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## RESULTS OF SANATORIUM TREATMENT

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The sanatorium has now been a recognized agency in the treatment of tuberculosis for three-quarters of a century. Estimates of its value have fluctuated during that time between a belief that it is the chief agency for solving the tuberculosis problem and a disappointment in its accomplishments.

However, in spite of this, it has established the curability of tuberculosis, if we use the word in the sense of the restoration of the patient to a satisfactory economic and social status; but the problems which beset the program of cure have not yet been surmounted.

It is not my purpose in this paper to discuss how many or what percentage of patients suffering from tuberculosis are cured while receiving treatment in a sanatorium, for that would be very disappointing and would take into consideration only a very small part of the results accomplished.

### THE FIRST IDEA OF THE SANATORIUM

Brehmer's original idea in establishing the sanatorium was to provide a place where patients suffering from tuberculosis could receive a treatment which was calculated to increase the size of a supposedly small heart, a condition which he believed to be a contributing cause of the disease.

I do not know whether or not he appreciated the truly great enduring factors which he was establishing as part of his regimen or whether they were only incidental to the carrying out of his fundamental idea. But the great principles which he established with that first sanatorium were: (1) isolation; (2) hygienic living; (3) close personal supervision, and (4) the substitution of a definite therapeutic technic for previous haphazard methods.

The results produced at Goerbersdorf were such as had never before been seen. They were sufficient to establish the sanatorium as a permanent institution for the treatment of tuberculosis.

At that time there were no stringent rules to be followed in measuring results. It was sufficient that pale, sickly, emaciated patients with elevated

temperatures, who were coughing and expectorating, should gain in weight and be restored to the appearance of good health. Such a demonstration was convincing. Nothing like it had ever been seen before; so the sanatorium became a fixed part of treatment.

## WHAT PATIENTS SHOULD BE TREATED IN SANATORIA?

The question of what patients should be treated in a sanatorium unfortunately answers itself. In private practice, the doors are closed to few, if any. In institutions depending partly or wholly on private philanthropy, the principle of rendering the maximum service for the money expended requires the choosing of patients who offer greatest chance of cure. While those with minimal and early lesions should constitute the majority of the patients, at least, in public institutions, alas, most entrants are classified as far advanced. This is the greatest tragedy connected with the antituberculosis movement. It might almost appear that by devoting itself so largely to the incurable the sanatorium has jeopardized its reputation as an instrument of cure, and delayed the demand for the treatment of the early case. However, we must revise our idea of early, for extensive exudative lesions, with or without cavity, may be early.

Brown and Sampson<sup>1, 2</sup> reported in 1935 that at the end of fifteen years 92 per cent of minimal cases, treated in the Adirondack Cottage Sanitarium, were still alive. They also reported on a group of what they called "good chronics" who had been discharged for periods of five and ten years. Of 205 "good chronics," 111 were working after five years, and 107 after ten years. This is a good showing for the "good chronic"; but the emphasis should be placed not on the fact that 52 per cent were still alive after ten years, but that by passing from minimal or early to advanced the "good chronic" had decreased his chances of being alive from 92 per cent at the end of fifteen years to 52 per cent at the end of ten years. No matter how good the result, the sacrifice is too great to be bragged about.

Contrasting with these "good chronics" they found that of 131 bad chronics, only 16 were working at the end of five years, and 14 at the end of ten years.

Of 36 patients who were in the Pottenger Sanatorium on December 25, 1904, 11 are still well and working; 20 are known to be dead, and 5 can not be traced. This is thirty-three years after discharge.

If sanatoria should confine their efforts to patients with early lesions, or to the more favorable groups, both immediate and final results would be more gratifying to patient and physician. Instead, however, sanatorium beds are largely occupied by advanced and far advanced active cases, and the

best-trained personnel and the best facilities for treating tuberculosis are being expended on patients whose restoration to health, and economic and social efficiency, is, to say the least, difficult and too often impossible. When we consider that most of these advanced cases treated in the sanatorium eventually die of tuberculosis, and so only have the time of death retarded, we are forced unwillingly to admit that we are using the sanatorium more for isolation than as a curative institution. It is too expensive for isolation.

### WHAT TREATMENT SHALL BE INSTITUTED?

The impatience shown on the part of many men to any method of treating tuberculosis except some form of compression is largely due to two factors: first, their attempt to cure so many far advanced cases; and second, the period in which they entered the field of therapy. Such impatience was not bred by the Brehmer, Dettweiler, Trudeau and Koch schools of physiologic and immunologic thinking. Nor has it been brought about by a failure on the part of hygienic measures to cure tuberculosis. Tuberculosis has been treated successfully since the time of Brehmer. The improvement of diagnosis and the technic of applying hygienic measures after the turn of the century made a marked change for the better in the results obtained. There was comparatively little doubt in the minds of clinicians about the curability of early cases. But the active, advanced cases, particularly the ones with chronic destructive lesions, have always baffled the physician's efforts. It was particularly for the treatment of this type of patient that operative measures were especially devised. Where unfavorable mechanical conditions exist, physiologic measures alone can rarely be successful.

At times there seems to be a tendency to forget that tuberculosis is a disease that will yield to the patient's own physiologic protective forces; but no matter what treatment is employed it is the patient's physiologic efficiency that brings about the cure, and it is the duty of medicine to continue its search for a better and more complete understanding of how it is brought about.

It is not tuberculosis, itself, but the results of tuberculosis that furnish the difficult therapeutic problems; the extensive scar, the chronic cavity, the pleural adhesions, the caseation and the effects of persistent toxemia. These are rarely a part of tuberculosis as we know it early; and are conditions which could largely be avoided if only present knowledge were put into practice. Best results are thwarted by gross defects in our methods of dealing with tuberculosis.

There is no way of getting away from the fact that healing is dependent upon the patient's physiologic reaction. Furthermore, there is no quick way

of producing healing. A short period of sanatorium treatment is better than none from both the standpoint of results obtained, and from the standpoint of educating the patient in the prevention of the spread of the disease; but it falls far short of what is desirable, and is followed by many unnecessary relapses. We may be obliged to use a short term of treatment in order to extend existing facilities to the greatest number of patients, but let us not entertain the fallacy of thinking that it is the best method either for the patient or for the community. Both clinical and public health ideals are much higher.

If a sanatorium furnishes the proper atmosphere and provides proper guidance for the patients, with rest and exercise according to their needs, supplies them with proper food, and establishes hygienic conditions under which they are to live, it is furnishing curable patients conditions under which any form of treatment can be most advantageously applied, but it cannot shorten the period of treatment beyond that which is necessary for healing to take place. Until the disease is treated regularly in its early stages, physiologic measures often will be insufficient, and there will be many who will require collapse therapy to overcome mechanical disadvantages, and others who will require it to check activity and prevent the spread of infection; but, the number is not nearly so great as present practice indicates.

After they have been put on sanatorium regimen I have rarely seen serious extensions of the disease take place in patients suffering from early exudative lesions or in those belonging to the "good chronic" group. Rest and other physiologic measures applied to these patients quickly raise their resistance to the point where metastases are either prevented, reduced in severity or caused to be abortive in case they take place. However, patients with acute exudative tuberculosis should be put under treatment as soon as the disease manifests itself. When this is done we find that sputum is usually reduced in quantity, and the stage of rare bacilli is soon attained in most instances. This is shown in the accompanying graphs.

There are many infiltrations and many cavities which do not require pneumothorax for their cure. Least of all is it necessary in those which appear as a part of an acute exudative process. It has been my experience that such infiltration and such cavities will nearly always heal physiologically; and, if aid is necessary, I usually prefer a temporary paralysis of the diaphragm to pneumothorax. Pneumothorax, however, gives the physician better control of the patient, and often the only control which will guarantee his continuation of treatment long enough for cure to be attained. So while not necessary for cure, it frequently becomes expedient for the control of the patient.

Unfortunately it is not an easy matter to keep patients in a state of physiologic balance for the time necessary for healing to take place. It is neither easy for the patient nor for the physician. But it is my observation that the patient who is treated physiologically and returned to good environment is able to interrupt treatment sooner than the one who is treated by pneumothorax.

Rarely do we find it necessary to keep patients with minimal lesions or those with acute exudative lesions with or without cavity in the sanatorium for more than eighteen months, and some may be safely dismissed in less than a year. We follow them up, however, for two or three years.

The chronic proliferative lesions with small cavities, the "good chronics," will also heal in the same manner if compensatory changes are not interfered with by adhesions or dense scar.

It is dense scar and large cavity or multiple cavities with rigid walls and many adhesions, unfortunately located, which make compensatory changes difficult and cause most trouble in treatment.

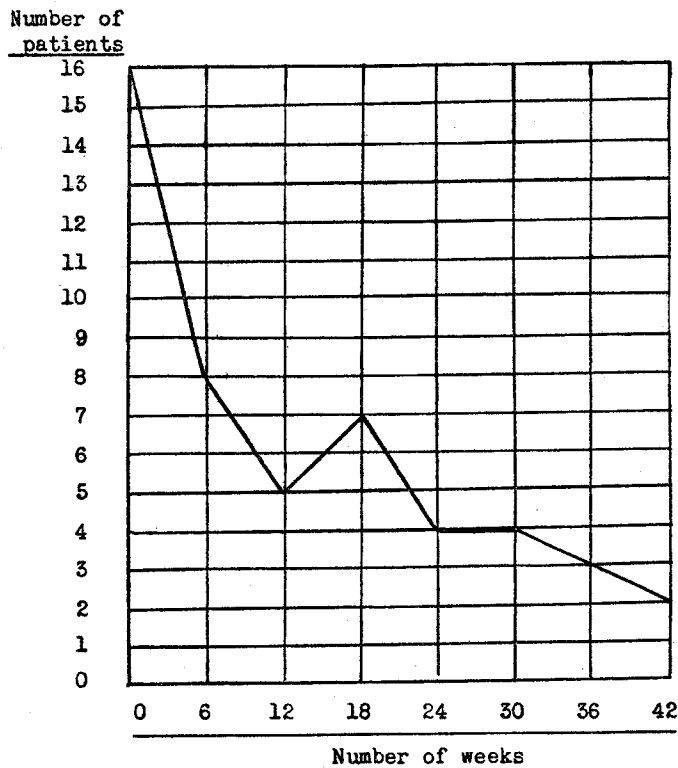
I often find it most difficult to know just what patient requires compression. Many who seem to need it heal without it. Many in whom we are unable to find free pleural space get well anyway, if treatment is persisted in.

There is no doubt that many patients as referred to us will not heal except they be given mechanical aid. There is no doubt that many patients cannot be prevailed upon to cooperate long enough to secure a healing unless they are forced to come back to the physician at frequent intervals for some such purpose as to receive refills. There is no doubt that many cases can have their cavities closed more quickly by pneumothorax than without it. Furthermore, there is no doubt that many patients who are forced to return to unfavorable environment will be safer with a collapsed lung than without it. Then, too, the bed capacity for serving a community often determines the amount of compression that will be used. If the patient cannot remain in the sanatorium as long as he should, because of lack of beds or for other reasons, he will leave the protection of the institution with greater safety if his diseased tissue is compressed, provided the treatment can be continued on the outside. But we must not let these difficulties destroy our faith in the possibility of physiologic cure.

The patient will also probably scatter less infection. I say "probably" because it is doubtful whether patients are as nearly bacillus-free when discharged as is thought. By the dilution-flotation picric acid method of examining sputum we find many patients positive for bacilli who would be pronounced negative by less accurate methods. We have been able to discharge less than four per cent of patients in whom no bacilli were found on repeatedly examining three-day specimens of sputum, no matter whether

they have been treated by rest alone, rest and pneumothorax, rest and phrenicectomy or thoracoplasty.

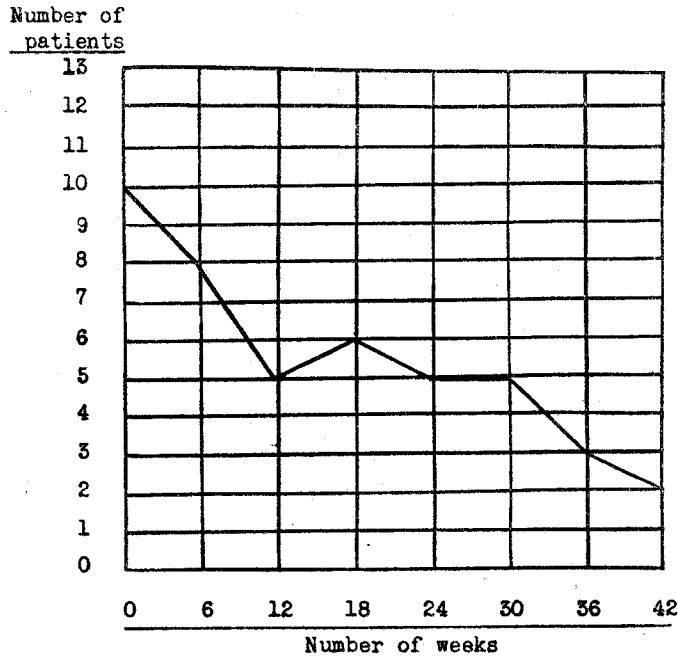
Many patients, however, show a rapid decline in both the amount of sputum and in numbers of bacilli under all methods of treatment, and attain a condition in which only rare bacilli are found after a few weeks or months. The following graphs indicate how rapidly sputum may drop and bacilli may reduce in numbers. The examinations are made at six-week intervals, using the dilution-flotation picric acid method of examination. "Rare bacilli" means one to many fields. The patients were not selected but chosen at random.



GRAPH 1. Graph showing 16 patients with preponderantly exudative tuberculosis (13 with cavity) with number attaining state of rare bacilli at each 6-weeks' examination.

12 were treated by physiologic measures only; 4 had temporary phrenics; none had pneumothorax.

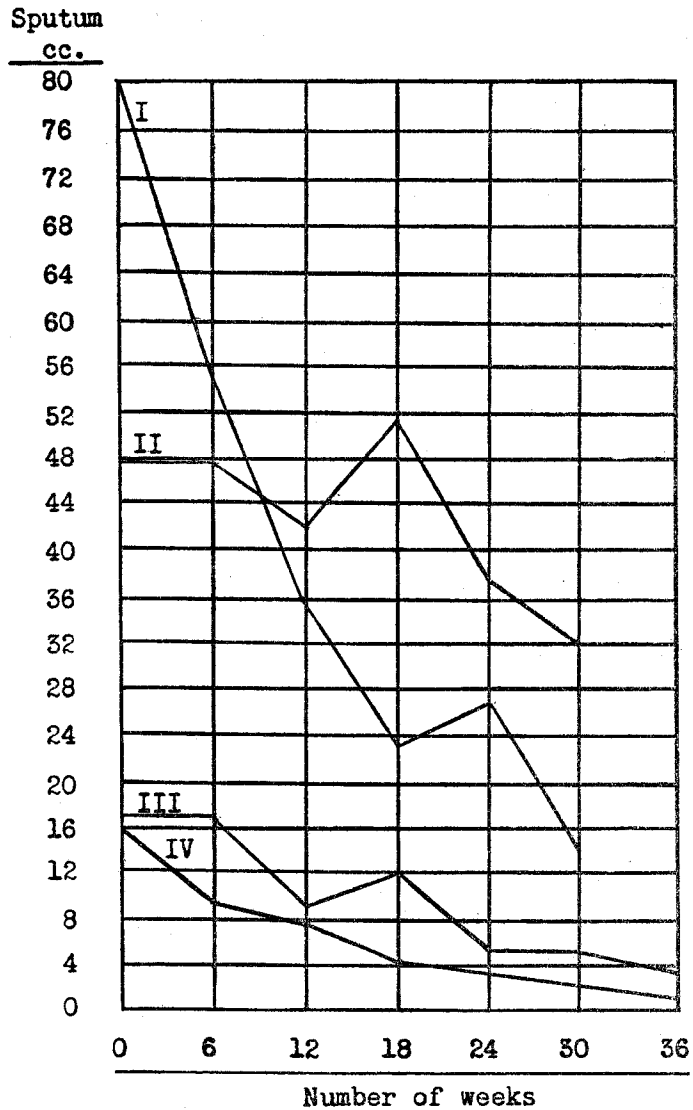
Graph I shows 16 patients suffering from acute exudative tuberculosis of which 13 had cavity. It will be noted that 8, or 50 per cent, had reached the rare bacilli stage at the end of 6 weeks, and that all but 2 had done so in 42 weeks. No extension of the disease occurred in any patient.



GRAPH 2. Graph showing 13 patients with preponderantly proliferative tuberculosis (5 with cavity) with number attaining state of rare bacilli at each 6-weeks' examination. 3 had rare bacilli on entrance. 11 treated by physiologic measures only; 1 had pneumothorax; 1 had temporary phrenic.

Graph II shows 13 patients suffering from preponderantly proliferative tuberculosis, 5 of whom had cavity. In 3 of these only rare bacilli were found on entrance examination; 5 more attained that state in 12 weeks, and all but 2 attained it in 42 weeks.

Graph III shows composite curves indicating the manner in which the sputum decreased in four different groups of patients; 7 with apical cavity; 8 with chronic active tuberculosis with caseation; 16 with acute exudative tuberculosis, shown in Graph I, and 13 with preponderantly proliferative tuberculosis, shown in Graph II. It will be noted how rapidly the sputum



GRAPH 3. Composite curve showing diminution of sputum at each 6-weeks' period for four groups of patients.

- I. 7 patients with apical cavity.
- II. 8 patients with chronic active tuberculosis.
- III. 16 patients with preponderantly exudative tuberculosis (13 with cavity).
- IV. 13 patients with preponderantly proliferative tuberculosis (5 with cavity).



decreases in all groups except II, and furthermore how low it drops in groups III and IV. In the first two groups, it drops quite rapidly at first, under rest, but it does not drop low. The bacilli did not decrease very much in either group I or II. Several of these were treated by pneumothorax and phrenicectomy in addition to physiologic measures.

### CRITERIA FOR ARRESTMENT

The criteria for an apparent arrestment or an arrestment unfortunately must leave much uncertainty for the patient's future. Different observers will give different interpretations of the condition in the chest as found on physical examination and shown in an X-ray film; and different methods of examination of sputum will vary greatly in accuracy. One observer will call a patient apparently arrested, or arrested, when a more cautious one would classify the same condition as quiescent. This makes for confusion and precludes the comparison of results.

We would like to restore patients to a state of normal physiologic vigor and to secure a negative sputum before discharging them from the sanatorium, but with the comparatively short term of treatment, and with the use of the dilution-flotation picric acid method of examination, we find few patients who will become bacillus-free during the short term of treatment usually pursued. In collecting samples of sputum we have the patient save every bit of secretion raised, no matter where he thinks it comes from.

However, long experience shows that patients who reach the stage in which they persistently show only rare bacilli by this method of examination during the term of treatment rarely break down after leaving the sanatorium and taking up work, provided they live in good environment and follow a proper post-sanatorium regimen. In fact, after a time, most of them become bacillus-free on twenty-four and forty-eight hour specimens, and doubtless many of them eventually become permanently bacillus-free, or free except at long intervals of time, particularly during and following acute respiratory infections.

I have observed and guided many patients who started to work while still showing rare bacilli; but by beginning with two hours' work a day they have increased their time gradually to a full day, with no ill effects. This persistence of bacilli is a source, and not improbably the principle source, for reinfection in post-discharge patients and shows the necessity of adequate after-care.

The future safety of patients differs according to their economic and social status. The patient who goes home from the sanatorium to a favorable environment and has a guarantee of the things which are necessary to a

hygienic life with a high state of nutrition, has an excellent chance of maintaining health when attained. One who must leave the sanatorium and return to unfavorable social and economic environment faces greater danger of relapse.

This is why early diagnosis and treatment of relatively small lesions is so essential if the future health of the patient and the safety of the community is to be conserved. This is why the period of treatment should be sufficiently long to allow healing to take place. This is also why the patient, discharged from a public institution, should live in a rest home or in a colony during a period of rehabilitation following discharge from a sanatorium.

It is too costly to furnish treatment for tuberculous patients to allow anything short of a permanent result to be attained in case such a result is possible. Discharge, followed by relapse, is costly. The treatment of individual patients not infrequently costs several thousand dollars; and this is not the end, for, in case the patient is a breadwinner, the family often slips to a lower economic status and requires aid.

There is only one economy in the treatment of tuberculosis; treat the patient when he is curable; treat him until he is cured; and make after-conditions favorable for maintaining health when once attained.

In treating tuberculosis as a community problem and considering the sanatorium as one of the chief agencies in the program, would it not be wise to bend every energy toward the one goal of early diagnosis and immediate treatment, using the sanatorium for the cure of the curable instead of the isolation of those who may spread the most infection at the moment; for today's early cases unsuccessfully treated are tomorrow's advanced ones.

We, as sanatorium physicians, are accomplishing more than we should because we are restoring, at least to a condition of inactivity of the disease those whom we should rarely be expected to treat; and we are accomplishing less than we should because we are so busy with advanced disease that we are missing the treatment of early cases whom we can restore to a life of usefulness and safety to the community.

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