Dr. Claiborne referred to the use of white lights; the majority of roads object to the use of white light in signaling entirely, as it is so easily mistaken for the lights illuminating the cities and towns the roads run through. They are now using yellow to some extent as a caution color, with green as clear. The use of blue lenses is out of the question with the kerosene lamps used to illuminate them, as they can not be distinguished at sufficient distance to be of use as a signal. With my vision reduced to one-half of normal, I could make out signals at one-half mile, and so I think enginemmen with 20/40 vision should be retained in service, even if with but 20/40 in both eyes, and especially if a clause be inserted to take them from the more trying runs and give them service about the yards, where such a high standard of vision is not necessary.

THE SANATORIUM FOR INCIPIENT PULMONARY TUBERCULOSIS.

ITS AIMS, METHODS AND RESULTS.

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HOME AND SANATORIUM TREATMENT.

The open-air treatment of tuberculosis is to-day an established fact. Its curative value is proven beyond cavil. It is not an experiment. It does not mean, however, that the patient is to be restored simply by a few weeks' or months' sojourn in a "lodge in some vast wilderness" or out-of-door life at a fashionable mountain resort or a tent life in his own back yard under the simple guidance of his own sweet will. It means rather a systematic regulated life under rigid discipline and routine. It means the constant watchfulness of every symptom, not by the patient himself, for this leads to introspection and consequent defeat, but by a well-trained nurse and a physician of experience. It means expense to the individual in time, in patience and in money. To the rich or the well-to-do this may be possible in his own house. For even the most favorably circumstanced, however, the proper régime at home is difficult if not well-nigh impossible. The family or friends of the patient can not give intelligent co-operation, and in laudable attempts to help will hinder advance by over-indulgence. Well-nourished, incipient cases with fair bodily strength do not impress their friends or themselves as invalids and are easily tempted to over-exercise, injurious amusements or other undue expenditure of energy, seriously handicapping the best efforts of even a thoroughly trained medical attendant.

Even when private grounds and houses can be adapted to the requirements of an out-of-door life the patient will often find himself unable to make full use of them because of the exaggerated impression such living makes on his neighbors and friends, much to his embarrassment, and it may be to the serious detriment to his present or future business interests. We live too close to the radiator in our northern homes to give intelligent appreciation to the man sitting on his veranda wrapped in rugs and reading his morning paper with the mercury at zero, even though later in the day we meet that man in office or store. Such things can not fail to provoke unwarranted remarks until we have been more liberally educated as to the value of oxygen and good red blood.

In such sanatoria as exist to-day the patient can find most congenial surroundings and agreeable companionship among persons of his own social class. He readily enters into the routine to the observation of which he

is helped by the example of his fellows. He is stimulated by the spirit of hope which is everywhere manifest, and by the sight of others as ill or worse than himself steadily improving and returning to their work restored.

To be sure, all do not get well; some he sees slowly decline, occasionally some one dies, but these are exceptional cases and in spite of them the spirit of hopefulness is dominant and an inspiration to each to put forth his best efforts toward recovery. The medical supervision is here such as it is not possible to provide in the patient's home. A hospital with properly trained physicians and nurses, with the appliances and equipment for all details of treatment and all possible contingencies, is to-day recognized as the only rational method of treating the vast majority of diseases. Similarly equipped sanatoria are to-day recognized as indispensable to the curative treatment of tuberculosis.

STATE SANATORIA FOR CONSUMPTIVE POOR.

It is now everywhere conceded that it is the duty of the state to take a hand in this crusade against man's most insidious enemy by the education of the masses in hygiene, the enforcement of judicious sanitary laws and the provision of sanatoria for the treatment of the poorer people who form so large a percentage of her citizens, and for the protection and fostering care of whom she is responsible. Many countries abroad and several states in the United States and Canada have opened such sanatoria. That established at Rutland, Mass., has been in successful operation since 1898 and was the first institution of the kind supported by the state in America. New York has erected a state sanatorium at Raybrook in the Adirondacks and other states, among them Maine, Vermont, Rhode Island, Connecticut, New Jersey, Pennsylvania, Maryland, Louisiana, Minnesota and Ohio, have taken active measures for the erection and opening of similar institutions. The establishment of a state sanatorium for the treatment of tuberculosis in the state of New Hampshire, so ably discussed and warmly advocated by the commission of 1901, and subsequently endorsed by legislative action, let us hope, is soon to be accomplished.

The functions of such a sanatorium should be not only curative, but educational. It should aim to so instruct its patients that they may go from it as missionaries of hygiene, that they may instruct their families in the sanitary conduct of home life, and by their personal example help in bringing about much needed reform in the hygiene of the home. It should afford opportunity for health officers and physicians to study the sanitation of tuberculosis and should be equipped for the scientific study of the tuberculosis question in all its phases.

REQUIREMENTS FOR A STATE SANATORIUM.

Location.—The site selected for a sanatorium should be at an elevation of from 1,000 feet to 1,500 feet above sea level, and should contain from 200 to 500 acres, according to the number of patients it may be planned to accommodate, and should be on dry, porous soil. That part on which the buildings are to be located should be protected on the north from the prevailing winds, and should be open and gradually sloping toward the south, permitting exposure to the largest possible amount of sunshine. There should be sufficient tillable land to provide for the needs of the institution, and ample pasturage for cattle. The location should be near enough to a railroad to be readily reached by patients and to facilitate the handling of supplies. The building site

should be sufficiently remote from a public highway as to avoid contamination of the air by dust. Proper attention must be given to the presence of an abundant water supply from a source above suspicion and to efficient drainage.

Buildings.—These should consist of a central block, containing administrative building, store-house, kitchen, laundry and power-house. Grouped about this administrative block should be pavilions for the patients, including an infirmary for each sex, congregate dining-room and wards, accommodating from twelve to twenty patients each. The buildings should be connected by covered corridors, should be heated from a central plant, and lighted by electricity. The bathing and sanitary accommodations should be of the most approved pattern. The wards should be so built as to receive the greatest possible amount of direct sunlight, and there should be an allowance of 2,000 cubic feet of air space for each patient. Such ventilation should be provided as will change this air several times an hour. There should be ample accommodation of wide verandas with a southern exposure. The sexes should be separated by the administrative block. Inexpensive shacks opened on three sides, of sufficient size to hold ten beds, and furnished with a dressing-room containing lockers and bathing facilities should be provided for sleeping in the open air. There should be a nurses' home at a distance of several hundred feet from the other buildings. A disinfecting plant and crematory for sputum, etc., should be provided. Laboratories for chemical and research work should be provided in connection with the administrative group or in a separate structure.

The outlook from the infirmaries and wards should be unobstructed by buildings, and the site should be so chosen that the views may be pleasing and restful to the patient.

In addition to the usual farm buildings, especial attention should be given to the erection of sanitary cow barns, and every facility provided for the cleanly collection of the milk and for its proper cooling. Patients should not have access to the cow barns or pastures.

Grounds.—The grounds about the building should be laid out with carefully graded walks, that the earliest exercise may be graduated and readily adapted to the patient's strength. Frequent seats and resting places should be provided where the patient may rest sheltered from the wind or direct rays of the sun. There should be an abundance of shrubs and flowering plants, which will not only be a source of pleasure to the patients, but the care of which may be made a means of employment and interest to those who are sufficiently convalescent to be benefited by some light work. On the well-sodded lawns such out-of-door amusements may be allowed as do not call for too active exercise, and here such games as lawn-bowls, croquet, archery, tether-ball, quoits, etc., may be enjoyed when prescribed by the physician.

ADMISSION OF PATIENTS.

The sanatorium being designed for the treatment of incipient cases only, it is of vital importance to the success of the undertaking that none but suitable cases be received. There should be two or three examining physicians appointed in each county to whom applicants for admission should be sent for physical examination. The reports on such cases as are found suitable for admission should be sent to the superintendent of the sanatorium and placed on file. As rapidly as vacancies occur these patients should be admitted in the order in which the re-

ports from the examining physicians have been received. No patient should be retained in the sanatorium who is found, on further observation, to be unsuitable for treatment. Those cases should be excluded which have intestinal, renal or joint complications; a temperature running above 103 F., active laryngeal tuberculosis; extensive consolidation in both lungs; cavities, with constitutional disturbances, excessive in proportion to the area of lung involved. The favorable cases are those with slight constitutional disturbance and fair nutrition; pleuritic cases; cases beginning with hemoptysis without constitutional impairment; incipient cases. These are the classes of patients received by Dr. Trudeau at the Adirondack Cottage Sanatorium.

CLASSIFICATION OF PATIENTS.

For best carrying out the treatment and for the regulation of routine the patients should be classified according to their physical condition as follows:

1. Infirmary cases, including those with active lesions, the new patient under preliminary observation, and those suffering from intercurrent affections and exacerbations of temperature, hemorrhage or other incident of the disease.
2. Patients not on exercise, but who may be allowed some association with other patients.
3. Patients on limited exercise.
4. Patients who are sufficiently convalescent to be allowed full exercise and who are capable of performing some light occupation.

So far as possible this classification should be observed in the housing of the patients. Too free intercourse between the patients whose activity is restricted and those in the free exercise class creates an unreasoning and unreasonable discontent among the former, disarranges the discipline of the sanatorium and is a bar to progress in treatment.

The lines on which classification are drawn and the rules governing each class should be made so far as possible with a view to the patient's comfort and happiness, and a spirit of kindness should prevail in all our dealings with them, but the classification must be rigidly adhered to and the rules strictly enforced. The whole environment should be made cheerful and the patient brought to have an interest both in his own welfare and in the best interests of his neighbors, but with the mutual understanding that the ultimate good to all concerned can be attained only by a careful observance of the discipline by every individual.

GENERAL PLAN OF TREATMENT.

In the practical application of the treatment each case must be considered separately, and the methods followed be adapted in a large measure to the needs of the individual, as determined by a rigid physical examination and a careful observation for several days under the care of a trained nurse (one trained for this particular work). Every patient on admission should, then, be thoroughly observed and the details of his treatment carefully formulated that he may follow a carefully prescribed course from the beginning.

The following general plan of treatment is subject to such individual modifications as may be from time to time judged to be desirable.

1. *Rest.*—The recumbent or semi-recumbent position and bodily and mental repose must be insisted on so long as the rectal temperature remains above 100 degrees F. All things which have a tendency to raise the pulse rate above 100 must be forbidden. At times mental rest must be absolute. At others a little light

reading, a game of chess, of cards or other quiet pastime may be enjoyed. The effect of all these things must be watched, and everything denied which is followed by any undesirable result. We must guard against too long continued or exciting conversation, tiresome visiting with friends, etc. It is the careful, judicious regulation of these little things that make for success in our management of the case.

The patient may be in bed or in a reclining chair. His position should be changed at intervals of an hour. If his condition is such that he can be dressed and use a reclining or steamer chair, he should get up and walk eight or ten paces every hour.

2. *Open Air.*—The patient must be in the open air as many hours as possible. He should average eight hours out of doors every day; in summer ten hours may easily be thus spent, in winter often not more than six; but at all seasons his attempt must be to attain the maxi-

dietetics should be in immediate charge of the food preparation, giving attention not only to the quality of the food and its proper cooking, but also to the details of its service at proper temperature, and in a tempting, appetizing manner. As a rule, the appetite is poor without an actual digestive derangement, and the patient must be stimulated to eat by persistent persuasion, attractive service and sometimes catering to his fancy, before resorting to medication.

Fat and fat-forming foods must be administered freely, carbohydrates and proteids being given in due proportion. Milk, cream, butter, eggs and potatoes served in varied and pleasing ways offer the best means of attaining this end. Fresh meats, fish, vegetables, cereals and fruits should be freely supplied. The diet should be mixed and varied from day to day. The following dietary is given by Lucas to indicate the amount of the various forms of food necessary:

Breakfast.—Half a pint of porridge, with two ounces of sugar; two rashers of bacon, and two eggs (or chop, steak or fish), bread, four ounces; butter, two ounces; half pint of tea or coffee; milk, one pint.

Mid-day Meal.—Soup; fish, three ounces (or poultry), with butter, two ounces; two or three slices of meat, four ounces; potatoes, four ounces; cabbage and other vegetables, four ounces; pudding, six ounces; cheese, two ounces; bread, four ounces; butter, two ounces; milk, one pint.

Evening Meal.—Two eggs (or cold meat or fish), bread, six ounces; butter, two ounces; jam; half a pint of tea; milk, one pint.

The diet must be largely modified, according to individual needs. During febrile attacks a liquid diet must be prescribed and should consist of milk, raw eggs, meat broths, cocoa, meat juice and other concentrated liquid foods. At times the predigestion of food will be called for and sometimes lavage. Patients much reduced in flesh should be given milk with eggs between meals, and the feeding should be forced until the normal weight is gained. This being attained the diet should be but little in excess of the ordinary, as too much stuffing is liable to lead to digestive disturbance, with consequent loss of weight and a temporary relapse.

4. *Exercise.*—From the beginning of the treatment routine, systematic exercise should be practiced in order to increase the lung expansion and the volume of air habitually respired. A patient in bed may be taught to take eight or ten slow, deep inspirations, hold the breath a moment and then forcibly expire. He should breathe through his nose and take the exercise several times a day at stated intervals. The following respiratory exercise, given by Knopf,* is excellent for increasing the chest expansion, and can be practiced by nearly all class of patients.

Stand straight, with heels together, chest out and head erect.

1. Take a deep, slow inspiration, beginning with the abdominal muscles, and then expanding the chest to its fullest capacity, at the same time raising the arms from the sides to a horizontal position (Fig. 1). Hold the breath a moment and then lower the arms, at the same time making a somewhat forcible expiration.

2. A similar exercise, except that the upward movement of the arms is continued until the hands meet above the head. (Fig. 2.)

3. Stretch the arms out as in swimming, the dorsal surfaces of the hands touching each other. During inspiration move the arms outward until they meet behind the back, bringing them forward again during expiration. (Fig. 3.) This

Figure A.

mum in this regard. When possible, he should sleep in the open air also, and if he sleeps indoors it must be with windows open wide and the bed screened from draughts. This he must do, no matter what the weather, always, of course, with proper protection from wind, rain and cold. The infirmary should be provided with such means of egress and covered verandas that bed patients may be taken out into the open air whenever there is not a positive contraindication to such a procedure, the bed being wheeled directly out on the veranda. (Fig. A.)

3. *Diet.*—The arrangement of the dietary and the preparation of the food should receive the careful personal attention of the physician. This is a matter of vital importance to the successful management of the tubercular patient. A person thoroughly trained in

*S. A. Knopf: Prophylaxis and Treatment of Pulmonary Tuberculosis, P. Blakiston's Sons & Co. 1899.

exercise may be made more effective by the patient rising on his toes during inspiration, and descending during expiration.

4. Place the hands on the hips with the thumbs toward the front. Bend slowly backward as far as possible during inspiration. Hold the breath and remain in this position a few seconds, then rise somewhat rapidly during the expiration. (Fig. 4.)

Follow each respiratory act by a forcible secondary expiratory effort, pressing the thorax with the supinated arms to expel as much as possible of the supplemental air.

Massage and Swedish movements should be considered as forms of exercise and be brought into service during the first part of the treatment.

When the rectal temperature does not go above 100 F. in the afternoon the patient may be allowed limited walking exercise. At first a walk of a few rods may be

5. *Bathing.*—On rising in the morning the patient should take a cold sponge bath or at least sponge the body to the waist with cold water. He should then rub himself briskly with a coarse towel until the skin is red and warm. If at first the cold water produces too much shock and there is no proper reaction, the use of a dry rub with a coarse towel should be substituted for the cold sponging. After a few days the dry rub should be preceded by sponging with lukewarm water, a few days later by alcohol and water, and then by water the

Figure 1.

Figure 2.

taken and the rectal temperature determined one-half hour thereafter. If it is not elevated the exercise may be allowed regularly, and gradually increased, but must always be under careful regulation by the physician, and due regard paid to the effect on the temperature and other symptoms. No active muscular exertion must be indulged in until convalescence is established, but limited participation may be allowed in the various forms of less active lawn games, provision for which has been previously mentioned. Exercise may also be obtained by occupation of the patients in light gardening, the care of lawns and flowers, some of the farm work, and also, in the case of women, in the work of the household.

temperature of which is reduced about 5 degrees each day until cold water at a temperature of 45 to 50 is used, or as it comes from the tap. The same method of bathing should be used for infirm patients; the water and the friction being applied by the nurse. For cleansing purposes a moderately warm bath should be used twice a week and this should be followed by a cold affusion and friction of the skin of the whole body. Shower, spray and needle baths are excellent for stimulating nutrition and hardening the tissues or increasing the resistance to cold. The sanatorium should be equipped with hydrotherapeutic appliances for the administration of various forms of baths and douches in selected cases.

6. *Sleep.*—The patient should retire at 9 o'clock and remain in bed until 6:30 a. m., between which hours absolute quiet should prevail in the sleeping quarter, thus allowing nine and one-half hours for sleep. Those who have suffered from insomnia generally rest well when taking the open-air treatment, particularly when sleeping out of doors. Being constantly in the open air during the day is conducive to sleep, and hypnotics will seldom be required. Gentle, cool sponging of the head and shoulders, or of the entire body, or cold compresses applied to the abdomen or extremities and covered with a flannel bandage are often efficient in inducing sleep. In more obstinate cases, wet packs, or massage, local or general, should be tried before resorting to hypnotic remedies.

Figure 3.

DISPOSAL OF SPUTUM.
The thing of greatest importance in the sanitation of tuberculosis is the systematic and complete destruction of the tubercle bacilli. Since the bacilli are confined to the sputum in cases of incipient pulmonary tuberculosis, the thorough destruction of this excretion will effectually prevent the spread of the infection. Not only must great care be exercised in the collection of the sputum, but also the utmost cleanliness must be observed in the care of the utensils used and the cleansing of the hands, person and clothing, both of patients and nurses.

Every patient must be provided with a small sputum cup or flask, made of such material that it can be economically destroyed or thoroughly cleansed by anti-

Figure 4.

7. *Symptomatic Treatment.*—In every case there is present, or constantly arising, some condition, anemia, malnutrition, digestive disorder, cough, hemorrhage, pleurisy, or other symptoms which require careful remedial treatment, but the discussion of which does not come within the scope of this paper. I would call attention, however, to the importance of maintaining the entire digestive tract in a healthy condition for the proper digestion of the increased amount of food taken and the thorough removal of waste. Constipation and consequent autointoxication must be guarded against. The teeth should be put and kept in good repair, and systematic attention given to the hygiene of the mouth.

septics or by boiling. A useful form of cup is one made of manila paper, which is supported in a metal frame with handle and cover. (Fig. 5). This cup is inexpensive and can be burned after use, and the frame well disinfected. When the patient is taking exercise and is off on a walk a more convenient receptacle is a pocket flask like the Detweiler or the Knopf flask. (Fig. 6.) These may be made of glass, but preferably of metal (aluminum) as the glass flasks are liable to be broken in the pocket, by dropping or otherwise, and are therefore less sanitary. A metal flask with tight joints and a properly fitting cover can be carried in the pocket, is light, inconspicuous, cleanly and can be sterilized by boiling.

The patient must be taught to always use his cup or flask for expectoration wherever he may be, and whether for the reception of sputum from the lungs or saliva from the mouth. He must never be without it. It must be at his bedside at night ready for immediate use; always by him during the day, at rest in his room, among his fellows on the veranda and in his pocket on his daily walks. The flask should be used only when away from the building, the cup at all other times.

Twice a day the paper cups should be emptied, their contents mixed with sawdust and burned in a furnace or sputum crematory. The paper cup should also be burned. The metal frames should be washed in a 10 per cent. solution of carbolic acid and refilled with fresh paper cups. The contents of the pocket flasks should be mixed likewise with sawdust and cremated, the flask being washed in a 10 per cent. carbolic acid solution, and boiled for one-half hour in a 1 per cent. solution

or three feet from the floor. Cuspidors, if used at all, should be of iron, which can be sterilized by heat; should always contain a quantity of an antiseptic solution and should have well-fitted covers to prevent evaporation or the access of flies and other insects to the contents.

If the sputum cup is spilled or sputum is deposited in any way on the furniture, floor or about the grounds or on the clothing of patients, the nurse, being notified at once, should immediately remove the infectious material and properly disinfect the place before the sputum has time to dry.

If a patient is suffering from intestinal or bladder tuberculosis, or if there are any infectious discharges whatever, these should receive the same thorough antiseptic treatment as in a case of typhoid fever.

KITCHEN AND LAUNDRY STERILIZATION.

All knives, forks, spoons and dishes on which the patients are served must be disinfected after every meal. This can be accomplished by means of a sterilizer after the pattern of a dish washing machine, in which the dishes may be immersed, first in a strong, hot caustic lye and then in boiling water, on being removed from which they dry rapidly by evaporation.

At the table each patient should have his own napkin and rings or other device should be used so that these do not become mixed. The table linen and all bed and body linen should be sterilized by steam before going through the usual laundry operations. Clothing soiled with tubercular sputum, vomitus, etc., should be soaked in 10 per cent. solution of carbolic acid for an hour before being sent to the laundry. The patient's outer garments should be subjected to sterilization by formaldehyd gas at stated intervals, and on discharge from the sanatorium all his belongings and his wearing apparel should be similarly treated.

HOUSE DISINFECTION.

Experiment and careful observation have demonstrated that the wall and floors of properly conducted sanatoria are comparatively free from tubercle bacilli. Also that the walls seldom become infected above a distance of three feet from the floor. The floor should be gone over daily with a mop moistened with a 1 per cent. solution of chlorinated lime and the mop put into boiling water after use. Once a week the furniture and the walls, to a height of three or four feet, should be wiped with cloths moistened with 1 per cent. solution of chlorinated lime, and the cloths burned. The floors and walls to a height of six feet should receive a weekly scrubbing with soap and water. Once a month the rooms should be disinfected with formaldehyd gas. The various articles in the room should be left in place and books should be stood on end and opened so as to separate the leaves freely. Any one seeing a tubercular patient reading and coughing as he reads and noting in this act the spraying of the open page with fine droplets of mucus, will realize the danger which arises from the drying of these droplets containing, as many of them do, the tubercle bacilli. The frequent disinfecting of books used by patients, then, becomes a matter of importance. All rugs, mattresses and pillows should be exposed weekly to the bright sunlight for several hours.

In the construction of the building all corners should be made round for most efficient cleansing.

PERSONAL HYGIENE.

Mention has been made previously of the proper care of the skin and the hygiene of the mouth. The use of

Figures 5 and 6.

of carbonate of soda. The nurse who has charge of this operation—and it should always be done by a completely trained person—must wear rubber gloves and a washable sleeved apron during the procedures.

The use of stationary cuspidors about the buildings and grounds is not to be commended. Although many individuals pride themselves on their ability always to expectorate in the cuspidor, many are they who fall wide of the mark and even miss the target altogether. In respect to the memory of these delinquents it is well to insist on the individual use of sputum cups on all occasions. An exception might be made on the use of a cuspidor in the toilet rooms. Here is a strong temptation, which is seldom resisted, to use the hopper for expectoration. This must be forbidden, and that the restriction may be well obeyed, it is well to have a cuspidor in a convenient location raised two and one-half

an antiseptic mouth wash with a tooth brush before and after meals should be enjoined, and also the proper cleansing of the hands and face before each meal, to avoid ingestion of bacilli in saliva dried on the skin. The nails, being such frequent harborers of bacteria, must be kept well manicured, and the use of the nail brush go with every washing of the hands. It is best that the patient be clean shaven, but when the retention of a mustache or beard is preferable to the patient, it should be kept closely trimmed and washed several times daily. The patient must be instructed in the danger of swallowing sputum, and the habit broken up, if present.

The clothing should be as light as is consistent with proper warmth. Over-burdening the body with clothing must be avoided, as it provokes perspiration, increasing the danger of "taking cold," is not cleanly and limits respiratory expansion. Mufflers, chest protectors, leather vests and jackets must be discarded. Absorbent materials should be worn next the skin and changed frequently. The underclothing worn during the day should be entirely replaced at night. The skirts of the women patients and employes should be of such length that they do not sweep the ground in walking. So long as corsets are made they will be worn, but their construction and adjustment should be such as will allow a measure of abdominal breathing and good chest expansion. The feet should be warmly clad with closely woven stockings and comfortable, well-fitting shoes and carefully protected from moisture.

METHODS OF RECORDING PROGRESS.

On admission of the patient to the sanatorium a full record of the case should be started on suitable forms. Hospital experience has demonstrated the superiority of the envelope system of loose leaf records, which may be fastened together in book form, over the older case book system. The former system is more flexible and allows of a full and complete record in compact form and available for ready reference. The accompanying forms are patterned closely after those designed by Dr. Herbert Maxon King for use in the Loomis Sanatorium. Form No. 1 is a general summary of the case valuable for reference and for statistical purposes, and is not fully filled up until after the discharge of the patient. The other forms are self-explanatory, giving in order a full family and personal history; history and symptomatology of the present illness; results of examination of the entire body covering two or more forms; records of temperature, pulse and respiration; weight and sputum records; results of examination of urine, blood and stomach contents together with blank forms for record of symptoms, treatment and the régime followed.

The weight should be recorded regularly every one or two weeks, always at the same time of day, the patient being weighed stripped, and clad only in a dressing gown of known weight. The sputum should be weighed every two weeks and a record made of the amount in cubic centimeters. Once a month the sputum should be examined for tubercle bacilli, elastic tissue and note should also be made of its character, whether mucoid, mucopurulent or purulent; the presence of staphylococci, streptococci or other bacteria, with their relative number. In case of failure to find the tubercle bacilli in any examination, specimens should be obtained on three successive days, and several smears from each specimen carefully examined.

The blood should be examined on admission and once a month thereafter in cases showing any abnor-

mality in red or white corpuscles or hemoglobin content.

The urine should receive a thorough examination on admission, both chemical and microscopic. Once a month thereafter a record should be made of the twenty-four-hour amount, the color, reaction, specific gravity; the presence or absence of albumin, sugar, indican and the diazo-reaction, the latter being of considerable prognostic importance.

The thorax should be examined once a month and at such other times as the symptoms may suggest, the physical signs being recorded on a diagram readily made by means of a rubber stamp, thus showing graphically the exact extent of the lesion and the location of the physical signs found. Previous to discharge the patient should receive the same thorough physical examination of the whole body as on admission for purposes of study and comparison. The first and last examination should include a careful system of measurements of chest expansion, lung capacity and physical development.

EDUCATIONAL WORK.

The work of a sanatorium for the treatment of incipient tuberculosis should not be only curative, but educational. The daily sanatorium life is an education in itself, but in addition simple, clear instruction should be given on personal hygiene, home sanitation, prophylaxis of tuberculosis, and rules laid down for the guidance of the patient after leaving the institution. The vast majority of the patients have too little realization of the necessity of careful sputum disposal and hygienic surroundings, and every effort should be made to impress on their minds the importance of prevention and the possible eradication of the disease, which can only be accomplished by the active co-operation of the enlightened and educated public. As a means to the accomplishment of this utopian result I would suggest the following topics of a course of talks to the patients. These should be very informal, and should be given in simple language and illustrated whenever possible by models, diagrams, charts, pictures and in all other ways which would add to their educational value and popularity. They should be supplemented by a pamphlet containing directions for carrying on the treatment at home, prophylactic measures, health notes and facts about tuberculosis, which should be given to each patient on discharge.

1. Air and sunshine. Ventilation.
2. Structure of nose, throat and lungs. Proper breathing.
3. Bacteria, what they are; how they grow; diseases caused by them.
4. The tubercle bacillus; how it enters the body; condition favoring its growth, etc.
5. Disposal of sputum at home.
6. House disinfection.
7. Food and digestion.
8. Exercise.
9. Bathing and care of skin.
10. Clothing day and night.
11. Personal hygiene and habits.
12. Rearing of children of tuberculous parents.
13. Amusements, things and places to avoid.
14. Occupation for consumptives.
15. The life régime of the consumptive.

These talks should be short, not more than one-half hour in duration and should be so arranged that every patient may attend them before his discharge.

DURATION OF SANATORIUM RESIDENCE.

The following data should be taken into consideration in determining the arrest of the morbid process in the lungs:

1. Absence of symptoms and physical signs of active disease.
2. Absence of tubercle bacilli from the sputum in repeated examinations.
3. Return to normal strength and maintenance of body weight at or above normal.

The length of time necessary for the accomplishment of these results will depend on the progress made by the disease before admission and the zeal which the patient displays in carrying out the prescribed treatment. The more conscientious he is in living up to the spirit and the letter of the régime, the more immediate and certain will be the results. Except in the most incipient cases six months should be put down as the minimum time to be spent in the sanatorium. There are occasional patients whose symptoms become quiescent and who can be discharged after a residence of three months, continuing at home the routine which they have learned. Many cases will show signs of active disease after twelve months' residence. This, as a rule, should be the maximum duration of residence in a public sanatorium where there is constant great pressure for the admission of recent cases. After this length of time any person of ordinary intelligence should be able to carry out in practice at home the principles with which he has become familiar by association and teaching, and the way should be made for the reception of others who may be waiting and losing ground for want of proper guidance.

RESULTS OF SANATORIUM TREATMENT.

Some such classification as the following is usually observed on discharging patients from sanatorium treatment: Apparently cured. Lesion arrested. Improved. Not improved. Those patients are discharged as "arrested" in whom all active symptoms have disappeared, who have no cough, no bacilli, and whose temperature and weight are normal. The patients discharged as cured are those who have passed a considerable interval, usually from six to twelve months, in apparently good health.

The following figures are taken from the Seventh Annual Report of the Massachusetts Sanatorium for the year ending September 30, 1903:

	Per cent.
"Arrested" and "apparently cured".....	48.97+
Improved (including all shades of improvement).....	43.00+
Not improved (including one death).....	7.90+

Of the incipient cases treated, 72.6 per cent. were arrested or apparently cured. There has been a steady increase in the number of arrested and apparently cured cases during the five years of the work. "The replies from former patients to our annual letter of inquiry up to the present date (Oct. 1, 1903) enable us to say that the large majority of those who were discharged from the sanatorium as arrested or apparently cured in the year preceding this, are well, and are actively at work."

The imperial health office at Berlin published in 1901 a statement as to the results of the sanatorium treatment in Germany. Out of 6,108 cases, 67.3 per cent. were able to follow their former occupation; 7.1 per cent. were fitted to earn a living at a different occupation; 14.6 per cent. were partly able to earn a living, and 11 per cent. were unfitted for work. The older institutions of Germany, Gorbardsdorf and Falkenstein, report apparent arrests in 60 per cent. of the cases treated. Results at the Adirondack Cottage Sanatorium show over 70 per cent. of arrests or apparent cures.

These are the results, of course, in selected cases, only the incipient cases or those not far advanced in the disease being received in these sanatoria. The same methods applied to more advanced cases, however,

leads to very favorable results, about 50 per cent. of such cases being very greatly benefited, and some cures resulting even in cases seeming most unpromising. Statistics drawn from resorts receiving all classes of cases, even the most far advanced, show an increase in weight and general health, and decrease in fever, cough and expectoration in 80 per cent. with a return in approximately normal health in over 30 per cent. Thus we see that while the sanatorium treatment is beneficial in all stages of tuberculosis it is the earliest incipient cases which derive the greatest benefit, and are returned with the least delay to their homes and occupation. Thus, the very great importance of an early diagnosis is emphasized, and there is no question but that with earlier recognition of the disease by the use of all diagnostic measures on the slightest suspicion, and the immediate resort to sanatorium treatment a very much larger proportion of cures will be effected, and much time, expense and many valuable lives saved.

FOLLOWING OF PATIENTS AFTER DISCHARGE.

It is important to keep track of patients after their discharge, and to ascertain from time to time their condition and the ultimate result. At intervals of three, six and twelve months after discharge the patient should be required to report to the sanatorium his present condition on a printed form mailed to him for the purpose; or to report in person to the nearest examining physician and a physical examination made, the findings of which should be sent to the sanatorium and put on file with the record of the patient. Thus there would be obtained a record covering a period of two years following his discharge. To supplement this, inquiry should be instituted as to the whereabouts and condition of discharged patients at intervals of two or three years. In this way there would be collected in time valuable statistics as to the ultimate results of sanatorium treatment showing the per cent. of permanent cures, the duration of arrests, the frequency of relapses, the length of life, the causes of death and other facts of importance in the guidance of future therapeutic work.

CONCLUSION.

In conclusion I would call attention to the importance of continuance by the patient of a hygienic life after he leaves the sanatorium. In his home and place of work there must be proper ventilation and cleanliness, the latter term including adequate disinfection. These things are necessary for his own safety, for the protection of his family and his business associates. His food must be of the most nourishing, and his whole life well ordered and lived after the manner his institution experience has taught him. Not only should he practice these things himself, but he should be an apostle of the gospel of fresh air and sunlight to his fellowmen. And to the accomplishment of all this he should be strenuously aided by the physicians and sanitary officers of every community. "If," says Knopf, "we wage a vigorous war on all that is insanitary in our cities, towns and villages; if we endeavor to raise the coming generation to be a strong people, able to resist the invasion of the pathogenic micro-organism which may escape the watchful eye of the sanitarian; if we can, by the creation of sanatoria for all classes, rich and poor, and by carrying out the hygienic, dietetic, educational and symptomatic treatment of all consumptives outside of such institution, cure the curable and make harmless the incurable tuberculous patients, the problem of dealing with the most widely spread of all diseases will have been solved."