sore and tender and bleed easily, a report should be made at once, especially if mercurials are being given.

Special Senses.—*Taste.*—When the tongue is out of order the sense of taste is often impaired. Certain diseases or the administration of certain drugs may give rise to a characteristic taste in the mouth; thus the patient sometimes becomes aware of a persistent metallic flavor while taking mercurials or arsenic; a bitter taste is complained of in certain disorders of the digestion, and a salty taste in phthisis.

The Ears.—In disease the sense of hearing may be abnormally acute, especially in nervous troubles; some drugs, particularly quinine, may produce temporary deafness. The occurrence of pain in the ear or any discharge from it, with the amount and character of such discharge, should be carefully recorded.

The Eyes.—In observing the eyes we should note the condition of the pupils. They may be dilated or contracted; they may react readily to light or their size may remain unchanged. The eyeball itself may be rolled from side to side or remain motionless. In some diseases we have protrusion of the eyeball, in others it may be sunken. The conjunctival reflex may be active, while in cases of complete unconsciousness it is lost.

Any departure from the normal in the condition of the skin should be watched for; it may be too dry or too moist. Perspiration may be caused in illness either by weakness or it may accompany a fall of temperature. A high temperature with a damp skin indicates great weakness and is a grave symptom. Any peculiarity in the odor of the perspiration should be noted. Localized sweating is not uncommon in certain forms of nervous diseases.

In diseases of the respiratory organs the chief points to notice are the cough, expectoration, rate of breathing, pain, and dyspnœa.

Cough is the result of irritation in some part of the respiratory tract, and is caused very often by some accumulation or occurs as the result of reflex irritation. The main points to notice about a cough are its frequency and duration, whether it comes on in paroxysms or is short, hacking, and difficult to control; at what times of the day or night it seems to be worst, and whether it is brought on by lying down or moving about; the amount and gross appearance of any accompanying expectoration and the location of any pain associated with it should also be noted. Coughs may be described either as sharp and barking, as in some forms of hysteria, or deep and hollow, as in lung diseases; then there is the ringing, brassy cough which accompanies aneurisms of the aorta, and the peculiar laryngeal cough, which is high-pitched and superficial: besides these must be mentioned the characteristic croupy cough in children—a crowing sound produced by the spasmodic contraction of the glottis. The typical convulsive paroxysm of whooping cough, in which the sound is loud and barking and accompanied by a whoop heard soon after a long inspiration, will hardly be mistaken after it has once been witnessed. If there is any expectoration, it may be mucoid—that is, clear and tenacious, somewhat like the white of egg; muco-purulent, a combination of mucus and pus; or completely purulent, as in abscess of the lung. It may be ropy and tenacious, or frothy, and may be streaked with blood. No sputum can be said to be characteristic of phthisis: the nummular or coin-shaped sputum occurs perhaps most commonly in chronic tuberculous disease of the lungs. Now-a-days, by means of special staining methods and microscopical examination, physicians are able in three or four minutes to examine the sputum for tubercle bacilli, and if these are found, there can be no doubt of the existence of a tuberculous process. The bacilli are found in greatest numbers in the minute, whitish, cheesy-like particles, about the size of a pin's head, so often seen in the sputum of phthisical patients. When the lung is gangrenous the sputum consists, as a rule, entirely of greenish pus, and has a very offensive odor. The sputum of pneumonia is scanty as a rule, sometimes very tenacious, and at certain stages is intimately mixed with blood, which gives it a rusty color. The amount of blood may be great, producing the so-called prune-juice expectoration; in the pneumonia of drunkards or where the constitution has been much impaired, the measurements of quantity should be accurately reported and recorded: and if at any time the nature of the sputum appears to be changed, a specimen should be preserved for the inspection of the physician.

Dyspnœa, palpitation of the heart, variation in the quality and frequency of the pulse, syncope, and œdema may all be present as symptoms of disease of the heart; any one of them may occur in other diseases.

Palpitation is frequent not only in organic but in functional diseases of the heart, and in dyspepsia, hysteria, and nervous prostration.

Reliable information as to the condition of the appetite and the amount of food taken by a patient can only be obtained from the nurse's observations; the exact amounts, whether of solid or liquid foods, which are taken should be noted, and also the hours at which they were given. It should be noticed whether the food is eaten with a relish or only with an effort: some patients are inclined to be ravenous, while in others the appetite is capricious, and can be tempted only by particular forms of food. Any inclination to nausea or vomiting should be recorded.

When food is not retained the fact should be recorded and reported, with the amount and character of the vomitus. In some instances this may have peculiar characteristics; if so, it should be covered over and saved to show to the physician. The color and odor of the rejected material are of importance, especially where there is any suspicion of intestinal obstruction; for where this is at all serious the contents of the intestine, not being able to pass by it, are forced back into the stomach, producing vomiting of fæcal matter. Small quantities of blood may be changed in the stomach from a red to a dark-brown color by the action of the gastric juice, so that the vomited material has been described as "coffee-ground" vomit. The position and nature of any pain associated with vomiting, and any other symptoms occurring with it, should be inquired into.

Flatulence is the result of fermentation of the contents of the alimentary canal, with the production of gas; if these gases are not liberated in some way they accumulate until there is tympanites or distension of the abdomen; this condition is recognized by the hard, unyielding, resonant, distended abdomen, and for its relief the passing of a rectal tube is frequently ordered. In a general description of evacuations from the bowels should be mentioned the color, consistency, whether formed or liquid, the admixture or non-admixture of blood, mucus, or pus, the quantity, odor, and frequency. The evacuations characteristic of certain diseases will be found described elsewhere. The urine should also be kept under daily observation.

The implication of the nervous system may be first shown by one or more of many various symptoms. Thus we may have incoherency of speech, rigidity, contortions of the face and body, twitchings, delirium, paralysis, coma, most of which conditions may best be treated of in the general description of nervous diseases.

Delirium may be present as a complication in a great many diseases: delirious patients should be kept under constant surveillance, as they frequently get out of bed, and are liable to do themselves harm. When least expected, a delirium which has before taken on a low quiet muttering form may become loud and noisy or even maniacal. On the other hand, there may be merely a wandering of the mind, without any attempt to move—a symptom which sometimes occurs only during sleep.

Coma is also associated with many diseases, particularly those of the kidneys and heart. It is a state of complete insensibility. In coma-vigil the patient lies with the eyes wide open, but in a delirious, unconscious state; both are very grave symptoms. In connection with diseases in women the catamenia should be carefully watched as to regularity, amount, color, and pain.

Even symptoms which may appear trivial should be considered of sufficient importance to report, for when taken in connection with others they may be of value.

In hospitals, regular report-books for the night reports should be kept. The day report can be given to the physician when he makes his daily visit, but the night nurse should make a brief and accurately written statement of each patient's condition during the night. In the case of patients who are seriously ill a special written record for the twenty-four hours should be kept. The night report should be headed with the date, and each patient's name is to be written on the margin, a space of one or more lines being left between each. No remarks should be allowed in this report beyond a clear statement of facts founded upon observations such as we have spoken of in this chapter, and at the end should be appended the nurse's signature.

CHAPTER XXIV.

OBSTETRICS.—PREGNANCY.—SYMPTOMS AND PHYSICAL SIGNS.—DEVELOPMENT OF THE FŒTUS.—ABORTION.—MISCARRIAGE.—PREMATURE LABOR.—CARE OF THE PATIENT BEFORE, DURING, AND AFTER LABOR.—CARE OF THE BREASTS.—CARE OF THE CHILD.—THE PUERPERAL STATE.

THE impregnation of the ovum, which is to result finally in the formation of a new being, constitutes what is called conception. The ovum lodges in the uterus, and, remaining there, gradually develops until the fœtus matures, when it is expelled, under normal conditions, in the shape of a well-formed infant. In the beginning the new organism is called the embryo, after the fourth month the fœtus. The symptoms and signs of pregnancy are numerous. The first to appear after cessation of the menses are nausea and vomiting (morning sickness), which, however, generally occur only in the early months of pregnancy. In some cases there may be slight nausea on rising, which does not result in actual vomiting, and as a rule the nausea and vomiting of pregnancy amount to nothing more than an inconvenience, but occasionally this symptom is aggravated, and may become of grave import. A few weeks after conception there can be noticed some enlargement of the breasts and a darkening of the areolæ; the breasts become fuller, the veins are distended, and the woman often has a throbbing sensation in them.

The changes in the size of the abdomen are dependent of course upon the progressive enlargement of the uterus. The uterus at first is low in the pelvis; sometime during the fourth month the fundus is on a level with the brim of the pelvis; by the end of the fifth month it has risen halfway to the umbilicus; and at the end of the sixth is on a level with the umbilicus. At the end of the seventh month the fundus is midway between the umbilicus and the tip of the sternum; at the end of the eighth month it reaches to the xiphoid cartilage; and finally during the ninth month the uterus again sinks a little in the abdomen. Between the eighteenth and the twentieth week quickening is first felt; that is, the mother first feels the movements of the child. From the fifth month on, the fœtal heart may be distinctly heard on listening with the stethoscope; the sound resembles the ticking of a watch under a pillow. The rate of pulsation of the fœtal heart varies from 130 to 160 beats per minute. Attempts have been made to determine the sex of the child before birth by the frequency of the heart-beats, the pulse being generally a little slower in larger children, who are more commonly males, but no trustworthy diagnosis can be made by this method. Changes also take place throughout the whole body of the pregnant woman; the heart, having more work to do, enlarges a little, and there is a general increase in tension in the arterial system. Sometimes there is swelling of the thyroid gland.

The obstetrician is often able to diagnose pregnancy very early by a vaginal examination. The vagina as early as the third week assumes a bluish tint, owing to the dilatation of the veins, and, what is more important, the cervix of the uterus becomes softened. In women who have never been pregnant the cervix feels as hard and firm as the tip of one's nose, but at the end of the first month of pregnancy it is much softer than this. There are often marked digestive changes: the appetite may be capricious, when there will be a craving for certain foods; the salivary secretion is increased. Wherever pigment is found normally, it is increased in amount in pregnancy; thus, there is often a deep-brown line running from the umbilicus to the pubes, and the face nearly always shows alterations in tint. Occasionally the latter is very much pigmented, and we have the so-called *masque de femme enceinte*. The nervous system may be influenced in a striking manner: sometimes nervous, irritable women become quiet and amiable, while those who have been even-tempered and genial become cross and excitable. The quantity of urine is increased; there may be functional disturbances, such as frequent, painful, or involuntary micturition. Albumen is sometimes present—a sign which always makes a physician anxious; the bowels may be constipated. Headache, neuralgias, and insomnia are not uncommon.

The average duration of pregnancy is 280 days, or about nine calendar months. The probable date of confinement may be calculated in two or three ways, but the one considered the most accurate is to count back three calendar months from the date of the cessation of the last menses and add seven days. This will give us the month and approximately the day. In first pregnancies—or, as we say, in the case of primiparæ—labor is apt to begin a week earlier than this, as the uterus is not so tolerant of distension as it may afterward be in later pregnancies.

Ballottement (from the French *ballotter*, to toss up like a ball) is another means of diagnosing pregnancy. The examining finger is placed in the vagina, while the other hand presses slightly on the abdomen; the fœtus is poised on the finger in the vagina, and then tossed up till it strikes the outside hand, after which it will return to its former position with a gentle tap. This can generally be appreciated at any time after the fourth month; the sign, which is known as *internal ballottement*, may be absent if the amount of amniotic fluid be small; *external ballottement* is a sign of less value.

The fœtus receives its nourishment from the mother through the placental vessels. The arrangement for the interchange of substances in the placenta between mother and child is most wonderful. The uterine and placental vessels fit into one another like fingers into a glove, and there is so thin a membrane between the two that nutrient substances coming from the mother and waste substances from the child returning to the mother pass through easily.

The development of the fœtus begins, as we have said, by the impregnation of the ovum, which, entering the uterus, becomes attached to the mucous membrane, normally at the fundus. At the point of junction of ovum and uterine mucosa the placenta is formed. The fœtus becomes enclosed in several membranes, the formation of which is too complicated to be discussed here, but which will be found fully described in any treatise on embryology.

The membrane nearest to the fœtus, and which contains the fluid in which the latter is suspended, is known as the amnion, the fluid being called the amniotic fluid. The umbilical cord contains the blood-vessels which run between the fœtus and placenta. A fully-formed placenta occupies about one-third of the surface of the mucous membrane of the uterus. It is round in form, from seven to nine inches in diameter, and about one inch thick; the surface next the fœtus is covered by a smooth membrane; the uterine surface is rough and irregular. The placenta is connected with the fœtus by the vessels of the umbilical cord, and the fœtal vessels communicate with the uterine vessels of the mother—not indeed directly, for, as we said, the two bloods never mix. The placenta is the organ by means of which the respiratory, excretory, and nutritive functions of the fœtus are carried on; the umbilical cord is attached to the placenta at one end and to the umbilicus or navel of the child at the other. It is from sixteen to twenty inches long and about one inch in diameter. It is covered by the amnion, and is mainly made up of a peculiar tissue called *Wharton's jelly;* it contains the umbilical vein and the two umbilical arteries; the vein carries the blood from the placenta to the fœtus, and the arteries return it.

The terms used for an uncompleted pregnancy are *abortion*, *miscarriage*, and *premature labor*. When the ovum is expelled at any time during the first three months of pregnancy, we say that an abortion has taken place; when the expulsion occurs at any time between the third and seventh months (*i. e.* before the child is viable), we call it a miscarriage; a premature labor is one which occurs between the seventh and the end of the ninth month.

The care to be given in nursing a case of abortion is, if possible, even greater than that required in one of normal labor: the latter is a natural, the former a pathological process. There will be more danger of hæmorrhage and more shock to the nervous system. The patient must be kept absolutely quiet, and much attention must be paid to diet and cleanliness. The symptoms of abortion are pain and hæmorrhage; the latter may be excessive, owing to a partial separation of the placenta from the walls of the uterus. Besides, it is always more difficult for the uterus to regain its normal condition after abortion than after labor at term.

Treatment of Abortion.—In a case of threatened abortion the doctor should be sent for at once, but if the symptoms are slight, absolute rest in bed and the avoidance of all mental excitement may be the only treatment necessary. If, however, the abortion seems inevitable and there is much hæmorrhage, the patient is to be kept perfectly quiet, with the foot of the bedstead elevated. and in an emergency the nurse may be called upon to tampon the vagina. If abortion takes place before the arrival of the doctor, all discharges must be saved in a covered basin for his inspection.

The rupture of the membranes some time prior to labor may be considered as an accident. The patient should be put to bed, kept perfectly quiet, and the doctor notified.

Convulsions sometimes occur during the pregnant state, and too often are the indications of uræmic poisoning. Nervous patients should be given plenty of light, nourishing food and gentle outdoor exercise, and be kept as free as possible from all worry and excitement.

Certain symptoms precede the onset of labor, beginning about two weeks or ten days previous to it, when the fœtus descends somewhat into the pelvic cavity; the pressure is now removed from the thoracic organs to those of the lower abdomen, and may cause frequent micturition and diarrhœa; œdema of the lower extremities is sometimes very marked, owing to the pressure on the pelvic veins. The cervix secretes a large quantity of mucus, which lubricates the surrounding structures and prepares them for the expulsion of the head. The vagina becomes softer; rhythmical uterine contractions come on in the evenings about 6 P. M. and last until midnight. These are not so noticeable in primiparæ as in multiparæ.

Labor is divided into three stages, which practically are not sharply separable in normal cases. The first stage comprises the changes which bring about complete dilatation of the cervix; during the second the child, and during the third the placenta is delivered.

The dilatation of the cervix is a gradual process: when the pains are first felt it may be possible only to introduce the tip of the finger through the os, but with each succeeding pain the bag of waters is pressed down and produces gradual and even dilatation. When a pain subsides, the bag tends to recede into the uterus, but with each subsequent contraction it continues to press upon the cervix until the tissues are fully relaxed. During this process the surrounding blood-vessels become congested, and the cervix may be slightly lacerated, so that the discharge is tinged with blood. When the external os is three inches in diameter, it is time for the membranes to rupture, and in a primipara this is the time to send for the physician. The rupture of the membranes should occur spontaneously, but occasionally it must be artificially produced by means of a grooved director, a sterilized darning-needle, or by a sharp finger-nail. After this the head descends into the vagina, a portion of the fluid remaining behind; as the head goes back during the interval between the pains, another portion of the waters comes away. This process continues, the pains gradually becoming more vigorous, until all the water is expelled. The head may be born without rupture of the membranes, and the child is then said to have been "born with a caul." The uterus, assisted by the abdominal muscles, continuing to contract, causes the child to descend, dilating the parts as it goes. Finally, the head comes down upon the perineum, and begins to dilate the vulval outlet. At this stage a certain amount of support should be given to the perineum during a pain, as the head presses upon it, stretching it each time a little more. While the head is being born the perineum should be supported by the hand, while at the same time the head is pushed upward, thus relieving the strain and lessening the danger of rupture of the perineum.

The placental or third stage lasts from the time that the child is born until the placenta is delivered; during this period the woman may complain of some slight disturbance, such as chilly sensations, and after the removal of the child the filling up of the blood-vessels of the abdomen may cause headache or even syncope. Before the placental pains come on there is a period of quiet of from five to fifteen minutes; then contractions begin again, and the delivery of the placenta takes place. In a normal delivery the placenta descends folded vertically in the axis of the womb through the vagina; after twenty minutes, if muscular contractions do not take place of their own accord, it may be necessary to excite them; this may be done by gentle friction over the fundus. Five or six gentle motions will be usually enough; if after gentle manipulation the uterine walls do not contract, the obstetrician usually expels the placenta by what is called "Crédé's method." The uterus is firmly grasped in the left hand, so that an even pressure can be exerted from all sides and from above upon the body, with the result of actually squeezing out its contents. The best plan is to stimulate the fundus gently by kneading it until a contraction is felt, and then express immediately. Traction on the umbilical cord should never be made under any circumstances by a nurse. As the placenta is expelled, the membranes may be caught in the os; even now no traction should be made, but one twists the membranes gently to prevent tearing, and waits a moment or two until the spasm of the cervix is over, when everything will come away. After the delivery of the placenta the uterus presents at the placental site a large raw surface with open bleeding vessels, from which there may be hæmorrhage if the uterus does not contract well. After the delivery of the child it is essential that one hand be kept always over the uterus until some time after the placenta is born. Occasionally the doctor will entrust the nurse with this duty. Any relaxation of the uterine walls must be carefully watched, as there is no danger of hæmorrhage from the torn placental vessels so long as the uterus keeps well contracted.

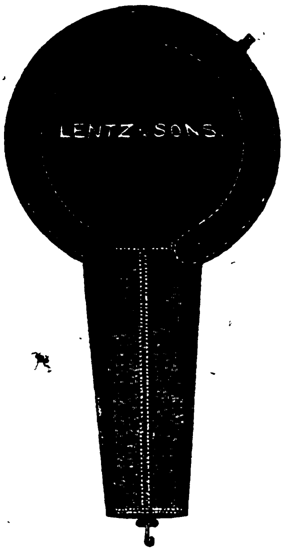
It is the numerous lacerations, small and large, of the uterus, cervix, vagina, and perineum which make the puerperal state so dangerous, since these are so many open pathways for infection with septic material. For this reason the same precautions must be taken in treating a patient in the puerperal state as in caring for any open wound; in other words, the most rigid antiseptic measures should be enforced.

The average duration of labor in primiparæ is seventeen hours, in multiparæ twelve hours. The second stage of labor in the former usually takes two hours, and in the latter one hour. Labor-pains usually begin in the evening, and the majority of births take place between the hours of 12 and 3 A. M.

When a nurse is called to assist at a confinement, her first duty is to see that the necessary articles are ready at hand, that the patient is prepared, and that the room and bed are arranged; she must also make sure that everything has been provided for the reception of the child. There must be plenty of hot and cold water, basins, preferably of china or granite-ware, ice, nail-brushes, disinfectant solutions (5 per cent. solution of carbolic acid, 1 : 1000 bichloride), sterilized vaseline, olive oil, plenty of towels, a basin for receiving the placenta, a bath thermometer, material for tying the cord, a rubber sheet, a small old blanket or a piece of an old blanket, a large square of old muslin or linen, and blunt scissors. A Davidson's syringe, ergot, and chloroform may also be required, but the doctor usually provides these.

The labor-bed should be of medium height, and situated so that it may be accessible from both sides; a hair mattress is the best, and it should not be hollowed out in the middle; a feather bed should never be used for this purpose. The mattress is to be protected with a large rubber sheet, and over this a cotton or linen sheet is placed; next comes a draw-sheet or large sheet folded once, which should be kept smooth and in position by means of safety-pins; then over this is placed a second rubber sheet and draw-sheet, which may be removed after the confinement with little difficulty, leaving the patient in a dry, comfortable bed. In addition to these sheets, pads may be prepared to absorb discharges: the most convenient size is about two feet square and two inches thick; they may be made of either bran, sawdust, or absorbent cotton, the last being rather more expensive. The cotton may be covered with cheese-cloth; soft old linen or muslin does very well for the bran-pads, the bran being prevented from becoming lumpy by loosely quilting the pad. These pads may be rendered perfectly clean by sterilizing in an Arnold sterilizer for half an hour before using, or by baking in the oven. When used properly they will absorb all discharges, and may afterward be easily destroyed by burning. These precautions can, however, be rendered unnecessary by the use of the obstetrical pad invented by Dr. Kelly, which prevents any soiling of the bed-linen. In private practice it is usually provided by the obstetrician. (See Fig. 18.)

FIG. 18.



SURGICAL RUBBER CUSHION.

The nurse should next prepare the patient by giving her a thorough bath, brushing the hair and braiding it into two braids; the bowels are to be emptied by giving a simple enema, and if the urine is not voided the patient should be catheterized. The external parts should be carefully bathed with soap and water, and then with a 2 per cent. carbolic-acid solution. The patient is best clothed in a clean night-dress and enveloped in a warm wrapper. Light, unstimulating, and easily digestible food is given, and she is allowed to move about the room during the first stage, unless there should be a previous history of precipitate labor.

The first stage of labor may occupy from two to six hours; during this time an examination is made from time to time by the nurse, or by the physician if he be present, to ascertain what progress is being made; but such examinations should be as infrequent as possible.

In preparing to make an examination the hands are to be scrubbed thoroughly with hot water and soap, the finger-nails cleaned, and the hands and forearms soaked in a hot bichloride-of-mercury solution (1 : 1000), being afterwards rinsed off in sterilized water. The examining finger is introduced into the vagina during an interval between the pains, as the membranes are then lax and the presenting part of the fœtus can be defined more easily; but if one wishes to determine the extent of the dilatation of the os, it is well to examine also during a pain, as the outline can best be felt when the membranes are pressed against it. Every examination should be made gently and carefully in order not to rupture the membranes. The patient should be cautioned not to bear down during the first stage, as this only exhausts her without doing any good. When the os is fully dilated and the pains begin to follow each other in rapid succession, she should be put to bed, a large sheet having been previously pinned about the hips, while the night-dress is folded neatly and smoothly up under the arms and fastened in place with safety-pins. This prevents the soiling of the night-dress, and the necessity of changing it when the labor is over may thus be avoided.

When in bed the patient usually lies either on her side or on her back, but preference is given to the left lateral position, since where this is employed at the end of the second stage there is less danger of tearing the perineum.

The expulsion of the head causes the most pain, and as long as it is advancing satisfactorily it is not considered wise to interfere. If, however, the head has been down upon the perineum for two hours and no progress has been made, the physician usually takes some steps to terminate the labor. It is in this stage, when the pains are too strong, that chloroform is administered in small doses, since the use of it calms the patient, weakens the pains, and prevents the too sudden expulsion of the head. Chloroform should never be given in the third stage of labor.

The most desirable presentation is that of the head. Any part of the body may present, and it is particularly important that the obstetrician see the case early, since sometimes a faulty position may be rectified before rupture of the membranes has taken place—a thing which would be impossible later. We are speaking here almost altogether of a normal labor, in which the occiput is the presenting part, and shall not refer to the cases in which another part, such as the face, breech, foot, arm, or shoulder, presents. These presentations will be found fully described in the text-books on midwifery, and it is important that a nurse who attends many labor cases should make herself conversant with many more facts about the subject than can possibly be considered in the brief space allotted to it in this text-book.

When the head is down upon the perineum, one finds out by means of the finger whether or not the cord is twisted about the neck, and if such a complication has taken place attempts may be made to slip the cord over the shoulder, and set it free during an interval between the pains, when the head has receded into the pelvic cavity. If the cord is prolapsed, efforts should be made to push it back carefully above the head, as there is danger of its being compressed during the passage of the head through the vulva, and thus the supply of oxygen to the child be cut off. After the head is born there is usually a slightly longer interval before the next pain: the nurse immediately wipes out the eyes and mouth of the child with pledgets of absorbent cotton soaked in a saturated solution of boric acid. The shoulders are born at the next pain, and with them, as a rule, the whole body. The shoulders in their passage, perhaps almost as frequently as the head, produce laceration of the perineum.

As soon as the child is born it is usually placed on its right side; the old idea was that this assisted in the closure of the foramen ovale. If the child does not cry or make some sign of life at once, it should be slightly shaken and a finger inserted into its mouth to remove any accumulation of mucus. A gentle slap on the back may excite inspiration, or a few drops of cold water sprinkled over it briskly with the fingers will often cause the child to give a cry. If these means are not successful, tickling the ribs in the region of the diaphragm acts as a strong stimulant to the respiratory centre, or a few drops of whiskey or brandy rubbed into the skin will generally be found efficacious.

Unless the child shows signs of asphyxia, the cord should not be cut until pulsation in it has ceased, or at any rate not until the child has cried. The cord should be tied in two places, the first ligature being placed about two or three inches from the child's abdomen, and the second about two inches farther away; it is then divided with scissors at some point between the two. Sometimes it is tied in only one place, but the second ligature is used as a precautionary measure to prevent hæmorrhage from the placenta, or in case there were still a second child in the uterus the loss of blood might otherwise be fatal to it.

The child should be at once wrapped in a large square of old muslin, and again in a flannel blanket, and laid in a warm place until the mother has been attended to: she should receive the first care unless there is difficulty with the child's breathing. After the birth of the placenta the first thing to do is to stimulate the contractions of the uterus in order to prevent hæmorrhage. This is done by palpating with the hand over the abdomen just above the symphysis pubis and grasping the uterus, which will be felt as a firm hard ball under the fingers. For at least half an hour after the birth of the placenta the hand should be kept on the abdomen, and every few minutes gentle kneading movements should be made in order to keep up the contractions of the uterus. If it is necessary to give ergot at all, this is the time, but this drug should never be given until after the delivery of the placenta. The latter should be kept in a covered dish until the physician has had time to inspect it. If any portion of the placenta is missing, the physician will seek to remove it, as retained portions are liable to decompose in the uterus and be a direct source of danger. The safest way to dispose of the placenta is to wrap it in paper and burn it, or it may be buried.

The external genitalia should now be thoroughly cleansed with a 1 per cent. solution of carbolic acid, and a sterilized napkin made of absorbent cotton and gauze put on. This dressing is changed once in three hours for the first twenty-four hours; after that once every four or six hours is all that is necessary. *The nurse should remember never to do this dressing, catheterize her patient, or care for her after a movement of the bowels without first thoroughly cleansing her own hands and taking every antiseptic precaution possible.* If a binder is used, the most comfortable will be a Scultetus bandage, as any degree of pressure desired may be made with it; it is held in place with the perineal straps. Sometimes extra pressure is made over the uterus by means of a folded towel placed under the bandage. The use of this depends, however, entirely upon the wishes of the physician: many do not employ such a pad, owing to the fact that it frequently becomes displaced, in which case it does more harm than good. After the patient has been bathed and cared for, she should be kept very quiet; no talking should be allowed, and visitors and members of the family should not be admitted to see her until after she has had some hours of rest. A constant watch should be kept upon the pulse, which at this time will have fallen to or even below its normal level. An unusually rapid pulse, such as one of 100 or more per minute, unless it can be accounted for by some other known cause, may be taken as indicating the occurrence of hæmorrhage. These "post-partum hæmorrhages" form one of the greatest dangers to be encountered after the birth of the child. The hæmorrhage may come on quite unexpectedly, and it is necessary to be always ready to meet this emergency and to take prompt measures to check it. The means by which nature endeavors to prevent post-partum hæmorrhage are contraction and retraction of the uterus; the sinuses are thus closed and the venous blood-vessels are occluded.

The best thing to do, and the one which can be done most quickly, if hæmorrhage occurs, is to induce contractions of the uterus by manipulation in the manner described when speaking of the third stage of labor: the foot of the bedstead is to be elevated, and ergot may be given hypodermically; ice may be introduced into the vagina or very hot douches given, and the patient should be kept quiet. If this fails, the hand and arm should be sterilized and introduced into the uterus, and the blood-clots removed; at the same time stimulation of the internal surface of the uterus with the finger-tips usually causes immediate contraction; the danger in doing this is that infectious material may be introduced unless the hand is rendered surgically clean. Perhaps the safest and most effectual method is to inject very hot water (120° F.) through a long douche-nozzle directly into the uterine cavity. Sometimes astringents may be introduced in the form of lemon-juice, or vinegar, which can always be procured. This emergency perhaps more than any other requires presence of mind and prompt action, and no time should be lost in making every effort to control the hæmorrhage. After we have been successful in producing contraction of the uterus, a rubber bag of cold water may be placed on the abdomen above the symphysis pubis to prevent subsequent relaxation. Cerebral anæmia and faintness from the enormous loss of blood may follow such a hæmorrhage. The symptoms and treatment are the same as those given when discussing hæmorrhage as a surgical emergency.

The puerperal state begins as soon as the placenta is delivered. Marked changes must take place in the uterus before it can return to its ordinary quiescent condition. Immediately following labor there is a period of comfort and relief, which may be followed by a post-partum chill of more or less intensity and of shorter or longer duration; this is not of very great importance, as after the birth of the head evaporation from the skin and lungs takes place, producing chilly feelings, which soon disappear after the patient has been made clean and comfortable. The temperature of multiparous patients may rise from 1 to 1½° F. in the puerperal state, but there may be a temperature of even 100.5° F. without the case being abnormal. This elevation is supposed to be due to organic disturbances which take place in the uterus, laceration of the cervix or vagina, or nervous influences. The pulse falls after labor, ranging between 60 and 70, and on the third day may go even as low as 40. Frequently this condition is associated with diminished arterial tension, but its cause is imperfectly understood.

The skin, which is a most active excretory organ, is constantly exposed to sudden changes of heat and cold. It is best not to cover the patient too warmly, but she should never be exposed to draughts, particularly if she be a nervous woman. The urine will be abundant, and not infrequently a trace of sugar appears in it. If the milk in the breasts is used up as rapidly as it forms, the sugar disappears. Retention of urine is a very common occurrence after labor, and is due to the previous overstretching of the bladder, and also to a want of elasticity in the abdominal muscles, which fail to assist the organ in its action. The loss of the contents of the uterus makes the entire weight of the body less by one-twelfth than it was before.

Involution, or the process by which the uterus returns to its normal condition, begins with the after-pains and continues for several weeks. The change is gradual, and the normal size and condition is slowly attained, fatty degeneration of the muscular fibres taking place. In the fourth week new cells form on the outside, while the inside cells waste away; in fact, we may say that a new organ is being constructed. This change produces a decrease in the weight of the uterus. The cervix quickly regains its normal size: at first it is soft and flabby, but two weeks after labor it should be about normal. The vagina is at first smooth and relaxed; by the third week it becomes much smaller, the change being more marked near the outlet than internally.

When involution is incomplete and the uterus remains larger than it ought to be, we have the condition termed "subinvolution." This may often be traced to getting up too early after labor, and is a frequent source of trouble to women who have borne children.

After-pains are due to contractions of the uterus, and resemble somewhat labor-pains. They cause the expulsion of blood-clots, and usually continue from one to four days. If labor is of short duration, the after-pains are intense and prolonged, and *vice versâ;* in multiparæ they are apt to be more severe than in primiparæ.

By the *lochia* we mean the discharges from the uterus and soft parts after labor. At first these discharges are mixed with blood (*lochia rubra*), and contain dark coagula, mucus, shreds of placenta, and pieces of membrane. From the end of the third to the sixth day they are paler in color (*lochia serosa*); they contain less blood and more serum, and epithelial cells from the cervix and vagina, besides portions of membrane. The lochia after this assume a yellow-greenish color, and contain pus and fatty cells, with a small quantity of blood. By the fourth day bacteria are plentiful and the discharges have a decided odor. The lochia vary in amount in different individuals; in those who menstruate freely and do not nurse their children they are increased.

The breasts on the third day are frequently swollen and very sensitive to the touch. Women who have these changes in the mammary glands frequently have swelling and tenderness in the glands of the axillæ, with chilly sensations and elevation of temperature. This was formerly thought to be a physiological process, and was called "milk fever," but now is supposed to be due to some form of infection. The colostrum is the first milk secreted, and as it comes from the breasts is a semi-opaque fluid which contains a large quantity of sugar and organic salts. It coagulates on boiling and has a laxative quality, driving out of the intestines of the child the meconium or waste material which they contain at birth.

The characteristic symptoms of the puerperal state are, then, enlargement of the breasts with well-marked areolæ; the uterus is enlarged; the vagina and vulva are swollen and œdematous; there is a lochial discharge, and frequently there is laceration of the cervix. If, after the first eight hours, the patient has not passed any urine, the catheter must be employed, absolute cleanliness of the parts being observed. The diet at first should consist of liquid, unstimulating food, given in small quantities and at frequent intervals; on the fourth day light diet, such as boiled eggs and milk-toast or custard, may be given, and to this may gradually be added chops and cooked fruits, as the latter will aid in keeping the bowels regular. If there be any tendency to constipation (and this is usually the case), the bowels should be opened by a simple or glycerine enema or by one or more doses of the compound liquorice powder, about 2 drachms, if necessary, at intervals of three or four hours, or half a glass of Hunyadi Janos water may be given three times a day.

The nursing of the child should be begun as soon as the mother has rested and recovered from the exhaustion, as the stimulation of the breasts by acting reflexly helps to bring on uterine contractions. The breasts before and after confinement should have special attention: they are to be bathed with alcohol night and morning, beginning two or three months previous to labor, as this hardens the surface. If the nipples are very sensitive, they may be protected with shields. Before touching the breasts antiseptic precautions should be observed with the hands, and the nipples should be carefully bathed after every nursing of the child. The patient should be warned never to handle her breasts herself, as there is always danger of introducing foreign material through the nipple opening, or, if there should be a fissure or crack on the nipple, infection may take place through it—an accident too often resulting in abscess of the breast. If the breasts are very full and hard, the quantity of milk secreted may be reduced by means of a breast bandage applied with even pressure. Care should be taken to keep the breasts soft and pliable by not allowing the deeper glands to remain unemptied.

The lying-in period usually lasts until after the lochia have stopped; by this time no pain is felt in the back and the patient is not easily exhausted. This takes from ten to fifteen days, or even longer.

Some of the suspicious symptoms during the puerperal state are a rise of temperature, a rapid pulse, a flushed face, a chill, pain and tenderness of the abdomen, an abnormal increase or decrease of the lochia, hæmorrhage, or, finally, an offensive odor of the discharges. At each time of changing the napkin the amount of the lochia, their color and odor, should always be noted, and if the discharge presents any unusual appearance, it should be kept for the doctor's inspection.

Puerperal Fever.—One of the most grave conditions which can occur during the puerperal state is that of puerperal fever: this results from a septic infection which has taken place during labor or the lying-in period. Every case of puerperal fever arises from the introduction of infectious material into some wounded portion of the genital tract. The modes of infection are two in number: first, the septic matter may be carried in on the fingers or instruments, and in this way physicians and nurses may be the agents of contamination. The second mode of entrance is readily understood when we remember the almost constant presence of bacteria in the cervical and vaginal structures and in the pubic hair. The nurse should see to it that this dreaded complication never occurs from any carelessness or lack of precaution on her part.

If called upon to nurse a case of puerperal fever, besides carrying out faithfully the treatment outlined by the physician, the nurse should do everything in her power to improve the patient's general condition. The woman should be kept thoroughly clean—she should be given plenty of fresh air to breathe, and her linen should be frequently changed. In addition to these attentions the nurse should see that the patient has a liberal supply of nourishment.

Eclampsia is the term applied to certain convulsions that may occur in pregnancy, during labor, or later in the puerperal period. They may be clonic or tonic. In the majority of cases, although not in all, premonitory symptoms announce the impending outbreak. Of these the most important are headache, vertigo, an unusual desire to sleep, flashes of light before the eyes, nausea, œdema of the face and extremities, disturbances of the memory, gloomy forebodings, and finally, the most important, the presence of albumen and casts in the urine.

The attacks may resemble somewhat those of epilepsy, but the cry is lacking and the facial contortions are far more hideous. When they occur during labor, the first one is often preceded by a short period of calm, in which the patient ceases to complain; she closes her eyes and seems to be asleep; the pulse becomes small and the respirations shallow. Then the convulsive seizure comes on, commencing in the muscles about the eyes and extending to those of the face and limbs. The superficial veins are swollen, the eyes become blood-shot, and the whole body cyanosed. Involuntary evacuations may occur. On awakening from the attack, the patient will complain of headache, impaired memory, and pains in the muscles. The body is often covered with a cold, clammy sweat. Too often the patient dies in the first attack, or convulsion follows convulsion with lightning-like rapidity till death occurs from sheer exhaustion.

Eclampsia predisposes to post-partum hæmorrhage and to puerperal inflammations. In fatal cases death results from asphyxia, due to spasm of the respiratory muscles or to exhaustion of the nervous system, either from the direct effect of the uræmic poisoning or from the continuous muscular exertion. The earlier the convulsions occur, the more unfavorable the prognosis. It is very rare for the convulsions, if they appear during pregnancy, to cease previous to the birth of the child. Under such circumstances half the children are born dead. The occasional examination of the urine of pregnant women is an indispensable precaution.

Albuminuria calls for special treatment. The utmost care should be taken to avoid all mental excitement, anything which would interfere with the digestion, and sudden variations in temperature. When there is œdema of the limbs and face a strict milk diet will be enjoined and suitable medicinal treatment will be ordered by the physician. The action of the skin is to be promoted by means of the wet pack, and the bowels should be kept freely opened by laxatives.

Puerperal Insanity.—The insanity which sometimes occurs during the puerperal period generally takes the form of melancholia, although genuine mania is not uncommon. In the treatment the orders usually are to check excessive discharges, support the patient's strength, and ensure perfect quiet and freedom from mental irritation. Upon the appearance of the first sign of this complication the child should be taken from the breast and the patient put upon liquid food given at frequent intervals. The bladder and rectum are to be emptied at proper intervals, and attention given to the regulation of the heat and light of the room. The skin is kept active by sponging, and the sacrum watched carefully for the appearance of bed-sores. All pictures or articles of furniture in the room which seem to disturb the patient must be removed, Dr. William T. Lusk says that he knows of no other condition in which a trained nurse can be so valuable. She must see that the patient is kept covered, that she does not injure herself, and that no member of the family is allowed in the room. Above all, the nurse must gain the confidence of her patient and try to keep her quiet without using force.

Cold to the head is effective for the severe headache which will often be complained of. The patient must never be allowed to get out of sight, and, above all, the mother and child should never be left alone together for a moment. During convalescence, rest and sleep, nutritious food, daily evacuations of the bowels, are factors which hasten a return to health, and little by little the patient may be brought back to her old habits and to the responsibilities of existence.

CHAPTER XXV.

THE NURSING OF CHILDREN.—CONVALESCENT CHILDREN.—CONDITIONS PECULIAR TO CHILDREN.—THRUSH.—CHOLERA INFANTUM.—CONVULSIONS.—INFANTILE PARALYSIS.—CHOREA.—RICKETS.—CROUP.—ECZEMA.—THE INFECTIOUS DISEASES OF CHILDHOOD.

THE two periods of childhood are *infancy*, which extends from birth to the age of two and a half years, and *childhood* proper, beginning at that age and lasting until the fourteenth or fifteenth year. The conditions of life during this time are very different from those of mature growth, and the principles upon which adults may be treated will not always apply to children; nor is the same kind of nursing suitable, for a nurse who may be entirely satisfactory for grown people sometimes utterly fails in caring for children. Besides tact and plenty of patience, there must be a certain sympathy that children are always quick to feel, and this, combined with judicious firmness, will make a nurse successful in the management of either well or sick children of any age. When children are sick the habit of observation on the part of the nurse is in the highest degree important, for, children being helpless and unable to properly understand or explain their own feelings, we have to depend on signs to tell us where the trouble is located, and we may be able to gather facts of much importance from what are apparently quite trivial symptoms.

The first attention to give the new-born is to wash the eyes as soon as the head is born, and to see that the pulmonary circulation and normal respiration are established. It is desirable, of course, that this should take place before the infant is separated from the mother. Some obstetricians hold that the cord may be cut directly the child has breathed a few times, while others maintain that in normal cases, and in the absence of any special indication, this should not be done till pulsation in it has entirely ceased. If respiration is not established after the removal of mucus from the mouth and contact with the air or by slapping the child on the back, a few motions according to Sylvester's method of artificial respiration may start the breathing. This may be instituted before separating the infant from the mother, but, as a rule, the cord should be cut as quickly as possible, and the child removed while some one else gives the necessary attention to the mother. Cold water may be sprinkled on the face and chest, and if this still fails, immersions in hot water and sprinkling with cold water must be resorted to. Another method of artificial respiration is that of Schultze. The operator, facing the child's back, puts an index finger into each axilla and his thumbs over the shoulders, so that their ends overlap the clavicles and rest on the front of the chest, the rest of the fingers going obliquely over the back of the chest. The child is first suspended perpendicularly between the operator's knees. Its whole weight now hangs on the index fingers in the axilla; by these means the ribs are lifted, the chest is expanded, and inspiration is mechanically produced. The infant is now swung up-

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ward till the operator's hands are just above the horizontal line, when the motion is abruptly but carefully arrested. The momentum causes the lower limbs and pelvis of the infant to topple over toward the operator. The greater part of the weight now rests on the thumbs, which press on the front of the thorax, while the abdominal viscera press upon the diaphragm. By these two factors the thorax is compressed and we get mechanically an expiration. After five seconds the first position is again resumed, and the lungs expand and fill with air. This process may be repeated several times until the breathing seems to be going on naturally. With delicate infants it should be the last resort.

After respiration has been established, the child is wrapped in a warm flannel with hot-water bags or cans near it, and left until the mother has been cared for. Infants at birth are covered with a white greasy substance called vernix caseosa, or "cheesy varnish;" this begins to form during the fifth month, and protects the skin from the action of the amniotic fluid; it is removed by oiling the child with olive oil or vaseline and afterwards rubbing it gently with a soft cloth. The eyes and mouth should be washed out with pure warm water, separate squares of soft linen being used for the purpose. If it be a premature birth or the baby be very small, weak, and undeveloped, an oil bath should be given, after which it should be wrapped in cotton wool and kept at a temperature of not less than 80° F. for the first ten days or fortnight. In some hospitals incubators are used for this purpose, but this is not often practicable in private houses.

To a fully-developed child the first bath may be given at once. Before beginning, everything necessary should be ready at hand—a foot-tub bath, warm soft towels and warm water, castile soap, olive oil or vaseline, small squares of muslin or linen, dusting powder, a dressing for the umbilicus and clothing, the latter consisting of a diaper, a flannel band, a loose long-sleeved flannel petticoat, and a simple soft white outside garment—the two last long enough to more than cover the feet. The child should be wrapped in flannel, and only the part which is being bathed at the moment should be exposed.

The head should first be washed in warm, slightly soapy water; but very little soap should be used with infants, as it is more or less irritating, and is apt to injure the fine texture of the skin. Next, one should carefully clean the parts behind the ears and the crevices of the neck, axillæ and joints, and those between the buttocks and thighs. It is well at this time to notice whether all the natural openings of the body are perfect; finally, the baby is put down into the tub of warm water at about 96° F. and washed off. The head and back should be firmly supported with the left hand and arm during the bath. After a minute or two it is lifted out, laid on a warm towel, and dried, not by rubbing, but by "patting." Powder should not be used unless there are signs of chafing in some part. The navel is then dressed, a hole being cut in the centre of a square of sterilized lint or linen, which is slipped over the cord and folded about it; the cord is then laid toward the left side, and over it is put another small sterilized cotton pad which is held in place by the flannel bandage, the nurse being particularly careful that this is not drawn too tightly. The binder may be kept on by sewing it smoothly with half a dozen large stitches, thus avoiding the danger of injury from pins. As a matter of fact, it is now held by some of the best obstetricians that a binder, far from being a necessary article, is rather calculated to do harm to the infant, from the undue pressure exerted by it upon the ribs and upon the diaphragm. After the first bath the child is not again bathed in the tub until after the cord has dried up and is ready to fall off, which will usually occur on about the fifth or sixth day, although the process may be delayed until the ninth day. During the bath the temperature of the room should be about 80° F., and the greatest care be taken not to expose the child more than is necessary to the air. After the bath the infant should be laid away in warm flannel wraps on its right side, and it is important that it should be kept in an equable temperature of about 80° F. for the first two weeks by the judicious use of hot-water bags and wraps. If care is taken in this particular, it will probably sleep the greater part of the time, and afterwards it may gradually be exposed to a lower degree of temperature. Within twenty-four hours after birth the first discharges from the bowels should come away; these consist of a dark greenish material, and are known as the meconium. If the meconium is not evacuated and the child has pain, a soap suppository held in the rectum for a few minutes will produce a favorable result. An old piece of muslin should be laid in the diaper to catch this discharge, and the whole burned, as it is difficult to wash the stain out of the diaper. The urinary organs should also be watched, and if urine is not voided flannel wrung out of hot water may be applied to the abdomen just above the symphysis pubis. Each time the diaper is removed the parts should be bathed in warm water, carefully dried, and a perfectly clean diaper put on. The breasts of babies of both sexes usually contain milk, and should not be interfered with, as inflammation and ulceration may develop and permanently destroy the functions of these glands; all pressure upon them should be guarded against.

All the baby's habits should be made as systematic as possible; there should be regular times for sleeping, feeding, and bathing from the very first.

The best food for an infant is of course the mother's milk. Certain pathological conditions in the mother, however, make it injurious; thus the existence of tuberculosis, typhoid fever, or pneumonia in the mother is a contraindication to the nursing of the child, although in a case of abscess of one breast the other, if it is healthy, may sometimes be used. The infant at first should nurse every two hours during the day, and every three hours at night, say at ten, one, and four. After the first six weeks this may be changed to every three hours during the day and twice at night. Between meals, if there be much crying, a little plain or sweetened water may be given, as the child is probably only thirsty. Water should be given regularly to drink in any case. Persistent crying does not occur without a cause in these early days of life, and is usually due to indigestion from over-feeding or from improper food, to gas-accumulation, thirst, or cold. Goat's milk is the best substitute for mother's milk, but it is not easily obtained, and cow's milk has to be used as being the next best. It should be diluted with boiled water before being given, as it contains more albumen than mother's milk, but the addition of water also lessens the percentage of sugar, fats, and salts; by adding a little cream, sugar of milk, and lime-water in proper proportions these objections may be overcome. Milk at first should be diluted in the proportion of 1 part of milk to 3 of water. After the second month Meigs' formula may be used, which is—

1 part milk;
2 parts cream;
2 parts lime-water;
3 parts sugar-water.

The sugar-water is made by adding one ounce of pure fresh sugar of milk to a pint of water.

The greatest care should be taken with the bottles, nipples, and stoppers. To have them thoroughly clean and aseptic, the bottle and nipple used should be boiled each day in a 2 per cent. solution of carbonate of soda for five minutes, and afterwards in plain water. When not in use the bottle is filled with boiled water and the nipple kept in a weak solution of boric acid. No change in the form of food need be made before the ninth month, but it will have to be given, of course, in increasing quantities, and the proportions of the milk and water must be changed. Unless the milk is known to be quite fresh, it is safer to have it sterilized—that is, rendered free or at least comparatively free from micro-organisms. A special apparatus may be had at little expense for this purpose, but where it cannot be obtained an ordinary nursing-bottle may be used. This is filled with milk and set on a small square block of wood about one inch thick, which is placed in a boiler so that the bottle does not touch the bottom. The water in the boiler should be about an inch deep, and the latter should be then closely covered and allowed to steam. The bottle should be plugged with clean cotton, and the steaming should be continued at least one hour, when the milk may be put away in a cool dark place. Several bottles may be sterilized at one time, enough to last for twenty-four hours, one bottleful being used for a meal; if any should be left over after feeding, it should be thrown away. Milk for use on a journey of two or three days' duration may be prepared in the same way, only that the steaming process must be repeated for three successive days, just as for the sterilization of salt solution, the preparation of which we have previously described. Of late there is some evidence to show that children fed for a long time on this milk (sterilized at 100° C.) do not do well. It is supposed that this is to be accounted for by certain changes brought about by the high temperature. A plan to obviate this has been recently recommended, by which the milk is subjected to a temperature of 60° or 70° C. for some time continuously—the so-called Pasteurization of milk. Time has yet to show whether or not this system will meet with general adoption.

After birth several physiological changes take place in the child. The bones, which at first are very soft and flexible, require some months to ossify and become firm enough to support the child, so that it can stand alone. A child should not be allowed to try to stand before it is a year old, and if permitted to sit alone it should not be left in this position for any length of time, unless some support is given to the back, because curvatures are apt to result if the weight of the body is thrown too early upon the slender bones. A child should be very carefully handled, as tossing it and throwing it up and down may cause serious injury.

The head may be of a peculiar shape, which may have been caused by pressure during birth. The bones of the skull do not unite firmly for some months, and the fontanelles must not be pressed upon, but the greatest care should be taken to protect them from injury. The sutures are yielding, and sometimes at birth the edges of the bones overlap. Very marked peculiarities in the shape of the head or of its bones may disappear after a few weeks' growth.

The stomach at first is very small, and very little food, one or two teaspoonfuls, will be sufficient for one feeding; when too much is taken the surplus will be regurgitated, a condition often mistaken for vomiting.

The skin soon undergoes changes: during the first few days it is red, later it becomes yellow, and after a few more days assumes its natural color. The yellow of jaundice may be distinguished from this yellow color, since in jaundice the conjunctivæ are also tinged.

The average weight of a newborn child is seven pounds; for the first two days it loses weight, and after this gains from two to six ounces a week.

Until after the first six weeks a child should sleep twenty hours out of the twenty-four. The habit of putting it quietly down, and allowing it to go to sleep without rocking or nursing, should be formed at once.

Regular bathing is of the greatest importance to a child's health. One bath should be given daily, not too close to the time for a meal, in a room of which the temperature is about 75° F. The temperature of the water should at first be 95° F., but after the child has reached the age of three months it may be lowered to 90° F. During the first three or four months the child should not be kept in the bath longer than two or three minutes.

The disorders common in the newborn are colic, jaundice, ophthalmia neonatorum, thrush, and affections of the umbilicus. An inflammation of the umbilicus is probably always due to infection, and the physician's attention should be called to it at once. If any moisture appears about the cord, iodoform, or, better still, a powder made of 1 part of iodoform to 6 parts of powdered boracic acid, may be thickly sprinkled about it, and a pad of sterilized gauze applied. The inflammation, unless checked, may prove serious, as the general strength fails rapidly, abscesses may form, and the termination be fatal. If granulations appear after the cord has dropped off, nitrate of silver in solution or stick is usually ordered to be applied gently, the wound being afterwards dressed with the iodoform and boracic-acid powder.

Colic is a very frequent disturbance, and one that begins very early in a child's life; it is due to an accumulation of gas in the stomach or intestines, and is caused usually by either over-feeding, improper food, or exposure to cold. The pain, which comes on in paroxysms, is sharp and griping. The child suddenly utters a sharp cry, the legs are drawn up, and on examination the extremities are found to be cold. With care in feeding and keeping the body sufficiently warm many of these attacks can be avoided, and frequently, when one does come on, the pain will cease if the child be held before the fire until it is well warmed through. Hot flannels to the abdomen have also been recommended, and internally a little warm water or peppermint-water may be given for two or three doses to relieve or expel the gas. Stimulants, paregoric, soothing syrups (most of which contain opium) should not be given under any consideration, simple heat being in the majority of cases quite as effectual.

Icterus, or *jaundice*, is often seen during the first and second weeks of life, but is not considered of much importance if the general health is good, as it subsides without treatment after a few days. The bowels should be kept freely open.

Ophthalmia neonatorum is an inflammation of the superficial tissues of the eye, particularly of the conjunctivæ. In the newly-born the cause is to be sought for in an infection during birth from the urethral or vaginal discharges of the mother, or the pus-producing organisms may be introduced afterwards by carelessness in handling. To avoid it, the moment the child is born and before its eyes are opened, the nurse should wipe carefully away all discharges, using for the purpose separate small squares of cotton or gauze sponges wrung out of a solution of boracic acid. At the first bath the eyes should be bathed first, and the same piece of linen should never be used for both. In some lying-in hospitals, especially in suspicious cases, as a matter of routine one drop of a 2 per cent. solution of nitrate of silver is dropped into each eye. At the onset of ophthalmia a slight redness of the eyelid about its edges is noticed, with a little swelling; this condition rapidly becomes worse, and at the end of twenty-four hours the swelling has increased, so that the eye may be wholly closed, and both the eyelids and the conjunctivæ are deeply injected, and pus oozes out; in some cases the purulent discharge is very abundant, and there will be danger of destruction of the cornea by ulceration and perforation. Upon the slightest indication of redness the eye should be frequently bathed with a warm weak solution of boracic acid, and sometimes cold compresses will be ordered. In any case the physician should be notified at once. In bathing the eyes no friction should be used, and the lids should be gently held apart without pressing on the eyeball. When pus appears, the eye should be washed out every hour, every half hour, or even oftener. This may be best done by letting the solution run over it from a medicine-dropper. After being allowed to trickle from the outer to the inner angle of the eye, it will then run down beside the nose, and can be caught on a piece of absorbent cotton or sponge. Where there is much pus, the eye may have to be irrigated in this manner every fifteen minutes, as the only way to save the cornea is to keep down the inflammatory process. When this has to be done at such frequent intervals, a small fountain syringe with a glass nozzle attached will afford a steady flow of the solution. No forcible stream should be used. Precautions should be taken to prevent the other eye from becoming infected, and no particle of the discharge should be allowed to touch it; in very bad cases the sound eye is sometimes covered. All sponges and cloths used should be at once burned, and the basin which has held them filled with 1 : 20 carbolic-acid solution. The nurse's hands should be thoroughly scrubbed in hot water and soap, and disinfected with the same solution. Touching the face or hair should be avoided unless the hands are quite clean.

The disease is prevalent among people whose dwellings are unclean and poorly ventilated, and who are dirty and untidy in the care of themselves.

Thrush, or *sprue*, is a disease in which small whitish spots or ulcers spreading into patches appear on the tongue, the sides of the mouth, and the gums of infants; in severe cases the process may extend over the entire cavity of the mouth, into the throat, and even down the gullet into the stomach; sometimes, although only very rarely, it has been known to invade the intestines. In serious cases the child may die of inanition, the throat and mouth being too tender and painful to permit of swallowing, or at other times death may result from the exhausting diarrhœa, which may be present. These patches result from the growth of a yeast-like fungus. Milk should not be allowed to remain along the sides of the mouth, but each time after food has been given the mouth should be washed out. The disease is combated with an alkaline wash, usually a borax solution (gr. xx to an ounce of water). It should be applied every two hours with a camel's-hair brush until signs of improvement appear. In all cases the child is fretful and irritable, and in the severer forms there will probably be diarrhœa. Thrush sometimes appears in adults in the later stages of tuberculosis and of some fevers.

Enteritis in children is known according to its form and severity by different names—viz. acute dyspeptic diarrhœa, cholera infantum, and acute entero-colitis.

Diarrhœa is a disorder that occurs among children chiefly during the hot summer months, and is attended with a high death-rate. The majority of cases occur during the first two years of life. It is due, as are so many children's disorders, to disturbances in the digestive tract. It is more common where improper forms of food have been given, and where sufficient attention has not been paid to cleanliness. Bottle-fed infants are very liable to it, particularly among the poorer classes, owing no doubt to ignorance on the part of mothers, who neglect to keep the feeding-bottle clean and the milk pure. As a rule, a child should not be deprived of the breast-milk during the hot months of summer, as diarrhœa almost invariably follows, but there are cases where the mother's physical condition is such that the physician is compelled to order an immediate weaning of the child.

With older children the diarrhœa is not only associated with the use of tainted milk, but frequently follows the eating of improper foods, such as unripe or decayed vegetables. In all cases it is believed that the diarrhœa results from abnormal fermentative processes due to bacteria. Summer diarrhœa may be first signalled by an increased number of evacuations from the bowels, with griping pains in the abdomen, which make the child fretful and restless, or it may come on suddenly and manifest itself by vomiting, griping pains, frequent evacuations, and fever. Care in the diet, giving only rice-water or albumen-water, and keeping the child quiet in bed, may be sufficient. Castor oil or calomel is usually ordered at first to remove the irritating cause. In the more severe forms, where there is much irritation of the stomach or intestines, the stomach and colon are sometimes washed out. To wash out the stomach a large soft-rubber catheter and funnel are used instead of the regular stomach-tube, and for irrigating the colon a catheter of the same size is used, being introduced as far as six or eight inches, and a pint or quart of lukewarm water is passed in at one time; if there be fever, cold water may be substituted. Milk, if given in the severe cases, should be diluted and sterilized; egg-albumen, barley-water, beef-juice, or cold mutton-broth may be given instead. In addition to a strict regulation of the diet, a change of air will generally prove of the greatest benefit. The poor emaciated weakling from the city is often restored in a very short time to health and vigor if it can be removed to the country.

Cholera Infantum, a disease less frequent than summer diarrhœa, but one which is extremely serious, is generally preceded by some mild disturbance of digestion, but may come on quite suddenly. It begins with continuous vomiting and frequent thin, watery stools, which are at first very offensive. The child has fever, the eyes rapidly become sunken and hollow, the features look pinched, and in extreme cases symptoms of collapse soon come on. The pulse is rapid and feeble; there is excessive thirst and restlessness at first, which may be followed by a condition of stupor. Starch and laudanum injections may be ordered; if so, they should be given cold and introduced high up, the starch having been previously well boiled. Plenty of water or cold barley-water may be given, and the food for a time will usually consist of egg-albumen with a few drops of brandy.

Entero-colitis, or *Catarrhal Dysentery*, is an acute inflammation of the colon and ileum, and may also follow an ordinary attack of diarrhœa. There is constant pain and fever, the stools are mixed with blood and mucus, and, in fact, sometimes consist almost entirely of these two elements. An attack may end fatally after forty-eight hours. Irrigation of the intestines may be ordered, and the nourishment is much the same as in the other diarrhœas. In any of these diseases there is apt to be chafing and soreness of the skin about the hips, which is kept almost continually wet by the frequent discharges. The bathing may be done with very thin boiled starch-water in place of soap and water, and the parts afterwards dusted with bismuth or oxide of zinc finely powdered. A flannel bandage should be worn over the abdomen and stomach, and kept on until the child has fully recovered. For the prevention, as well as the cure, of all such diseases, the child should always be kept properly clothed, the abdomen being more especially protected. Other hygienic precautions and care are of the greatest importance. A nurse, particularly a district nurse, may do much towards this. If she fully realize the importance of hygienic measures, and the results which almost certainly follow, and can induce the mothers to care for their infants properly, her privileges and opportunities for saving the lives of young children will be almost unlimited.

Convulsions may occur as a complication in diarrhœa, and are frequently produced also by improper feeding, congestion of the brain, affections of the ear, rickets, uræmic poisoning, the infectious fevers, such as measles, scarlet fever, whooping cough; again, they may be due to reflex irritation from teething; the pricking of a pin or the presence of worms may produce nervous excitability, and where other conditions tend this way convulsions may follow. The attacks occur more often during the first year of life, and may come on quite suddenly, or the onset may be gradual, restlessness with twitching and grinding of the teeth being premonitory symptoms. The hands stiffen first, and afterwards the whole body becomes rigid; the eyes are staring or rolled upward. In a few moments the muscles relax, and twitchings or convulsive movements are seen in the limbs and arms; gradually these cease and sleep follows. In bad cases the seizures may follow each other in rapid succession. If the physician is present, he usually gives chloroform during the attack; if the cause be over-distension of the stomach or indigestion, an emetic is given, and is followed by an enema. A warm bath is customary: this should be given with care, so as not to give the child too severe a shock. The temperature of the bath should be 96° F., not hotter; the warmth will relax the muscles and induce perspiration and sleep.

The head should be kept cool by cold compresses or by means of an ice-cap. Any possible source of irritation should be searched for, and when found should be removed.

Acute meningitis is an inflammation of the meninges of the brain or spinal cord; it may come on gradually and insidiously, or develop suddenly with continuous convulsions. It usually comes on in the former manner, with symptoms of fretfulness, restlessness, intolerance of light and noise, headache, and vomiting, and, as the disease advances convulsive attacks may occur. The bowels should be kept freely opened, perfect quiet enforced, the room darkened, and all causes for excitement kept away. Only liquid food at regular intervals should be given, and plenty of fresh air with thorough cleanliness is indispensable.

Infantile paralysis (acute anterior poliomyelitis) begins usually with high fever and convulsions, which are followed in a day or two by a more or less marked loss of power and atrophy of the muscles. A physician should be called at once. The treatment at first will probably be limited to reduction of the fever and the proper regulation of the bowels. After the acute stage is over, massage of the affected limb, with plenty of light nourishing food and fresh air, is recommended. A nurse may frequently be ordered to apply electricity for the purpose of maintaining a certain amount of exercise in the muscles, and so keeping up their nutrition.

Incontinence of urine is of frequent occurrence, especially in nervous children. It may be met with in connection with diseases which are accompanied by other and more prominent symptoms, or may be due to an increased quantity or to too great an acidity of the urine, to weakness of the sphincter muscles, or to the presence of pin-worms in the rectum. The child should be placed under the care of a physician, and regular habits of urination formed; if he is old enough, he should be taught to exercise his will-power. He should not be allowed to drink much in the evening. The bladder should be emptied just before going to bed for the night, and the foot of the bedstead elevated.

Chorea may be defined as a disease in which there are irregular movements produced by involuntary contractions of single muscles or groups of muscles. It is commonly spoken of as St. Vitus' dance. Young girls and children of a highly nervous temperament develop it most frequently. Absolute freedom from excitement and worry should be imposed, besides the best of hygienic surroundings, the child being amused in a quiet way, and in all severe cases kept in bed. Nurses should know how to manage such cases, as they often have the care of the patient with only occasional visits from the physician, and a great deal depends upon proper nursing.

Rickets, or *rachitis*, is a constitutional disease of childhood, characterized by deformities in the bones, owing to increased cell-growth in them, with a deficiency of lime-salts. Non-hygienic surroundings and improper food are the main causes, and the substitution of cleanliness, wholesome food, fresh air, and sunshine will effect more than drugs. The child is always pale and delicate-looking. The head may be unusually large, and the changes in the shape of the long bones be noticeable; the legs are perhaps more or less bowed, or the child may be knock-kneed. A most important point to remember is that deformities may often be prevented in the early stages if constant care is taken by the nurse in carrying and holding the child properly. Among the poor in crowded localities are to be found the greatest number of such cases.

Croup among children occurs in two forms—the false or spasmodic, and the true membranous or diphtheritic croup. The spasmodic form is supposed to arise from spasmodic closure of the glottis; it comes on suddenly, and may be the result of exposure to damp and cold, of excitement, or of indigestion. This false croup is not dangerous, but the symptoms are alarming, especially when, as most frequently happens, the attack comes on during the night: the child wakens from a quiet sleep with a hoarse cough, difficulty of breathing, and the mother fears that suffocation is imminent, since the face sometimes becomes perfectly blue. The spasm ceases abruptly and the child goes to sleep. Sponges or flannel wrung out of warm water are first applied to the throat, and a hot bath or a mustard foot-bath is sometimes given. An emetic consisting of a drachm of the wine or syrup of ipecac, repeated every half hour till free vomiting occurs, and a simple enema, are generally very effective. The attack frequently comes on for three nights in succession, an hour or so earlier each succeeding night. One should try to prevent an attack by taking precautionary measures during the day; thus the bowels should be freely opened with a dose of castor oil, only light forms of food be given, and the child kept in a uniform temperature.

In membranous croup a false membrane is formed in the larynx, and may thicken gradually until the passage is quite closed between the cords; in such cases, if the patient does not succeed in coughing it up, he is liable to die from asphyxia, and even where the membrane is not so extensive death may result from exhaustion. It is always well to consider this membrane as due to diphtheria, and to isolate the patient until an examination of the membrane has revealed the presence or absence of the diphtheritic bacillus. The symptoms come on gradually with a wheezing sound from spasm of the glottis, and as the membrane accumulates there is evidence of depression throughout the whole system. The temperature may range from 103° F. to 104° F. (although in some cases the patient may be apyretic), the pulse-rate may be increased, and the disease may terminate fatally after twenty-four or forty-eight hours. The air breathed should be moist; a steam kettle filled with lime-water may be kept boiling in the room, with the steam directed toward the mouth from a moderate distance. Careful attention to the diet is necessary: beef-juice and milk and stimulants, if the pulse indicate them, will be ordered, and it is usual to allow plenty of water to drink if the patient is thirsty. In extreme cases, where the child is apparently dying from suffocation and the services of a physician cannot be obtained, a nurse is justified in trying to remove the membrane with her finger. While waiting for the physician the nurse may make preparations for intubation or tracheotomy, either of which operations may be expected at this stage.

Eczema in children takes on various forms; the affection is an inflammatory disease of the skin. It may occur within a very short time after birth, and is most frequently the result of improper care on the part of the nurse. The flannel in which it is wrapped may be too irritating and rough for the tender, delicate skin of the child, or even a small amount of friction may produce chafing or redness. Again, the ointment or oils used may be impure, or the child may have been kept too warm. Further, the fæces and urine are irritating, and unless the infant be properly bathed and dried an eczema will be sure to appear. It occurs chiefly in the folds of the neck, behind the ear, on the head, under the arms, about the buttocks, and in the groins. For such patients soap and water should not be used for bathing purposes, as they are irritating, but some bland mucilaginous wash, such as thin starch-water, bran-water, or flaxseed tea, should be substituted, as these soothe the itching which is always present. On the scalp irritation may soon appear, unless care is taken to remove all of the vernix caseosa from the part. But over the fontanelles, as the spots are soft, the nurse had better leave an accumulation rather than incur the risk of doing harm. As a rule, however, gentle, careful cleaning, preceded by a good oiling, will soften and remove it. Besides thorough cleanliness, whatever treatment is prescribed by the physician should be faithfully carried out.

A rash appearing on different parts of the child's body may, however, be due not to eczema, but to one of the eruptive infectious diseases that occur in childhood more frequently than in adults, such as measles, scarlet fever, rubella, and chicken-pox.

Measles may occur at any age, but is most frequent in childhood; it is an acute, highly contagious disease, which may be divided into three stages—viz. those of invasion, eruption, and desquamation, respectively. The average period of incubation (*i. e.* the time which elapses between exposure to contagion and the onset of the first symptoms) is from eight to ten days or even longer. The stage of invasion sets in with coryza, simulating somewhat an attack of influenza, the running at the eyes and nose being accompanied by cough, fever, headache, and loss of appetite. The fever is highest on the third or fourth day, reaching 105° F. or more, and the reddish eruption appears usually on the morning of the fourth day, first upon the forehead, then upon the neck and chest, until finally the face and entire body may be covered with it. At first small red spots appear, which increase in size, and finally run together, and the papules or little elevations may be felt distinctly on passing the fingers over the skin. After two days the eruption begins to fade, the fever abates, and the catarrhal symptoms disappear, but the cough may continue for some days. As the eruption and fever decline desquamation or peeling off of the skin in fine branny scales begins. The child should be kept in bed on milk, or on light diet if there be little fever, the bowels should be made to move regularly, the temperature of the room should be kept at 68° F., and the ventilation must be looked after; exposure to sudden changes in temperature should be guarded against, and if the rash does not come out well, hot drinks or a hot bath and wrapping the child in flannel may hasten its appearance. The room should be moderately dark for the first few days, or the eyes should be protected from the light, as there is generally marked photophobia. When desquamation begins, the whole body may be smeared with vaseline or an oil bath may be given daily, usually in the evening, and a warm-water bath in the morning; usually some antiseptic is mixed with the oil or ointment. The complications in measles are often more serious than the disease itself; of these pneumonia is the most common and perhaps the most dangerous; bronchitis is also very frequent, and some degree of conjunctivitis is nearly always present. Isolation is usually ordered, and the clothing and the room must afterwards be disinfected as in other infectious diseases.

Rubella (German measles) is a contagious disease which spreads rapidly. The period of incubation is about ten days or a little longer. The initial symptoms are coryza, chilliness, pains in the back and legs, and some fever. The eruption appears first on the face and chest, and very soon spreads over the body. In appearance it resembles that of measles; after two or three days it fades away. The disease is usually mild, and the giving of a light diet, keeping the bowels active, and confinement to the house in a room of a warm equable temperature will be all that is necessary.

Scarlet Fever like measles, is a contagious disease which has a stage of invasion, one of eruption, and a third of desquamation. The time of incubation is variable, being from three to twelve days. The symptoms begin abruptly; there may be slight indisposition for a day, that may be taken for the beginning of an ordinary cold, but the temperature increases, and very soon rises to 102° or 104° F.; a higher temperature than this indicates a grave condition. The pulse-rate in mild cases is from 110 to 120, but in severer cases it may reach 160 or more. There is usually nausea and vomiting, the tongue is coated, and there is more or less dryness and soreness of the throat.

The rash generally develops on the second day, appearing first on the neck and chest in reddish spots and patches, which extend over the back to the trunk, and finally over the whole body. In mild forms the rash does not change in appearance, but in marked cases it takes on a vivid scarlet color. The so-called "strawberry tongue," due to swelling of the papillæ, now appears, the throat becomes red and swollen, and an exudation may sometimes be present closely resembling the false membrane of diphtheria. The duration is variable, depending upon the violence of the attack. In a typical case the rash gradually fades, and on about the sixth day desquamation begins, and is not completed until the twelfth day or even later; often the peeling takes three weeks or more.

There are various types of scarlet fever, the mild form lasting a week or so, the most serious kind, known as malignant scarlet fever, sometimes terminating fatally in two or three days; in the latter form the temperature may be very high, 109° F. or more, the pulse rapid, the restlessness extreme. These symptoms may be followed by delirium and coma in which the patient dies. The throat symptoms are sometimes pronounced, and in this form the appearance of a membranous exudation is not infrequent; the rash is dark red, and may even be hæmorrhagic. The patient must be completely isolated, and nothing left in the room in the way of furniture except articles which are absolutely necessary. In even the mildest forms the patient must be kept quiet and in bed until after desquamation has ceased, as nephritis is very liable to follow even these cases. When the fever is high, sponge baths are recommended, also tub-baths at a temperature of 80° F., or the cold pack. Milk and water are to be given freely.

The physician will probably direct that the urine be examined daily for albumen, and a careful record should be made by the nurse of the total amount passed. The period of desquamation is considered the most highly contagious, and much time and care must be taken to prevent the scattering about of the flakes of skin. When possible, they should be burned, and all linen should be put at once into disinfectants. Inunctions of oil night and morning should be given, the oil being well rubbed in all over the body. A warm-water bath should precede the inunction in the morning. Exposure to cold should be guarded against more especially in this stage, as the skin is very sensitive, and if the surface of the body is chilled and the action of the sweat-glands is checked, nephritis may follow. Any puffiness of the eyelids or limbs should be watched for. Particular care during convalescence should be taken in these respects, as the patient may feel so well that to him such precautions may hardly seem necessary, and if left to himself he is too often apt to be imprudent.

The complications to be watched for and guarded against, besides nephritis, are inflammation of the middle ear, extending from the throat, sometimes resulting in deafness, arthritis, or inflammation of the joints, throat or heart affections, and convulsions. The best of sanitary conditions should be maintained, and the general system well nourished. The patient is to be kept free from unusual excitement, and should be careful not to exert himself too soon.

Parotitis, or mumps, is an inflammation of both, more rarely of one of the parotid glands, involving also the surrounding connective tissue; it as an infectious and a contagious disease. The period of incubation varies from eight to fourteen days or more. The onset is usually marked with a chill, malaise, headache, and some rise of temperature; in nervous children convulsions often occur. The disease reaches its height in from four to five days, and then the pain and swelling gradually subside. Warm fomentations may be applied to relieve the pain, the bowels should be kept open, and soft non-stimulating food given. The ventilation should be good and the room kept at an even temperature. It is best to keep the child quiet. This specific parotitis differs from that seen sometimes as a complication of typhoid fever; in the latter suppuration is the rule.

Whooping cough or *pertussis* is an infectious disease beginning with a catarrh of the air-passages, just like an ordinary cold. The incubation period varies from seven to ten days. There is some fever, wheezing, and a short dry cough; at the end of eight or ten days the cough becomes worse and has the characteristic "whooping sound;" this whoop is really a prolonged inspiration occurring at the end of a paroxysm of coughing; the expirations are short and spasmodic. At the end of a fit of coughing frothy mucus is expectorated or there may even be vomiting. This stage lasts from six weeks to three months, or even longer. The child should be kept away from other children, and in bed during the first stage and while the fever lasts. Inhalations of steam are sometimes prescribed for the cough, while easily-digested, nourishing food is given throughout the whole course of the illness. In the later stages a change of air is advisable, as it often shortens the duration of the attack.

A high temperature and a rapid pulse are not considered such serious symptoms in children as in adults. The temperature in children should always be taken by the rectum, and the pulse during sleep will always be more reliable.

CHAPTER XXVI.

THE URINE.

THE urinary organs are the kidneys, the ureters, the bladder, and the urethra. The ureters convey the urine from the kidneys to the bladder, whence it is expelled through the urethra. Normal urine is a clear watery, yellowish fluid, with an acid reaction and with a specific gravity of from 1018 to 1020; it is composed of water (in the proportion of 960 parts in 1000), inorganic salts, organic constituents, together with some coloring matter and a small amount of mucus. The more important inorganic salts are chloride of sodium, phosphate of potassium, and the sulphates of calcium and magnesium. The organic constituents are chiefly urea and uric acid. The urine is an excretion; that is to say, it is a fluid which carries off waste particles that would be harmful if left in the system. Two important waste substances of the body are urea and carbonic-acid gas; the former is excreted by the kidneys, the latter by the lungs.

In speaking of the physical properties of urine we have to consider the quantity, color, odor, reaction, and specific gravity. The normal amount for an adult for the twenty-four hours is from 40 to 50 ounces or from 1200 cc. to 1500 cc. The normal amount in health may be increased by drinking large quantities of fluids, especially water, by diminished perspiration, and by emotion. The diseases which may increase the quantity of urine are diabetes mellitus, diabetes insipidus, hysteria, convulsions, and certain forms of Bright's disease; a temporary increase often marks the crisis in certain diseases—*e.g.* pneumonia. As a rule, where the quantity is large the color is pale and the specific gravity low. An exception to this will be found in diabetes mellitus, where the specific gravity is high, 1040 and more, although enormous amounts of urine may be passed. Under normal conditions the quantity may be diminished where only small quantities of fluids are taken and where the perspiration is increased. The urine is diminished in amount in fevers, in profuse diarrhœas, in certain forms of Bright's disease, and in puerperal convulsions. The normal odor of urine is aromatic. The normal reaction is acid, but the urine in health may be faintly alkaline at certain times of the day. Urine passed in the morning has an acid reaction, a high specific gravity, and a dark color; after a hearty meal it may be turbid, perhaps alkaline, and of low specific gravity.

To test the reaction litmus-paper is used; acids change the blue color to red, alkalies the red to blue. When urine does not affect litmus-paper, it is said to be neutral. When it changes slightly the color of both the blue and red paper, it is said to be amphoteric in reaction. It is more acid than usual in acute fevers and in rheumatism. Alkaline urine is of two kinds, the first being due to the presence of fixed alkalies, the second to the presence of ammonia. Alkaline urine is always more or less turbid. If urine is kept in a warm place, it decomposes, with formation of carbonate of ammonia; this decomposition is due to the breaking up of the urea as the result of the action of micro-organisms. These organisms may obtain entrance to the bladder from outside, and a cystitis may be caused, or if already present may be aggravated, by the passage of a catheter if antiseptic precautions are not taken.

Retention signifies the accumulation of urine in the bladder, with inability on the part of the patient to void it. *Suppression* refers to the failure on the part of the kidneys to secrete urine; in the latter case no urine will be found in the bladder. *Incontinence* of urine is the inability to retain it in the bladder.

The color of urine may be spoken of as pale, colorless to pale yellow or straw-color, amber, high-colored, reddish-yellow, dark brownish, or blackish. The urine is pale in cases of hysteria, in diabetes, and also in that form of Bright's disease in which it is of low specific gravity; the urine is high colored in febrile and inflammatory complaints, and in some cases of indigestion. Rhubarb gives it a bright yellow or red color, bile imparts a greenish tinge, carbolic acid gives it a dark brown color with the odor of carbolic acid.

By the specific gravity of urine we mean its weight as compared with that of an equal amount of distilled water. The normal specific gravity reckoning that of distilled water to be 1000 is, as we said, about 1020, but may vary in health from 1015 to 1030. The specific gravity is determined by means of an instrument called a urinometer. Urine should be allowed to cool before using the urinometer. In health high-colored urine is of high specific gravity, pale urine is of low specific gravity.

In describing urine after the qualities already mentioned, the absence or presence of sediment should be noted; a sediment may have the appearance of a fine powder, or be ropy, viscid, or stringy; we describe a sediment as flocculent when it appears in the form of soft flakes suspended in the specimen. In strictly normal urine no albumen is present. The presence of albumen does not necessarily indicate a disease of the kidneys; thus there will be albuminuria whenever there is blood or pus in the urine—*e. g.* in cystitis or pyelitis.

The principal tests for albumen are—

(1) *The Heat and Nitric-acid Test.*—To test by heat take a convenient quantity of urine in a clean test-tube (where the urine is turbid it should be filtered before testing), and boil it; if there is a large quantity of albumen present, it will be precipitated at once; add two or three drops of nitric acid, and if the precipitate remain the specimen contains albumen. In acid urine the albumen is precipitated below boiling temperature, but in alkaline urine the albumen may be held in solution after boiling, and acid is needed to precipitate it. If alkaline, neutral, or weakly acid urine gives a precipitate on boiling, this may be due to the presence of phosphates; if so, these will disappear on adding nitric acid.

(2) The second, and perhaps most common, test of all is the *acetic-acid-and-heat test.* The urine in a test-tube, if not already distinctly acid, is rendered so by the addition of one or two drops of acetic acid. The

upper stratum is now heated, and if there is a precipitate, this will show the presence of albumen.

(3) *Heller's Test, or the Cold Nitric-acid Test.*—Take a small quantity of nitric acid in a test-tube, and let the urine trickle, drop by drop, down the side of the tube upon it; if albumen is present, a white ring will form at the junction of the acid and urine. Occasionally a specimen rich in urea will show a ring of nitrate of urea, but in that case the white ring begins higher up than the point of junction, and floats off into the urine like a cloud; such urine may be diluted until the specific gravity is 1005, and the test repeated. Further, the nitrate-of-urea ring will dissolve on heating; the albumen ring will not.

Tests for Sugar (glucose).—

(1) *Trommer's Test.*—To a given quantity of urine we add one-third of its quantity of liquor potassæ, and to this, drop by drop, a 10 per cent. solution of cupric sulphate, until a precipitate begins to form; the mixture is then boiled. If sugar is present, red suboxide of copper will be precipitated. The test is not reliable for small quantities of sugar.

(2) *The Fermentation Test.*—A small piece of ordinary baker's yeast is put into a test-tube full of urine, which is placed mouth downward in a tray of mercury, care being taken to prevent the urine from escaping by covering the opening with the thumb as we invert the tube. If sugar be present, fermentation begins, producing, among other things, carbonic-acid gas, which accumulates in the upper part of the tube and gradually displaces the urine.

(3) *Nylander's Bismuth Test.*—The following solu-

tion is prepared: 2 parts of subnitrate of bismuth and 4 parts of Rochelle salts are dissolved in 100 parts of an 8 per cent. solution of caustic soda. Add 1 part of the Nylander's solution to 10 parts of urine, and boil together for a few minutes. If as much as one-tenth of 1 per cent. of sugar be present, the mixture turns black, owing to the formation of an oxide of bismuth. This is a very sharp test, and is probably the safest for general use. It must not be employed, though, when the urine contains albumen, as the latter substance forms a black sulphuret of bismuth.

Quantitative Test.—The amount of sugar in a given specimen may be estimated either by using Fehling's solution or by the saccharimeter, a modification of the polariscope. For the methods text-books on the subject must be consulted.

Sediments.—If normal urine is allowed to stand for a time, a light flocculent sediment, composed of mucus and epithelial cells, becomes visible; this is not abnormal. The so-called brick-dust deposits are made up of urates; these occur in urine which is acid and high-colored, and usually of a high specific gravity. They are not uncommon even in health, and need not excite any alarm.

The test for urates is that they disappear when the urine is heated. They are usually deposited in normal urine which has been allowed to stand in a cold room, and in larger quantities more especially in the urine of fevers and of acute articular rheumatism.

Uric acid occurs in crystals, and forms what is known as a cayenne-pepper deposit. Uric-acid crystals only occur in acid and highly concentrated urine.

Sometimes they are passed in fresh urine. These crystals occasionally form the nucleus for a stone in the bladder.

Oxaluria is a term indicating the presence in the urine of a considerable quantity of oxalate-of-lime crystals. They are either envelope-shaped or much more rarely dumbbell-shaped. The crystals of the triple phosphate of ammonium and magnesium are present in alkaline urine, and may form a large precipitate; they disappear upon the addition of acid.

Bile in the urine gives to it a decided yellow color, so that when such urine is shaken the froth has a distinct yellowish tinge. A common chemical test for bile-pigment is made as follows: A drop of urine is spread out on a white porcelain plate, and a drop of nitric acid (yellow with nitrous acid) placed beside it. At the point where the urine and acid meet there will appear a play of colors if bile-pigment is present; the colors produced are green, violet, and red, the first being characteristic. This is known as Gmelin's test, but it is not always satisfactory.

The sediment in urine may be organized; thus it may contain epithelium, pus and blood-cells, tube-casts, accidental deposits, and bacteria. Small amounts of mucus and epithelium may be found in perfectly normal urine; pus in the urine indicates inflammation of some portion of the urinary tract, and always calls for a careful examination. If the inflammation be in the urethra, most of the pus will be in the urine which is passed first, and it will be well to collect the urine in two vessels. A test for pus in the urine is to add liquor potassæ, and if pus be present the deposit will be ropy and viscid. In alkaline urine, without the addition of any chemical solution, such a precipitate will probably prove to be pus. Of course a microscopical examination is the best method of deciding as to the nature of all such sediments.

To prepare a specimen of urine for examination, the bottle used must first be sterilized; the urine is drawn directly into it, through a glass catheter if the patient be a woman, and the bottle corked with a plug of sterilized cotton or a perfectly clean cork. It should be labelled with the name of the patient, the date and the hour it was taken, and the full quantity passed in twenty-four hours of which it is a specimen; if it is from a ward, the name of the ward should also be added. The fresh specimen should be drawn before breakfast; that taken from the total amount of the twenty-four hours' urine will give more reliable information as to the average specific gravity, and consequently of the total amount of solids which are being excreted. In the latter case the jar containing the urine should be thoroughly cleansed, and must always be kept tightly covered.

Inflammation of the pelvis of the kidney is called *pyelitis;* it may be caused by calculi, and renal colic may accompany it. No certain diagnosis can be made from the condition of the urine.

Hæmaturia is a name applied to the condition in which blood appears in the urine; the specimen will appear smoky, and red blood-corpuscles will be found on microscopical examination. The appearance of the urine varies in hæmaturia according to the source and quantity of the blood.

Hæmoglobinuria is characterized by the presence of blood-pigment in the urine, derived from the hæmoglobin of the red blood-cells. The blood-cells themselves are either absent or only found in insignificant numbers.

Uræmia is a diseased condition caused by retention in the blood of the waste substances which normally should be carried off by the kidneys; the symptoms may be very marked; there may be intense headache, nausea, vomiting, severe twitchings, or even convulsions and coma; but in chronic cases these indications may be so slight that they may perhaps pass unnoticed before an examination of the urine has been made.

For *retention* of urine, before resorting to catheterization attempts should be made to have the urine normally expelled by hot applications over the region of the bladder; in women a hot sponge placed over the vulva will often have the desired effect. Sometimes ice-water is injected into the rectum, or water is allowed to run down over the pubes, or where retention is due to nervousness the mere sound of running water may succeed in relieving the condition. If the urine is drawn by catheter, the operation should be repeated every six or eight hours according to directions, and the bladder should never be allowed under any circumstances to go over twelve hours without being emptied.

Incontinence of urine will sometimes be due to overdistention of the bladder, and where this is the case catheterization will be indicated. When rubber urinals are ordered for incontinence, they should be washed out thoroughly at least twice in the twenty-four hours in a solution of hot water, soap, and borax. In fact, if at any time there be the least odor from them, they must be thoroughly scrubbed.

Bright's disease of the kidneys assumes several forms, and may be acute or chronic. In the acute form there is an inflammation, which comes on suddenly and may be the result of exposure to cold or occur as a complication in some of the infectious fevers, particularly scarlet fever, or after the employment of certain toxic agents, such as cantharides or turpentine. The most prominent symptoms are a peculiar paleness of the skin, accompanied by dropsy, the swelling being first noticed about the eyes and ankles. There may, however, be severe kidney disease without much œdema, though headache, nausea, and other uræmic symptoms will generally be present. The quantity of urine is diminished or there may be total suppression; albumen is always present; the amount of urea excreted is lessened, and casts of the uriniferous tubules are found on microscopical examination. Every effort should be made to keep the skin and bowels active. The physician may order a sweat bath first and plenty of cream-of-tartar water to drink, which the nurse will make by dissolving a drachm of cream of tartar in a pint of boiling water, and adding the juice of half a lemon and a little sugar; this is to be given cold. Exposure to draughts and sudden changes in temperature should be guarded against.

In the chronic form, which may last for many years, the quantity of urine is often increased, the specific gravity is generally low, and in many cases only a trace of albumen is demonstrable.

A record of the amount of urine passed in the twenty-four hours will often be of great assistance to the physician in his treatment of the case in almost any disease, but where the kidneys are implicated such a daily record should be considered indispensable.

CHAPTER XXVII.

Infectious Diseases.—Fever.—Typhoid Fever.—Malaria.—Dysentery.—Asiatic Cholera.—Small-pox.—Erysipelas.—Septicæmia.—Pyæmia.—Tetanus.—Diphtheria.—Pulmonary Tuberculosis.

Fever is present in almost all acute infections; it is not a disease in itself, but a symptom. The progress of a disease may oftentimes be estimated and indications for treatment may often be obtained by watching the course of the fever. In all febrile diseases there is waste of the body-tissues, and this is usually proportionate to the height and duration of the fever. In caring for fever cases one should arrange for absolute rest of mind and body, as exertion produces not only an elevation of the temperature, but also an increase in the pulse-rate, and thus adds unnecessarily to the tissue-waste, while at the same time it increases the strain upon the heart. The patient should be made as comfortable as possible; there should be a constant supply of fresh air; the bed must be carefully looked after, and always kept fresh; all heavy clothing should be avoided; a night-gown which opens throughout the front for the patient, and a sheet and a light blanket for the bed, will usually afford sufficient covering. If regular sponge-baths are not ordered to reduce the temperature, at any rate a sponge-bath should be given every morning, and repeated at night if possible; if the patient is so sick that nothing more can be done, the face, hands, and back at least should be sponged. Frequent cleansing of the mouth is desirable, not only for comfort, but also to prevent bacterial growth in it, and thus lessen the chances of a complicating parotitis or an otitis media. The bodily strength should be kept up by the regular administration of nutritious food, given in liquid form, milk, as a rule, being the best. The temperature may be reduced either by medicinal agents or by applications of cold water; the latter method is the one most extensively used at present, the majority of physicians believing that antipyretic drugs produce too much prostration if continued through a long illness.

These general directions apply to the management of fever when present in any disease. We shall now speak briefly of the infectious diseases, by which we mean those resulting from an invasion of the body by micro-organisms.

Typhoid fever is an acute infectious disease, supposed to be caused by a certain organism (Eberth's bacillus). The disease is associated with a fever running a definite course, with local inflammation and ulceration in the small intestines, particularly of the glands of Peyer. These *Peyer's patches* are scattered throughout the mucous coat of the small intestines, being most numerous in the ileum; the inflammation and ulceration may also extend into the colon, in which case the solitary follicles are chiefly involved. Typhoid is most frequent in the late summer and autumn months. The majority of cases occur in individuals over fifteen and under forty years of age. The period of incubation lasts from one to two weeks, and the duration of the fever in moderate cases is about three weeks, convalescence beginning in the fourth week; in protracted cases, however, convalescence may not begin before the seventh week.

The prodromal symptoms are—constant headache night and day, aching of the limbs, and a dull tired feeling, with chilly sensations, loss of appetite, and perhaps nose-bleed. There is usually a gradual and progressive rise of temperature, with morning and evening variations, the evening temperature being higher on each successive day by a degree or a degree and a half, generally reaching 103° or 104° F. by the eighth day, where it remains with but slight variations during the second week. There is also but little difference between the night and morning temperature during this time, but in the third week there is a distinct fall in the morning and a gradual decline in the evening temperature. The pulse-rate increases proportionately with the temperature, going to 100 or 110 or even higher. A bronchitis with a troublesome cough may be present from the beginning and continue throughout the attack. The rash appears from the seventh to the twelfth day in the shape of rose-colored spots seen on the abdomen and thighs, and sometimes on the back, which disappear on pressure and return when it is removed, each spot lasting about three days. The rash often appears in successive crops. The tongue at first is coated and white, but afterwards may be very dry, dark, and cracked if the sordes that accumulate rapidly are allowed to dry upon it. The lips may be in the same condition and become very sore. By "sordes" we mean the dark-brown accumulations which remain in the mouth, being a mixture of food, epithelium, and micro-organisms. They collect thickly on the tongue, teeth, and lips, but such collections can be prevented to a great extent by frequent washing out of the mouth with antiseptic cleansing lotions and by giving the patient plenty of water to drink, especially after he has taken milk or other food. The mouth is most easily washed out with small squares of gauze or soft muslin, which after use are to be at once burned.

Constipation or *diarrhœa* may be present at first, the latter being more frequent, but an average of three or four stools a day during the second week is not uncommon. These stools have a yellowish, pea-soup appearance. Notice should be taken if there be anything unusual about them, so that they may be kept for the physician's inspection; if there be constipation, the bowels should be opened daily by an enema, which should not, however, be given without the orders of the physician. The care of the excreta has been described elsewhere. The characteristic odor of typhoid discharges is prone to cling about the patient unless scrupulous cleanliness in regard to the body and linen is observed. Its presence is always a sign of careless nursing. The urine is diminished in quantity at first, and retention should be watched for; later the flow is more abundant.

Hæmorrhage from the bowels may occur at any time after the second week. The first indication is usually a sudden fall of temperature with symptoms of collapse, or the blood may appear suddenly in the stools. The patient should be kept perfectly quiet on his back, the foot of the bedstead elevated, and an ice-bag applied to the abdomen. A sudden drop in temperature from high fever to or even below the normal should be at once reported, as it may indicate either hæmorrhage or perforation. The hæmorrhage comes from the sloughing through of the wall of a vessel at the base of an ulcer.

Perforation of the intestine is one of the greatest dangers in the course of typhoid fever. The wall of the intestine gives way, and through the hole, which is often very small, the contents escape into the peritoneal cavity, giving rise to a peritonitis which generally ends fatally. The symptoms are those of collapse, accompanied by severe pain, with a sudden fall of temperature, a small rapid pulse, and distension of the abdomen.

Tympanites.—Distension of the abdomen from gas in the intestines is frequently present, but is not considered a serious symptom unless it is persistent and marked. If turpentine stupes are ordered, care should be taken to have them well applied. Turpentine enemata are sometimes given for the same condition.

A relapse may occur once, sometimes indeed even two or three times, after convalescence has apparently begun. Then too, besides a genuine relapse, there are frequently marked elevations of temperature, lasting a few hours or days, due to errors in diet, over-exertion, or excitement. The nurse must be careful about these, and also avoid anything which might put too sudden a strain on the enfeebled heart, as sometimes death results from heart paralysis.

For *insomnia* or other nervous symptoms the ice-cap may be ordered or iced cloths be applied to the head. Sometimes sponging will allay the restlessness. A delirious patient inclined to get out of bed should be watched constantly. Among the symptoms which are considered unfavorable are marked muscular twitchings, subsultus tendinum, excessive tympanites, prolonged high temperature, and a rapid fall of temperature. A gradual fall of temperature, while the tongue becomes moist and clear about the edges, with return of appetite, are all symptoms of approaching convalescence.

The treatment usually prescribed, besides the reduction of the temperature, consists chiefly of good nursing. The temperature is reduced by the application of cold water, by means of the tub-bath, spongings, or the cold pack, all of which procedures we have already described in the chapter on "Baths."

Liquid diet is ordered while the temperature remains high, milk being the principal food; from three to four pints are usually given in the twenty-four hours (from four to six ounces every two hours), being diluted with either plain or aërated water. Milk may be alternated with chicken-broth, beef-tea or mutton-broth, albumen-water, or weak cocoa, and plenty of water should be given to drink, whether asked for or not. Strained lemonade, iced tea, or coffee may be given occasionally. Whether or not a patient shall be wakened for his nourishment at night is to be decided by the physician.

Soft food, such as eggs, milk-toast, custards, and jellies, is usually ordered when there is no fever in the evenings, but physicians do not, as a rule, allow any solid food until a week or ten days after the temperature has become normal, and then it is necessary to begin with small amounts. Milk or food of any kind should not be allowed to remain beside the patient or anywhere in the room. Especial care should be taken to disinfect the dishes used for typhoid patients, and no milk or food of any kind intended for other patients should be allowed to come in contact in any way with a typhoid case, as the bacilli which cause the disease find in them suitable media for growth and development.

The ventilation of the room, the cleanliness of the patient's person and of his bed, the disinfection of the linen and of the excreta, regularity in diet,—all are things to be very particular about in caring for a case of typhoid fever. The patient should be turned from side to side frequently, and his back supported by a pillow. Bed-sores must be watched for, and any evidence of local inflammation or abscess at once reported.

Typhoid is probably contagious only through the fæces; but nurses should always be careful to disinfect their hands thoroughly after working over a case, and especially before going to meals. Water is one great source of infection, and should be boiled before it is used if there is any suspicion that it is contaminated.

Malaria is an infectious disease due to animal organisms that invade the blood and rapidly destroy the red blood-corpuscles. It is characterized by an intermittent type of fever, a paroxysm occurring usually every day or every second, third, and much more rarely every fourth day. There is also a remittent type and a chronic type. The most frequent form is the intermittent, in which there are definite chills. Three distinct stages may be observed: first, the cold stage, in which the patient has a chill of greater or less intensity, lasting from ten or fifteen minutes to more than an hour, during which time he suffers from intense headache, backache, sometimes nausea, and vomiting, the temperature rising rapidly; in the second or hot stage the patient feels as though he were burning up, the face is deeply flushed, and the temperature goes to 105° F. or higher: after from three to five hours the temperature falls, and we have the third stage, in which there is profuse perspiration, the headache and other symptoms subsiding, and the patient, though weak, feels better. The attack may come on the next day (more often one day is missed) unless something is done to destroy the organisms in the blood. During the paroxysm the patient may be made more comfortable by hot bags to the trunk and feet, with an ice-cap to the head; for the intense thirst aërated waters or lemonade may be given, the latter being particularly acceptable. A sponge-bath is often ordered to be given both during and after the fever, and when the patient has ceased to perspire the linen should be changed. If the infection persists, a condition known as chronic malaria may be established, with development of a marked anæmia from decrease in the number of the red blood-corpuscles.

Dysentery is a disease in which there are frequent stools containing mucus and blood, accompanied by tenesmus. The acute catarrhal form is an inflammation of the large intestine. It may begin as a painless diarrhœa, but in a short time there are griping pains and straining, the stools consisting chiefly of mucus and blood. The duration of the disease is from four to twenty-one days. The amœbic or tropical form of dysentery is characterized by the presence in the stools of an animal organism called the *Amœba dysenteriæ*. It is uncommon outside the tropics; the stools, as a rule, are frequent and have a characteristic odor, which may be rendered much less offensive by the use of permanganate of potassium as a deodorizer. The patient is to be kept quiet in bed in all forms of dysentery, and liquid diet, usually milk, is ordered. If curds appear in the stools, the amount of milk given is to be lessened, or egg-albumen and beef-juice may be substituted. If injections of quinine or other drugs into the colon are ordered, they should be given in large quantities, high up and very gently. Antiseptic precautions are to be taken with the tube and vessels after use, the patient must be kept scrupulously clean and his linen and the discharges must be sterilized. Cold applications to the anus sometimes relieve the tenesmus.

Asiatic Cholera.—From bacteriological studies of this infectious disease it has been found that it is due to a certain kind of bacterium present in the evacuations from the bowels, and that it is probably chiefly contagious through the stools or by the contamination of water used for drinking and household purposes. In consequence, rigid disinfection of the stools and of the linen is necessary, and only boiled water and well-cooked food should be taken when the disease prevails. The stools of cholera patients are at first yellowish in color, but soon change to the so-called "rice-water" stools; they are profuse and very frequent, so that unless the disease is checked the patient soon falls into a condition of exhaustion and collapse. Hot applications may be made over the abdomen and heat applied about the body; warm injections of tannic acid have been used with some success, and subcutaneous injections of warm salt solution (4 grammes to the litre) are recommended as valuable in that they supply the loss of fluid from the blood and system consequent upon the profuse watery evacuations. Opium is usually given to control the pain, and plenty of ice-water to allay thirst. There is no great danger in nursing a case of cholera if sufficient attention be given to the food one takes and the water one drinks.

Small-pox, or *variola*, is one of the most virulent of diseases. The poison is present in the secretions and excretions, being given off chiefly from the lungs and skin. The stage of incubation is from seven to fourteen days; the disease proper begins with chills, intense headache, severe pains in the back, and vomiting, the temperature rising rapidly to 103° or 104° F., with a full, rapid pulse. On the third or fourth day the rash appears in the form of small red spots, showing itself first along the junction of the forehead and hair, whence it spreads over the body. When the rash appears the temperature falls, and the spots or papules gradually develop until the sixth day, when they become pustular. With the suppuration the temperature again rises, and there is much swelling of the skin about the pustules, with tension and pain, more particularly in the face. In the discrete form, where the pustules remain separated, the temperature drops in a short time and convalescence begins, the swelling subsiding, and the pustules drying up and desquamating; in the confluent form, however, the pustules increase in size, run together, break down, and form crusts over the surface of the skin, particularly of the face and hands, until about the third week, when the fever abates and the crusts gradually dry up and drop off, provided the patient has survived the attack. In the confluent form there is great thirst and often delirium; the danger is greatest in such cases about the tenth or eleventh day, being in proportion to the intensity of the eruption. Broncho-pneumonia is a frequent complication.

In caring for a small-pox patient the best hygienic measures should prevail, the air being fresh and kept at a temperature of 65° F. The patient should be lightly covered. To reduce the fever either cold sponging or bathing may be ordered. The food must be liquid, and water may be given freely. The face should be protected by a mask made of lint dipped in cold water or in 1 per cent. carbolic-acid solution, and then covered with oiled silk. When the scales begin to form, to prevent them from scattering and to keep the crusts soft, vaseline or oil is applied and warm baths are given daily. Dilute carbolic-acid solutions are useful in counteracting the offensive odor. Particular attention should be paid to the eyes, mouth, and throat, and all sponges or dressings used should be burned at once. If possible, the patient should be in a room with an open fire, which renders this burning a matter of little inconvenience. Isolation should be kept up until the skin returns to its normal condition.

Erysipelas in an acute infectious disease, the result of the invasion of a virulent micro-organism (*streptococcus*). It may appear from three to seven days after exposure, and be ushered in by a chill and elevation of temperature. If it be a wound that has become infected—and the majority of the cases of erysipelas arise in this way—a bright-red flush appears about it. The patient should be isolated at once and the usual precautions taken. The diet must consist of liquids or of light, easily digestible food.

The terms *septicæmia*, *pyæmia*, and *sapræmia* have come to have an altogether different significance since our knowledge of the infectious processes has become extended. In both septicæmia and pyæmia there is a general blood-infection with pus-producing bacteria, resulting usually from the infection of an open wound, accidental or operative. In an *acute septicæmia* the cocci multiply rapidly in the blood, and are very virulent, causing death sometimes in twenty-four or forty-eight hours through a direct poisonous effect upon the whole system. The symptoms are, as a rule, a sudden chill, accompanied by considerable elevation of temperature, a rapid, compressible pulse, and vomiting.

In *pyæmia*, on the other hand, either the bacteria are less virulent or the patient's tissues are more resistant, and the disease, lasting longer than acute septicæmia, results in the formation of multiple abscesses all over the body, particularly in the joints and larger organs. The fever runs the so-called "choppy" course which is seen on the charts of pus cases of all kinds, the temperature being perhaps normal in the morning, and going up to 103° or 104° F. at night. There will be chills, followed by profuse sweating; the patient becomes rapidly emaciated, develops a hectic flush on his cheeks, the pulse becomes small and very frequent, and finally death occurs from exhaustion. There is no sharp dividing-line between septicæmia and pyæmia, and cases apparently halfway between the two conditions above described have been called cases of septicopyæmia.

Sapræmia is an entirely different process. Here the pus-formation is altogether local, and the bacteria do not get into the blood and go all over the body. Severe symptoms, and even death, may nevertheless occur from absorption of the toxic chemical products from the local abscess or slough.

Tetanus, popularly known as lockjaw, and formerly supposed to be purely nervous in its origin, has been proven to be caused by a peculiar kind of bacillus. This species is found most often in garden earth, manure, or putrefying fluids, the poison being conveyed by the earth or dirt that is carried into a wound either at the time of its occurrence, or afterward where it has not been properly protected. The affection begins with stiffness in the neck, and a tightness about the jaws which increases until finally there is a tonic contraction of the muscles of mastication, which is called lockjaw; the stiffness extends gradually over the body. These spasms are severe and painful; the patient lies perfectly stiff and rigid, or may be drawn up so that he rests upon his head and his heels. The greatest quiet should be observed, as noise or irritation may excite more convulsions; the room should be darkened, and no one allowed to enter but the physician and nurse. These cases are usually fatal. If nourishment cannot be taken by the mouth, an attempt should be made to give it by means of a tube, by the rectum or through the nose.

Diphtheria is an infectious and highly contagious disease, the result of a specific germ which gives rise to a fibrinous exudate upon the mucous membrane in the throat, with severe general blood-poisoning. It begins with a chilly sensation, headache, and general aching of the muscles and some soreness and swelling of the throat. The membrane is first seen, as a rule, upon the tonsils, and becomes more or less extensive according to the severity of the case. At first it is of a grayish-white color, which afterward changes to a dull gray. The temperature ranges from 102° to 103° F., but may be lower. The glands in the neck are enlarged.

Local applications are made, and everything is done to keep up the patient's strength, in order that he may be able to resist the effects of the poison on the system. General prostration is very marked toward the end of the attack. Stimulants are usually ordered from the beginning. As the disease is very contagious, a nurse in swabbing out the throat should be careful not to become infected herself by any discharge that may be expelled during coughing or when she is applying the disinfectants. The expectoration should be received in small squares of muslin and at once burned. The bed-linen, dishes, and room should undergo the most rigid disinfection before being again put into general use.

Temporary paralysis is not infrequently a sequel of diphtheria. It may be local, affecting only the muscles of the throat and palate, or it may be more general, and include the muscles of the limbs. The eye-muscles, too, are often paralyzed. Heart failure may occur even after convalescence has commenced, and any undue exertion should be avoided. A nurse should be more than ordinarily careful of her own health while taking care of a case of diphtheria, and it is a good plan to use preventive treatment by gargling the throat and possibly taking a tonic; the physician will no doubt see to this where the nurse has but little sleep or opportunity for daily change of air.

Pulmonary tuberculosis has been intentionally included in this chapter for the reason that, after all that has been written on the subject, thousands of valuable lives are lost every year because people will not understand that one case of tuberculosis can be the cause of many others, and that this disease, which is commonly called "consumption," could, with proper precautions, be almost entirely stamped out.

The disease may be either acute or chronic. In the acute form in the early stages there is consolidation of the lung, and later softening or excavation, which follows the liquefaction of the necrotic tissue.

The bacilli enter through the air-passages and lodge at some point on the respiratory surfaces. The most frequent starting-place is at the termination of a bronchiole, just before it opens into the lung alveoli. The apex of the right lung is most often first attacked. The symptoms are a dry, hacking cough, with gradual but steady emaciation; there may be sharp pain in the side, with a rapid and feeble pulse, the temperature being normal in the morning and elevated in the evening. When cavities form, there may be occasional chills, and profuse sweating may occur, especially when the patient is asleep. The expectoration is opaque, muco-purulent, and contains tubercle bacilli, and in the later stages elastic tissue; it may be glairy, tenacious, and streaked with blood, and will become more profuse until the breaking down of the lung-tissue has begun; there may be nausea, vomiting, and diarrhœa, particularly late in the disease. The skin has a pearly pallor, the hectic flush appears on the cheeks, and the eyes are bright and glistening. Hæmoptysis is sometimes the very first symptom, and it may occur at intervals throughout the disease. The acute form is generally rapidly fatal. In the chronic form the progress of the disease may sometines be arrested. The treatment consists principally of hygienic measures. Warm flannels, good nutritious diet, a great deal of outdoor life and exercise where the patient can stand it without suffering from over-fatigue, with a change of climate, especially to a high mountainous district,—all are valuable.

Tuberculous sputum should be at once burned or else put in a strong disinfectant solution, as it contains enormous quantities of the bacilli, which, if allowed to dry and mix with the dust, become scattered broadcast, carrying infection everywhere.

The patients must be made to use sputum-cups; they should never be allowed to expectorate into a handkerchief, or in fact anywhere except into the proper receptacles. The sputum-cups can be sterilized by steam or by being boiled in a 2 per cent. soda solution. We scarcely need the support of a theory of heredity in consumption: when we think of a child kissing a parent, perhaps many times daily, over whose lips thousands of tubercle bacilli are hourly passing, and when we think of that same child inhaling the dried bacilli and their spores, which always float about in the dust of a house containing tuberculous patients, it would seem strange that the disease does not occur still more often.

CHAPTER XXVIII.

NOTES ON SOME MEDICAL DISEASES.

Tonsillitis.—Besides the common forms of sore throat which we term pharyngitis, and the rarer forms called laryngitis, we frequently meet with an acute or chronic inflammation of the tonsils. Here we find congestion and more or less swelling of the glands and the parts surrounding them. When in the acute form the process goes on to suppuration, the affection is then popularly spoken of as quinsy. It begins with a more or less severe chill accompanying the sore throat, and a temperature of from 102° to 103° F., with headache and backache. Astringent and antiseptic gargles are usually ordered, and when given early enough may cut short the disease. In quinsy, where the pain is severe, hot-water applications or poultices will give relief. In children the remedies to the inside of the throat are applied with a camel's-hair brush or swab. The disease rapidly exhausts the patient, and during convalescence a liberal diet should be given.

Acute gastritis denotes a condition often spoken of by a patient as a "bilious attack." In some cases it is caused by overloading the stomach with indigestible food, or comes on after drinking large quantities of alcohol: any irritant poison taken into the stomach may set up an acute gastritis. The patient may be very ill, and death sometimes occurs. He should be put to bed, his diet restricted to milk, and the physician summoned at once.

Dyspepsia is a term commonly used to cover a number of the so-called functional diseases of the stomach. The patient complains of a sense of oppression and fulness, generally referred to the epigastric region—of pain, dull headache, and languor; he is irritable, and is often very much depressed. The symptoms vary in different persons, aud sometimes in the same person at different times; pain may follow either immediately after taking food or come on when the stomach is quite empty, in which case it will be relieved by eating. Regurgitation or vomiting is a common symptom in cases of acidity caused by fermentation, and then flatulence and acid eructations are frequent. Vertigo or dizziness is often caused by indigestion, and constipation is not seldom present. A nurse should report to the physician the appearance of any such symptoms, in order that the necessary restrictions or change in the diet may be ordered.

Diarrhœa means the frequent discharge of fæces, usually of a soft or fluid character. There are different varieties, the principal forms being the irritative, the symptomatic, the nervous, the chronic, and the choleraic.

Irritative diarrhœa usually lasts but a short time, and is often due to some disturbance in the intestinal digestion from over-indulgence in the matter of food or the eating of tainted meats. The chief symptoms, besides the frequent stools, are more or less severe griping pains, nausea, weakness, and, if the disease has lasted long, great prostration of the patient.

Symptomatic diarrhœa occurs in the course of certain diseases, such as typhoid fever, dysentery, and tuberculous ulceration of the intestines. In the nervous form the intestinal digestion is disturbed by some strong mental emotion, anxiety, or fright. Chronic diarrhœa is often due to frequent or continued indigestion or to chronic inflammation or ulceration of the intestines. Diarrhœa preceding an attack of cholera may be mistaken in the beginning for a simple diarrhœa. A very severe form of diarrhœa resembling cholera occurs in the summer months, and may follow a sudden checking of perspiration, the abuse of iced drinks, exposure to sudden changes of temperature, or serious nervous disturbances. The attack usually begins at night with pain in the abdomen, vomiting, and purging, and in grave forms there are cramps in the lower extremities and in the abdominal muscles. These symptoms are accompanied by profuse sweating, a weak pulse, and a condition of exhaustion, usually lasting a few hours and terminating rapidly in recovery.

The diet in diarrhœa should be carefully regulated; albumen water, milk, or milk and lime-water, may be ordered at first, and afterwards the more easily digested solid foods, fruits and vegetables being prohibited entirely even for some days after convalescence. Rest in bed is a valuable adjunct to the treatment.

The name *appendicitis* is given to an inflammatory condition of the vermiform appendix, which may result in ulceration, perforation, and abscess-formation. The chief symptom is severe pain in the right iliac region, associated often with vomiting and obstinate constipation, tenderness on pressure, and elevation of temperature. Perforation with a resulting general peritonitis is an accident to be dreaded. Purgatives should never be given. Until medical aid can be obtained the patient should be kept perfectly quiet in bed, with an ice-bag placed over the seat of pain.

Peritonitis is an inflammation of the peritoneum which may be due to extension of inflammation from any of the organs covered by it or to perforation from an ulcer of the stomach or bowels. It is more especially to be feared after surgical operations on the abdomen if the wound should have been allowed to become infected. The main symptoms are severe pain, the patient lying on the back with the knees drawn up and shoulders raised; there is tenderness on pressure over the abdomen, which is generally distended; the respirations are frequent and shallow, the pulse rapid, small, and wiry, the temperature moderately high; vomiting begins early, the expression changes greatly, and the face takes on an anxious and haggard look. The patient should be kept very quiet, and all pressure from the bed-clothes be avoided by the use of a cradle.

By *ascites* is meant a collection of fluid in the peritoneal cavity. The abdomen is sometimes tapped if the amount of fluid be large. When this is to be done the instruments must be sterilized and the abdomen previously prepared, so that the danger of introducing septic material will be avoided. A small occlusive dressing should be ready for application after the operation.

Bronchitis is an inflammation of the bronchial tubes. The acute form begins as an ordinary cold, which extends to the bronchi, giving rise to a sense of tightness and oppression in the chest. The cough at the onset is dry or is accompanied by but little expectoration, which at first is mucoid in character, but later becomes more copious, and is often purulent; the pulse is quickened and the temperature a little elevated. The patient should be kept in bed in a warm, well-ventilated room, and a mustard foot-bath and hot drinks may be given. Inhalations of steam and keeping the air of the room moist will relieve the feeling of oppression and pain. The bowels should be kept open, and plenty of light nourishing food given; mild cases recover in a few days.

Asthma.—The most common form of asthma is a bronchial affection characterized by cough, dyspnœa, and expectoration of a mucous secretion, the attacks occurring paroxysmally. Although rarely dangerous, it is a very distressing disorder, and in a severe attack the symptoms may be alarming. Asthmatic subjects usually carry remedies with them, such as capsules of nitrite of amyl, which they break in a handkerchief for inhalation; these should never be used except by order of the physician. The patient should have all the fresh air possible, and a hot foot-bath and hot drinks may help to give him relief.

Croupous pneumonia is an infectious disease due to a micro-organism which locally produces an acute inflammation of the lung-substance, and constitutionally a condition of prostration, resulting from absorption into the blood of the poisons produced by the bacteria. It is a serious condition, and is especially fatal in the case of old people and in individuals who have been accustomed to the excessive use of alcoholic stimulants. It is divided into three stages: the first is the stage of engorgement; the second, that of consolidation; and the third, that of resolution. The lower lobe of the right lung is most frequently attacked: in the so-called double pneumonia both lungs are involved. Anything that tends to depress the vital powers, such as faulty hygienic surroundings, exposure to cold, and particularly to sudden variations in temperature may act as a predisposing cause. The onset is sudden: the patient has a chill, complains of a sharp pain in the side, and the temperature rapidly rises. The respirations are quickened to 30 or 40 or more per minute; the breathing is difficult; the face is flushed, particularly the cheeks; with each inspiration the nostrils dilate; the cough is short and hacking; the expectoration at first may be frothy and mixed with mucus, afterward becoming thick, tenacious, and of a rusty-red color, due to its admixture with red blood-corpuscles. In alcoholics so much blood may be mixed with the sputum as to give it a dark reddish-black color; this is the "prune-juice sputum." When resolution takes place, the expectoration becomes light yellow in color and more abundant. Through the course of the disease the temperature ranges from 102° to 104° or 105° F., being a little lower in the morning than in the evening. A sudden fall as early as the third or as late as the twelfth day, accompanied by profuse perspiration, indicates the crisis, after which convalescence begins. The pulse is full and rapid, varying in frequency from 90 to 120 beats per minute: in severe cases it may even exceed this. Delirium may be present from the beginning, and the patient, who may try to get out of bed, must be carefully watched. It is necessary that the nurse make accurate statements to the physician with regard to the pulse, temperature, respiration, and sputum: the last-mentioned should be kept for inspection. She must also be able to describe the symptoms, to note any serious change in the condition of her patient, and to understand its significance. The ventilation of the room should be carefully regulated, the temperature being kept at 68° F. The mouth must be kept clean and moist; when there has been a profuse perspiration the clothes should be changed at once, the body sponged in water and alcohol, and warm, dry clothes should be put on. The diet during the fever should be liquid, but concentrated, in order to supply plenty of nourishment. It is best given at frequent but regular intervals: much depends upon the keeping up of the strength of the general system, as heart failure is not uncommon. Stimulants are frequently ordered throughout the course of the disease, when the condition of the heart indicates their use and where the fever is very high, sponging is often employed to reduce the temperature.

Pleurisy is an inflammation of the two surfaces of the serous membrane which surrounds the lungs. It may be localized or general, dry or accompanied with effusion. When the inflammation begins there is a sharp shooting pain, the "stitch in the side," which is aggravated by breathing or in fact by any movement. An exudation (the amount and consistence differing in different cases) next takes place. Together with the sharp pain in the side, which is relieved as the exudation increases, the patient may have a slight chill; the respirations are hurried and shallow, the patient fearing to take a deep breath on account of the pain; the temperature is elevated, and there is a short, dry cough. The patient should be kept quiet, and where there is much effusion a dry nutritious diet given, the amount of liquids being restricted. A light bandage applied around the thorax or rubber strapping extending over about two-thirds of its circumference lessens the pain by diminishing the expansion of the chest on the affected side. As a counter-irritant Paquelin's cautery may be applied or mustard plasters used. To reduce the amount of effusion the physician orders Epsom salts or some other hydragogue cathartic. When the cavity becomes much distended with fluid, aspiration is performed. Sometimes the exudation becomes purulent, and the condition is then spoken of as *purulent pleurisy* or *empyema.*

A total loss of power in some of the muscles of the body is called *paralysis:* when the loss is only partial we have what is called a condition of *paresis.*

Hemiplegia means a paralysis by which one whole side of the body is affected. When one limb only is paralyzed the term *monoplegia* is used. By *paraplegia* we mean a loss of power in both arms or both legs. By complete paraplegia is meant paralysis of all four extremities.

These paralyses may be due to various causes—to lesions of the brain, of the spinal cord, or of the peripheral nerves. In most cases hemiplegia is due to thrombosis, embolism, or rupture of a blood-vessel in one of the hemispheres of the brain.

Where there are muscular spasms or convulsions the nurse should watch carefully to see what part of the body is first affected, since this knowledge may help the physician in localizing the seat of origin of the disease.

With good hygienic surroundings, good care, massage, and electricity, complete or partial recovery in some forms of paralysis may take place; great care must be taken to guard against bed-sores.

Tabes, a disease which is also called locomotor ataxia, is marked by a loss of co-ordination in the legs without any marked loss of power in the muscles. It is not a very rare disease, and in it the gait is unsteady, because the patient is not able to tell unconsciously, as he naturally would do, how his muscles are acting, but has to be guided by his eyesight. As a consequence, walking in the dark is particularly difficult. By looking after the general comfort of the patient, the nurse can do much toward making his life bearable, and besides this should encourage him to persevere conscientiously with the treatment prescribed.

Meningitis.—The meninges are the membranes which envelop the brain and spinal cord, and meningitis is an inflammation of these membranes. The acute form occurs most often in childhood, but adults are also attacked. There is usually violent headache, severe pain, an occasional sharp peculiar cry, great restlessness, and sometimes convulsions. There may be fever, and usually in the beginning there is a chill. As these symptoms are aggravated by bright light and loud noises, the nurse should see that her patient is kept quiet, the light subdued, and all visitors kept from the room. Where the house is near a busy and noisy street it may be necessary in this and other diseases to cover the roadway with sawdust. Noiseless shoes must be worn by all attendants, and the slamming of doors and other unnecessary noises avoided.

Neuralgia means a sharp pain in the course or distribution of a sensory nerve. Among some of the exciting causes we may mention exposure to damp and cold, chronic poisonings, decayed teeth, dyspepsia, constipation, and malaria. The pain may assume a variety of forms. One of the nerves most commonly attacked is the trigeminus, or fifth cranial nerve. When the pain in this nerve is accompanied by sharp spasms the affection is called *tic douloureux*. *Sciatica* may be due either to a neuralgia or to an inflammation in the sciatic nerve. In most forms of neuralgia the diet should be especially nourishing, in order to improve the general condition of the system.

Delirium tremens results from the excessive and frequent use of alcoholic stimulants. In the beginning there is depression and anxiety, sleeplessness and muscular tremor, with a weak and feeble pulse. After a few days delusions and hallucinations appear, and in the paroxysms of fear or fury thus induced the patient may become dangerous and attack his attendants. Where he is so violent the assistance of male helpers is necessary. Sleeplessness is a bad symptom, and if sleep cannot be obtained the termination is usually fatal. The patient should be kept in a large room, with the windows and doors guarded and the light subdued.

The Rest Cure.—Upon two very common nervous affections, which every nurse will meet with very frequently among both rich and poor patients, in hospitals as well as in private nursing, we have not space to dwell here. We will only say a few words on a method of treatment so frequently prescribed in cases of hysteria and neurasthenia, which has obtained the name of "the rest cure," and has been so strongly recommended and so much written about by Weir Mitchell, Playfair, and others. The patients to whose cases it is particularly applicable are those suffering from nervous exhaustion, such as is seen in nervous, hysterical women. The exhaustion in men may be the result of overwork, excessive brain-wear, continuous care and responsibility for a long period of time, strain from anxiety and business difficulties, aggravated by inattention to those habits which tend to keep the body healthy. In women the nervous prostration more frequently results from lack of congenial work, indulgence in excessive gayety, or again from nursing a sick friend, arduous household cares, or social duties. Where the prostration is severe, in order to procure much relief the patient must in most cases be removed from her home and placed in an institution where she may have the advantages of this "rest-cure treatment." To become expert in dealing with these patients it would be advisable for a nurse, if she intends to devote herself especially to the care of such cases, to spend some months in a hospital where the treatment of such diseases is made a specialty.

The first step in the cure is to ensure the complete isolation of the patient. No one should see her but the nurse, the physician, and the *masseuse.* Absolute rest in bed, massage, electricity, and systematic *over-feeding* are desirable. Very little if any reading, and no sewing or writing of letters, should be allowed. Usually the patient is kept in bed for from four to ten weeks. The massage is an important feature, and should be given at first very gently for a few minutes at a time, and gradually increased. The food should be abundant, easily digestible, and given at regular intervals.

The nurse, while very firm, should be especially bright, cheerful, and good-tempered, but she must observe a happy mean and be careful not to be over-sympathetic with her patient. When the nervous system has become rested and strengthened, it is advisable to allow the patient to return gradually to her former occupations and habits of life.

Cardiac Disease.—Diseases of the heart are diagnosed by physicians chiefly by means of physical signs obtained by inspection, palpation, percussion, and auscultation: with these, of course, the nurse has nothing to do, but she will be interested in noticing some of the general symptoms which occur. The particular symptoms of the various diseases may best be acquired by observation at the bedside. The most frequent disorders of the heart met with are inflammation, valvular diseases, angina pectoris, and dilatation.

Heart disease is frequently a sequela to other diseases, such as acute rheumatism, or follows acute infectious diseases like pneumonia, typhoid fever, diphtheria, or acute Bright's disease.

Pericarditis is an inflammation of the pericardium or the membrane that envelops the heart. *Endocarditis* is an inflammation of the lining of the internal surface of the heart. The origin of both diseases can often be traced to an attack of rheumatism or chorea. Most of the valvular diseases of the heart, where changes have taken place in the valves which obstruct the flow of blood through them, or on account of imperfect closure permit a backward flow, are due to chronic inflammation of the endocardium. Where the valve is thickened and there is obstruction to the onward flow of blood, we have a stenosis (mitral stenosis, aortic stenosis), and in those cases in which the valves leak, whereas normally they should close tightly, the valve is said to be insuffícent (mitral regurgitation or insufficiency, aortic regurgitation or insufficiency). A patient with heart disease may often go on for years without being aware of its existence, though at times he may notice that he is somewhat short of breath. As a rule, it is not until the heart is becoming exhausted that serious symptoms begin to show themselves, although, of course, such a patient sometimes dies suddenly if too much strain is put upon the heart by over-exertion or emotion. The appearance of a patient suffering from a grave heart affection is usually very striking when he comes into the ward. He is often very short of breath; his face may present a bluish appearance (cyanosis); the legs are often much swollen, and the swelling may affect the arms, hands, and other parts of the body (œdema). Besides the proper remedies, he will probably be ordered a liquid or very light diet and absolute rest in bed. If he cannot lie down, a bed-rest must be provided, or he may be propped up with a sufficient number of pillows. In many cases the heart will thus be enabled to recuperate, so that it can do its work fairly well for a long time. All sudden movements and excitement of every kind should be avoided. The patients, especially when they are getting better, are often very much averse to staying in bed, and the nurse will have to exercise a great deal of tact, combined with iron firmness, in order that the treatment may be thoroughly carried out.

Palpitation is a symptom rather than a disease; there is fluttering or abnormally rapid beating of the heart, which disturbs the patient very much. It is often seen in nervous individuals or in those suffering from anæmia or indigestion, and frequently gives rise to unnecessary alarm. It must be remembered that while this symptom does occur in organic diseases of the heart, it is by no means a sign of the latter.

Angina pectoris is characterized by a sudden agonizing pain in the region of the heart which extends down the arm and across the sternum. The patient grows pale, utters a cry of pain, and fears that he is going to die, and in fact a fatal termination does sometimes occur. The condition is serious, and a physician should be summoned at once.

In all these diseases precautions should be taken to keep the patient perfectly quiet, guarding against excitement and worry as much as possible.

Acute articular rheumatism, or, as it is often called, rheumatic fever, is one of the most painful affections which will come under the care of the nurse. Owing to the complications and the after-effects of an attack of rheumatism, it must always be looked upon as a formidable disease.

The acute form begins with a feeling of *malaise*, often with sore throat, with more or less severe pain in the joints, and with fever, the temperature ranging from 102° to 104° F. The joints become swollen, hot, and red, and very painful to the touch or upon the slightest movement; the perspiration is profuse, and has a characteristic sour odor; the urine is strongly acid, highly-colored, and scanty. The bed should be made up with flannel sheets above and below, and the patient should wear a loose flannel gown which opens down the front and has large sleeves, so that it can be changed easily without giving him unnecessary pain. He should have a daily sponge-bath (between blankets) of alcohol and hot water; he may be turned gently from side to side, but should not be moved more than is absolutely necessary. The diet consists chiefly of milk, effervescing waters, and lemonade. The affected joints may have to be wrapped in absorbent cotton.

In the chronic forms of rheumatism much relief is afforded by a careful and long-continued massage treatment.

Diabetes mellitus is a disease characterized by the excretion of an enormous amount of urine containing glucose or grape-sugar. The amount of urine in twenty-four hours may measure from six to thirty pints, or even more, according to the severity of the case. The specific gravity is high. There is gradual emaciation and loss of strength, great thirst and a ravenous appetite. Care in the diet and hygienic measures are important factors in the treatment. Dietaries for diabetic patients have been especially prepared, and should be strictly adhered to. Foods containing sugar and starch are not allowed except in very limited quantities. The action of the skin should be especially cared for, and unless the patient be too weak or the œdema be marked, a moderate amount of exercise should be taken daily, or massage may be substituted for it. An equable temperature is to be maintained, and freedom from excitement guarded against.

In *diabetes insipidus* a superabundance of normal urine of low specific gravity is excreted. It occurs most often in young people, and may be congenital. Sometimes such cases may persist for years without any deterioration in health. It is a disease of nervous origin, but its nature is unknown.

VOCABULARY.

MEDICAL.

Acme, ak′me. Crisis or height of a disease.

Acute, ā-kūt′. An *acute* disease, one in which the onset, progress, and termination are rapid. Applied to pain, *acute* means severe, sharp.

Affu′sion. A pouring upon; *e. g.* affusions of water are used to reduce temperature.

Algid, al′jid. Cold, chilly.

Aliment′ary. Pertaining to nutrition.

Anæmia, an-ē′me-ah. Deficiency in the number of red corpuscles or of the coloring matter of the blood.

Analgesia, an-al-jē′sē-ah. Insensibility to pain.

Anasar′ca. General dropsy.

Angi′na Pec′toris. Pain and oppression about the heart.

Anodyne, an′ō-dīn. An agent which relieves pain.

Anorexia, an-or-eks′ē-ah. Loss or diminution of appetite.

Antipyret′ic. (*subs.*) An agent which reduces fever; (*adj.*) fever reducing.

Aphasia, ah-fā′ze-ah. Partial or complete loss of the power of speech.

Aphonia, ah-fōn′e-ah. Loss of voice.

Ap′oplexy. A sudden paralysis (generally from rupture of a cerebral vessel).

Apyrexia, ah-pi-reks′e-ah. A state of freedom from fever.

Ascites, a-si′tēz. An abnormal collection of fluid in the abdominal cavity.

Asphyx'ia. Suspension of animation from lack of oxygen in the blood.

Aspira'tion. A method of withdrawing fluids by means of the aspirator.

Asthenia, ah-sthē'ne-ah. Loss of strength. Weakness.

Ataxia, atax'ē-ah. Incoördination of muscular action.

Atrophy, at'ro-fe. Wasting of a part from lack of nutrition.

Aura, ō'rah. A peculiar sensation, such as usually precedes an epileptic fit.

Auscultation, os-cul-tā'shun. The act of listening to sounds produced by organs of the body, usually the heart and lungs.

Benign'. Mild, not malignant.

Borborygmus, bor-bō-ryg'mus. Rumbling in the intestines.

Cachexia, kak-ex'e-ah. A depraved condition of nutrition.

Cada'ver. The dead body.

Centigrade Thermometer. A thermometer the scale of which is divided into 100 parts or degrees, 0° representing the freezing-point and 100° the boiling-point of water.

Chore'a. A disease characterized by involuntary muscular twitchings; St. Vitus' dance.

Chronic, kron'ik. Long continued, often opposed to *acute*.

Clinic, klin'ik. Bedside instruction.

Collapse'. Complete prostration of the vital powers.

Co'ma. A state of profound stupor.

Co'ma-vigil. A condition of unconsciousness and delirium in which the patient lies with open eyes.

Conta'gion. The communication of a specific disease by contact.

Coördina'tion. Harmonious action; *e. g.* of muscles.

Contraindication. Indication against.

Corpuscle, kor-pus-l. A minute body; a cell.

Crisis, krī'sis. The turning-point in a disease.

Cyano'sis. Bluish color of the skin, due to imperfect oxidation of the blood.

Decubitus, dē-kū'bi-tus. The recumbent position.

Defervescence, dē-fer-ves'ens. Decrease of fever.

Deglutition, deg-lū-tish′un. The act of swallowing.
Dejection, dē-jek′shun. A discharge of fæcal matter.
Delirium, dē-lir′e-um. A wandering of the mind.
Dementia, dē-men′she-ah, Form of insanity with loss of the reasoning powers.
Deple′tion. The withdrawal of fluid from some part of the body.
Desquamation, des-kwā-mā′shun. Peeling off; *e. g.* of the outer skin.
Diagno′sis. The recognition of disease from its signs and symptoms.
Diathesis, dī-ath′e-sis. A predisposition to disease.
Dicrotic, dī-krot′ik. A term applied to a pulse which gives the sensation of a double beat for each contraction of the heart.
Dyspnœa, disp-nē′ah. Difficult or labored breathing.
Em′bolism. The obstruction of a blood-vessel by an embolus or plug.
Empyema, em-pī′ē-mah. A collection of pus in the pleural cavity.
Epistaxis, ep-i-stak′sis. Hæmorrhage from the nose.
Eructation, ē-ruk-tā′shun. The bringing up of gas from the stomach.
Exacerbation, eg-zas-er-bā′shun. Increased severity of symptoms.
Excreta, eks-krē′tāh. Natural discharges of the body.
Expectant, eks-pek′tant. Awaiting; *e. g.* the expectant mode of treatment by non-interference.
Expiration, eks-pī-rā′shun. The act of breathing out.
Fæces, fē′sēs. The discharges from the bowels.
Febrile, fē′brīl. Pertaining to fever.
Fissure, fish′ūr. A crack.
Flat′ulence. The presence of gas in the alimentary canal.
Fluctuation, fluk-tū-ā′shun. The undulation of contained fluid upon pressure.
Formica′tion. Sensation as of ants creeping over the body.

Gastritis, gas-trī′tis. Inflammation of the stomach.

Gavage, gav-ahzh. Forced feeding.

Glo′bus Hyster′icus. Sensation (in hysteria) as of a ball in the throat.

Hæmatemesis, he-mat-em′e-sis. The vomiting of blood.

Hæmoglo′bin. The coloring matter of the red corpuscles.

Hæmoptysis, hem-op′ti-sis. The spitting of blood.

Hæmorrhage, hem′or-āj. Flow of blood from the vessels.

Hæmostatic, hem-o-stat′ik. Arresting hæmorrhage; (*subs.*) an agent to stop hæmorrhage.

Hectic, hek′tik. Pertaining to wasting or phthisis.

Hemiplegia, hem-i-plég-ē-ah. Paralysis of one side of the body.

Hepatiza′tion. Change into a liver-like substance.

Heredity, her-ed′i-te. The transmission of traits of ancestors to their offspring.

Hiccough, hic′kup. The spasmodic contraction of the diaphragm with sudden closure of the glottis.

Hydrop′athy. Treatment of disease by the use of water.

Hydrothorax. A condition in which there is a watery fluid in the pleural cavity.

Hygiene, hī′jē-en. The science of health.

Hyperæmia, hī-per-ē′me-ah. Excess of blood in the vessels of a part.

Hyperpyrexia, hī-per-pī-reks′e-ah. An excessively high temperature of the body.

Hyper′trophy. An abnormal increase in the size of a part or organ.

Hypnotic, hip-not′ik. Sleep-producing; (*subs.*) an agent which produces sleep.

Hypoder′mic. Under the skin—applied to the injection of medicines under the skin.

Hyperæsthesia, hī-per-es-thē′ze-ah. Excessive sensibility.

Icterus, ik′ter-us. Jaundice.

Idiosyncrasy, id-i-ō-sin′krā-se. Individual peculiarity.

Inani′tion. Exhaustion from starvation.

Incoördination, in-cō-or-din-ā′shun. The state of inability to produce coördinated muscular movements.

Incubation, in-kū-bā-shun. The period which elapses between the introduction of the contagium and the development of the symptoms.

Inges′ta. Substances introduced into the body by the mouth.

Infect′ion. The communication of the germs of disease.

Inocula′tion. The introduction of a specific virus into the system.

Insolation, in-sō-lā′shun. Sunstroke.

Inunc′tion. The act of rubbing in an ointment.

Lactom′eter. An instrument for measuring the specific gravity of milk.

Lac′toscope. An instrument for testing the quality of milk.

Laryngismus Stridu′lus. Spasmodic contraction of the glottis; false croup.

La′tent. Concealed, not manifest.

Lav′age. Irrigation of the stomach.

Le′sion. A morbid change in the function or structure of a tissue from injury or disease.

Leth′argy. A condition of drowsiness.

Lysis, lī′sis. Gradual decline, more especially of a febrile disease.

Macera′tion. Steeping in fluid to produce softening.

Marasmus, mar-az′mus. A wasting or emaciation.

Metastasis, met-as′tā-sis. Change in the seat of the disease.

Me′grim. Neuralgia or headache of one side of the head.

Narcot′ic. Producing narcosis; (*subs.*) an agent which produces a condition of lethargy or sleep.

Nephritis, nef-rī′tis. Inflammation of the kidneys.

Neurasthenia, nū-ras-thē′ne-ah. Exhaustion of nerve-force.

Neurosis, nū-rō′sis. A nervous affection of a functional nature.

Non Com′pos Men′tis. Of unsound mind.

Nostalgia, nos-tal′je-ah. Homesickness.

Œdema, ē-dē′mah. Accumulation of serum in the cellular tissue.

Ophthalmia, off-thal′me-ah. Inflammation of the conjunctivæ.

Orthopæ′dic. Pertaining to the correction of deformity.

Orthopnœ′a. Difficulty in breathing, relieved only by the upright position.

Osmo′sis. The diffusion of fluids through membranes.

Pædiatrics, ped-e-at′riks. The treatment of the diseases of children

Palliative, pal′i-a-tiv. Mitigating, relieving.

Paracentesis, par-a-sen-tē′sis. The operation of puncturing a cavity of the body (in order to draw off fluid).

Paraple′gia. Paralysis of the lower half of the body.

Paresis, par′es-is. Slight paralysis. Partial loss of muscular power.

Paroti′tis. An inflammation of the parotid gland. The mumps.

Pathogen′ic. Causing disease.

Percus′sion. Light tapping or striking on any part of the body for diagnostic purposes.

Peristal′sis. Undulating movements of the intestines.

Pertus′sis. Whooping cough.

Prophylaxis, prō-fil-aks′is. Prevention of disease.

Ptomaïnes, tō′mā-ins. Alkaloids formed during the decomposition of organic matter.

Quotidian, kwot-id′i-an. Occurring every day; *e. g.* quotidian fever in which the paroxysm occurs every day.

Rad′ical. A form of treatment meant to destroy a disease.

Reac′tion. Recuperation or return of power after depression.

Recur′rent. Returning at intervals.

Re′flex. A term applied to an involuntary action produced by an indirect nerve-stimulus.

Regurgita′tion. The flowing back or the rejection of the contents of a hollow organ.

Relapse′. Recurrence of the disease before complete convalescence.

Remit′tent. Alternately abating and returning.

Resolu'tion. The gradual return of the tissues to their normal condition after inflammatory conditions.

Retching. Attempts at vomiting.

Rhythm, rithm. A measured movement.

Rigor, rī'gor. A chill. Rigidity.

Rigor mortis. The muscular rigidity which occurs shortly after death.

Satura'tion. A term used to denote that a fluid contains as much of a solid substance as it can dissolve.

Sequela, sē-kwel'ah. Abnormal condition following the decline of a disease.

Singul'tus. Hiccough.

Sopor, sō'por. A drowsy condition.

Sordes, sor-dēz. The brownish deposit that tends to accumulate about the teeth in disease.

Sporad'ic. Scattered, or occurring in isolated cases or groups.

Steno'sis. Constriction or narrowing.

Stercoraceous, ster-kō-rā'she-us. A term applied to vomited matter containing fæces.

Ster'torous. Breathing with a snoring sound.

Stomatitis, stō mat-ī'tis. Inflammation of the mouth.

Strabis'mus. Squint. Condition of the eyes in which the visual axes do not meet at the desired objective point.

Stridulous, strid'ū-lus. Making a harsh or strident sound.

Subacute'. Midway between acute and chronic.

Subsul'tus Tendinum. Muscular tremor or twitching.

Sudorif'ic. Sweat-producing; (*subs.*) an agent which induces sweating.

Syn'thesis. Formation of a compound by uniting its elements.

Syn'cope. Fainting or swooning.

Tabes, tā'bēz. Progressive emaciation.

Tabes dorsalis. A disease of the nervous system, sometimes called *locomotor ataxia.*

Tenes'mus. The painful desire, coupled with straining, to empty the bowels or bladder.

Therapeu'tics. The medical science relating to the application of remedies,

Thermom'eter. Instrument for measuring intensity of heat.

Thrombo'sis. The formation of a blood-clot in a vessel.

Tor'mina. Griping pain in the bowels.

Tox'ic. Poisonous.

Traumatic, traw'mat'ic. Pertaining to a wound.

Tus'sis. A cough.

Tympanites, tim-pan-ī'tēz. The distension of the abdomen with gas.

Urtica'ria. Nettle-rash.

Vaccina'tion. Inoculation with a virus obtained from cows to protect against small-pox.

Variola, vā-rī'ō-lah. Small-pox.

Vas'cular. Pertaining to vessels.

Ver'tigo. Dizziness.

Ves'icle. A small blister.

Vicarious, vī-kā're-us. The term applied to the assumption of the function of one organ by another.

Vol'atile. Readily evaporating.

Vis'cous or **Viscid.** Glutinous. Ropy.

SURGICAL.

Abra'sion. Excoriation of the skin or mucous membrane.

Acupressure, ak'ụ-press-ūr. The compression of blood-vessels by means of needles.

Adeno'ma. A glandular tumor.

Adhe'sion. The growing together of two surfaces or parts.

Amputa'tion. A removal of a part of the body.

Anæsthe'sia. A condition in which sensation is lost.

Anastomo'sis. The junction of vessels.

Angio'ma. A tumor formed of blood-vessels.

Ankylo'sis. Stiffness of joint due to adhesions between its surfaces.

Antisep'tic. Preventing the growth of organisms which produce putrefaction.

Apposi'tion. In contact.

Arthritis, ar-thrī'tis. Inflammation of a joint.

Asepsis, a-sep'sis. The absence of septic matter.

As'pirator. Instrument for withdrawing fluids from cavities.

Atheromatous Degeneration, ath-e-rō'ma-tus. Fatty degeneration of arterial walls, with deposition of lime salts.

Bifur'cate. To divide into two branches.

Bistoury, bis'to͞o-rē. A narrow-bladed knife used in surgery.

Bougie, boo-zhē'. Cylindrical instrument for dilating canals.

Cal'lous. Hard.

Cal'lus. New bony deposit about a fracture.

Can'ula. A small tube.

Carcinoma, kar-sē-no'ma. Cancer. A malignant form of tumor.

Ca'ries. A local death of bone.

Caus'tic. Burning; (*subs.*) a substance which destroys living tissue.

Cellulitis, sel-ū-lī'tis. Inflammation of the cellular tissue.

Cicatrix, si-kā'triks. The scar which remains after the healing of a wound.

Cicatrization, sik-a-tri-zā'shun. The process of healing.

Circumduc'tion. Circular movement of a limb.

Clon'ic. Applied to spasms with alternate contractions and relaxations.

Coagula'tion. A clotting.

Coaptā'tion. The adjustment of edges of wounds or fractured bones.

Comminu'tion. Breaking into pieces.

Colot'omy. Incision into the colon.

Contu'sion. A bruise.

Coun'ter-exten'sion. Opposing traction upon a limb in extension.

Crep'itus. The grating of the ends of fractured bones.

Cystotomy, sis-tot'ō-me. A cutting into the bladder.

Demarca'tion (Line of). The line dividing dead from living tissue.

Disarticula'tion. Amputation of a limb at a joint.

Dors'al. Pertaining to the back.

Emphyse'ma. Distension of tissues with air or other gases.

Empyema, em-pī-ē'mah. A condition in which there is pus in the pleural cavity.

Enucleation, ē-nū-kleē-ā'shun. The peeling out of a tumor from its sack. (Of the eye.) The excision of the eyeball.

Epithelioma, ep-i-thē-le-ō'mah. A cancerous growth of the skin or mucous membrane.

Es'char. The dry crust of dead tissue.

Es'march's Bandage. Elastic rubber bandage used to prevent or control hæmorrhage.

Ever'sion. The folding outward.

Excis'ion. Act of cutting out or away.

Excoria'tion. Abrasion of the skin.

Excrescence, eks-kres'ens. An abnormal outgrowth.

Exten'sion. Traction upon a fractured or dislocated limb. The opposite of flexion.

Extirpa'tion. The removal of a part.

Extravasa'tion. Effusion of fluid into the tissues.

Exuda'tion. The oozing out of fluids.

Fenes'trum. An opening.

Fistula, fis'tū-lah. An abnormal opening between two parts of the body.

Flexion, flek-shun. The process of bending.

Fluctua'tion. Wave-like motion.

Graft. Transplanted living tissue.

Granula'tions. A reticulated framework of tissue containing embryonic cells.

Hæmatoma, hem-at-ō'mah. A tumor containing blood.

Her'nia. Protrusion of any viscus from its normal cavity through normal or artificial openings in the surrounding structures.

Immobilization. The act of fixing a part in such a manner as to render it immovable.

Impac′tion. The condition of being wedged together.

Incis′ion. A cutting into. A cut.

Indura′tion. Hardening of a part.

Inflamma′tion. The response of living tissue to injury.

Intuba′tion. The insertion of a tube into the larynx.

Inver′sion. The turning of an organ inside out or upside down.

Liv′id. Having a dusky bluish color (due to congestion).

Necrosis, ne-krō′sis. Death of tissue.

Ne′oplasm. A new growth.

Occlusion, ok-lū′shun. A sealing or blocking up.

Ossifica′tion. Formation of bone.

Ostalgia, os-tal′je-ah. Pain in bone.

Osteomyeli′tis. Inflammation of the bone, (*lit.*) of the marrow of the bone.

Osteotomy, oste′otomy. A cutting operation on bone.

Perforation. An opening or penetration.

Phlebitis, flē-bī′tis. Inflammation of a vein.

Plas′tic Operations. The engrafting of tissue from one part to another.

Prona′tion. Position of the arm when the palm of the hand is turned downwards.

Pyæmia, pī-ē′me-ah. Septicæmia with abscess-formations.

Resec′tion. Excision of a portion of bone.

Resolu′tion. The gradual disappearance of inflammatory products without the formation of pus.

Retrac′tion. Shortening. Drawing backward.

Sapræ′mia. Septic intoxication. Blood-poisoning.

Sarco′ma. A malignant tumor having the structural characteristics of connective tissue.

Scarification, skar-if-ik-ā′shun. The operation of making numerous small superficial incisions in a part.

Sep′tic. Relating to putrefaction.

Sequestrum, se-kwes′trum. A fragment of necrosed bone.

Slough, sluf. A portion of dead tissue which comes away after an ulcerative process.

Strangula'tion. Constriction. Choking.

Stricture, strik'tūr. A contraction of a duct or tube.

Styptic, stip'tik. Astringent; (*subs.*) an agent which stops hæmorrhage.

Subcuta'neous. Under the skin.

Suffu'sion. Slight diffused congestion.

Supination, sū-pin-ā'shun. Position of the arm when the palm of the hand is turned upwards.

Su'ture. Junction of cranial bones. In *surgery*, a stitch.

Synovitis, sin-ō-vī'tis. Inflammation of a synovial membrane.

Tax'is. The manual reduction of a hernia.

Ten'sion. Tightness. A condition of being drawn tight.

Tor'sion. A twisting.

Tourniquet, toor'nik-et. An instrument to compress arteries.

Toxæmia, toks'ē-meah. Poisoned state of the blood.

Traction. A drawing or pulling.

Transfusion. The injection of blood from the vessels of one person into those of another.

Transuda'tion. An oozing through.

Traumatic, traw-mat'ik. Pertaining to a wound.

Trismus. Lockjaw.

Trocar. An instrument consisting of a stilette contained in a metal tube, used for evacuating fluids from cavities.

Tumefaction. Swelling of a part.

Turgescence, ter-ges'ens. Swelling or enlargement of an organ.

Turgid, ter-jid. Swollen.

Ul'cer. An open sore.

Varicose, var'ik-ōs. A term applied to dilated and tortuous veins.

Venesec'tion. The operation of opening a vein.

Ves'icle. A small blister or sac.

GYNÆCOLOGY.

Amenorrhœ'a. Irregularity or suppression of menstruation.
Anteflexion, an-te-flek'shun. A bending forward.
Antever'sion. A turning or leaning forward.
Catamenia, kat-a-mē'nē-ah. The menses.
Climac'teric. A critical period in life. Generally used to signify the time of life at which the catamenia cease.
Cyst, sist. A sac containing fluid.
Cystocele, sist'ō-sēl. Vesical hernia.
Defeca'tion. Evacuation of the bowels.
Douche, doosh. A stream of water directed forcibly against a part.
Dysmenorrhœa, dis-men-ō-rē'ah. Painful menstruation.
Endometri'tis. Inflammation of the lining membrane of the uterus.
Gen'u-pectoral. Pertaining to the knee and chest.
Hæmatosal'pinx. Distension of the Fallopian tube with blood.
Leucorrhœa, lū-kor-ē'ah. Whitish discharge from the vagina.
Menorrhagia, men-or-ā'je-ah. Excessive menstrual flow.
Menses, men'sēz. The monthly flow from the uterus.
Men'opause. The end of the menstrual life.
Metri'tis. Inflammation of the uterus.
Patulous, pat'u-lus. Expanded. Open.
Ped'icle. The stem or narrow portion of a tumor by which it is attached to a part.
Pes'sary. Instrument placed in the vagina to support the uterus.
Prolap'sus Uteri. Protrusion of the uterus as far as or beyond the vulva.
Retroflex'ion. A bending backwards.
Retrover'sion. A turning or leaning backwards.
Sal'pinx. The Fallopian tube.
Subinvolution. Insufficient involution.
Superinvolu'tion. Excessive involution.

Tu'bal. Pertaining to the tube or oviduct.
U'terus. The womb.
Vagina, vā-jī'nah. The canal from the vulva to the uterus.
Vagini'tis. Inflammation of the vagina.
Vul'va. The external female genitals.

OBSTETRICS.

Abor'tion. The expulsion of the embryo at any time during the first three months of pregnancy.
Accoucheur, ah-koo-shur'. An obstetrician.
Am'nion. The inner embryonic membrane.
An'te-Part'um. Before delivery.
Ballottement, bal-lot'mong. A method of examination for pregnancy.
Caul. Fœtal membranes covering the head. The omentum.
Chorion, kō-re-on. Outer membrane enveloping the fœtus.
Colostrum, ko-los'trum. The first milk secreted after labor.
Congen'ital. Existing from birth.
Craniot'omy. The operation of breaking up the fœtal skull.
Decidua, dē-sid'ū-ah. Membranous envelope of ovum in the uterus.
Deliv'ery. Childbirth.
Fimbriæ, fim'bre-ē. Threads or filaments; a fringe.
Fœ'tus. The unborn child.
Fontanelle'. Membranous space at the junction of the cranial bones in an infant, where ossification is incomplete.
Genita'lia. The organs of generation.
Gestation, jes-ta'tion. Another term for pregnancy.
In'cubator. An apparatus kept at a uniform temperature of 86° to 88°, devised for the rearing of premature children.
Intra-u'terine. Within the uterus.
Involu'tion. The process by which the uterus returns to its normal condition after pregnancy.

Lacera'tion. A tearing.

Lacta'tion. A term used to mean the period during which the child nurses.

Lanugo, lan-ū'gō. Downy hair on the new-born.

Liquor Amnii, lī'kwor am'ne-ī. Fluid surrounding the fœtus.

Lochia, lō'kē-ah. Vaginal discharge after labor.

Mam'mary. Pertaining to the breasts.

Meconium, mē'kō-ne-um. First fæcal discharge of the new-born.

Multip'ara. A woman who has borne several children.

Næ'vus. Birth-mark (generally due to the dilatation of blood-vessels). A mole.

Omen'tum. A fold of peritoneum covering the viscera.

Palpa'tion. Exploration with the hand (for diagnostic purposes).

Parturi'tion. The act of giving birth to young.

Phlegma'sia Do'lens. Œdema of the leg from venous obstruction; milk-leg.

Placen'ta Præ'via. Presentation of the placenta before the fœtus.

Presenta'tion. A term used to denote which part of the fœtus comes first to birth.

Primip'ara. A woman pregnant with, or who has borne only, her first child.

Puer'peral. Pertaining to child-bearing.

Quick'ening. First perceptible movements of the fœtus in utero.

Secundine, sek'un-din. The after-birth.

Subinvolu'tion. Imperfect involution.

Symphysiotomy, sim-fiz-ē-ot'ō-me. Section through the symphysis pubis.

Ver'nix Caseo'sa. The cheesy material which covers the fœtus.

Ver'sion. Turning of the fœtus in utero.

Vi'able. Capable of living.

URINARY ANALYSIS.

Acet'ic acid, $C_2H_4O_2$. Acid of vinegar.

Albumin'uria. The presence of albumin in the urine.

Amorphous, a-morf'us. Formless. Non-crystallized.

Am'yloid. Starch-like.

Anal'ysis. The resolution of a body into its elements.

Anuria, an-ū're-ah. Absence or deficiency in amount of urine.

Bil'iary. Pertaining to the bile.

Blood-casts. Abnormal microscopic bodies in urine, being moulds of urinary tubules made up of blood-cells.

Calcu'lus. A stone-like concretion found in the body.

Calcu'lus, Re'nal. Stone found in the kidney.

Calcu'lus, Ves'ical. Stone found in the bladder.

Chyluria, kī-lū're-ah. The passage of milk-like urine.

Cysti'tis. Inflammation of the bladder.

Cystot'omy. Incision into the bladder.

Diaphoret'ic. An agent which produces perspiration.

Diuresis, dī-ū-rē'sis. Excessive secretion of urine.

Diuret'ic. An agent which increases the flow of urine.

Drop'sy. The effusion of fluid into tissues or cavities of the body.

Dysuria, dis-ū're-ah. Difficult or painful micturition.

Enuresis, en-ū-rē'sis. Incontinence of urine.

Filtra'tion. The process of straining or filtering.

Glomer'ulus. A knot or small tuft of vessels (particularly in the kidney).

Glycosuria, glī-kōs-ū're-ah. The passage of sugar in the urine.

Grav'el. Sand-like deposit in the urine.

Hæmaturia, hem-at-ū're-ah. The passage of blood in the urine.

Hippuric Acid. An acid normally found in small quantities in human urine, and in larger quantities in the urine of herbivorous animals.

Inconti'nence. Involuntary evacuation of the urine or fæces.
Lith'ic. Pertaining to stone.
Lithot'omy. Cutting into the bladder for stone.
Lithot'rity. Crushing a stone in the bladder.
Lit'mus. Blue pigment turned red by acid.
Mea'tus. A passage or opening.
Meatus Urinarius. The opening into the urethra.
Metamor'phosis. Transformation; structural change.
Micturi'tion. The act of voiding urine.
Nephrectomy. The operation of cutting out the kidney.
Nephritis, nef-rī'tis. Inflammation of the kidneys.
Nephrot'omy. The operation of cutting into the kidney.
Opac'ity. Non-transparency.
Pig'ment. Organic coloring matter.
Pipette, pip-et'. A small glass tube for taking up fluids.
Polyuria, pol-ē-ū're-ah. Excessive secretion of urine.
Precip'itate. Anything changing from a soluble to an insoluble form in a solution.
Pyelitis, pī-el-ī'tis. Inflammation with formation of pus in the pelvis of the kidney.
Pyuria, pī-ū're-ah. The presence of pus in the urine.
Quan'titative. Pertaining to quantity.
Rea'gent. Anything producing a reaction.
Reten'tion. Holding back. The act of retaining urine in the bladder.
Saccharometer, sak-ar-om'et-er. An instrument by means of which the amount of sugar in a solution can be estimated.
Sed'iment. Matter which settles at the bottom of a liquid.
Specif'ic grav'ity. Weight of a substance compared with that of distilled water.
Strangury, stran'gū-re. Painful urination in drops.
Stric'ture. A contraction existing in a duct or tube.
Suppres'sion. Concealment; failure of the kidneys to secrete urine.
Transuda'tion. Oozing of a fluid through the pores of the skin.

Uræ'mia. Toxic condition of the blood, due to the non-excretion of effete substances (formerly supposed to be urea).

Urates. Salts of uric acid.

Urea, u'rē-ah. Chief solid constituent of urine; a nitrogenous product of tissue-decomposition.

Ure'ter. The tube which carries the urine from the kidney to the bladder.

U'ric ac'id. An acid normally found in small amounts in human urine.

Urinom'eter. Instrument for measuring the specific gravity of urine.

BACTERIOLOGY.

Aëro'bic. Living only in the presence of oxygen or air.

Amœ'ba. A colorless protoplasmic animal micro-organism.

Anaëro'bic. A term used of micro-organisms which are produced or which live in the absence of oxygen.

Aut'oclave. Instrument for sterilizing by means of steam heat under pressure.

Bacil'li (sing. **Bacillus**). The most important group of bacteria, so called from their resemblance to small rods.

Bac'teria (singular, **Bacterium**). A general term for the lowest form of vegetable micro-organisms which multiply by fission.

Bacteriol'ogy. The science which treats of bacteria.

Conta'gium. Septic matter or germs of specific disease.

Cul'ture. A term loosely applied to the product of the propagation of germs in suitable fluids or other media.

Diplococcus, dip-lō-kok'us. Cocci united in pairs.

Fermenta'tion. The process of decomposition due to the action of living organisms or of an unorganized ferment.

Fraction'al Steriliza'tion. The process of sterilizing for a fixed time on more than one occasion.

Fis'sion. Reproduction by splitting into two or more equal parts.

Germ. The special virus or spore by which a disease becomes communicable.

Ger'micide. An agent which destroys germs.

Im'munity. Freedom from risk of infection.

Incuba'tion. The period which intervenes between the implantation of the virus and the appearance of the disease.

Infec'tion. The process of communicating the germs which produce a disease.

Infec'tious. Capable of infecting.

Inocula'tion. The act of introducing a specific virus into the system.

Me'dium. That in which anything lives.

Mi'crobe. A micro-organism.

Micro'coccus. A spherical bacterium.

Nu'clear. Pertaining to the nucleus.

Pasteuriza'tion. The name given to a special kind of treatment of a substance with a view to the destruction of microbic life in it, and thus preventing decomposition.

Pathogen'ic. Having the property or power to cause disease.

Phagocyte, fag'ō-sīt. A cell possessing the property of absorbing and digesting bacteria.

Phagocyto'sis. Destruction of microbes by the action of phagocytes.

Putrefac'tion. Organic decomposition.

Saprogenic, sap-rō'gen-ik. Pus-forming.

Spiril'lum. A genus of bacteria.

Sporad'ic. Scattered; occurring in isolated cases.

Spore. The form of reproductive body in cryptogams analogous to the seed.

Staphylo'cocci (sing. *-us*). A class of microbes.

Streptococ'ci (sing. *-us*). Bacteria arranged in strings.

Ther'mostat. Any automatic device for regulating temperature.

Vi'rus. A poison which causes a morbid process or disease; any pathogenic microbe.

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