

Reprinted from THE AMERICAN REVIEW OF TUBERCULOSIS  
Vol. XXXVII, No. 5, May, 1938

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OF VIEW IN THE TREATMENT OF TUBERCULOSIS**  
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### INTRODUCTION

Medicine has separated into two closely related groups of physicians—the practitioners of clinical medicine and the administrators of Public Health. The one, composed of private physicians, is particularly the guardian of the lives of the individuals who are ill; the other, composed of physicians occupying official positions responsible to government, is particularly the protector of the lives of the well. One holds the interest of the patient as paramount; the other, the interest of society.

Public Health, being the offspring of clinical medicine, is younger and therefore biologically the more aggressive. While Public Health, as we know it to-day, was born with bacteriology and so is only a little more than fifty years of age, clinical medicine is more than twenty centuries old. However, clinical medicine is not suffering from the inertia of age, for recently it has been reincarnated with a scientific basis. Its rebirth not only made medicine more efficient but also made possible the birth and present day conception of Public Health. For fifty years these great forces in civilization have been each increasing its own efficiency; and, together, they have marched forward battling for the health, happiness and success of the people.

Where two forces of such strength and individuality, of such importance to mankind, are occupying fields and pursuing purposes which of necessity overlap, it is inevitable that some conflict should arise, for each is jealous of its own prerogatives and seeks to protect its own province. So, without it being carefully analyzed and openly recognized, a conflict of opinion is arising between practitioners of medicine and the administrators of Public Health as to what should be the dividing line between their activities; or, rather, to what extent and in what particulars they should overlap.

The conflict is particularly in evidence where clinical medicine and

<sup>1</sup> Read at the joint meeting of the American Therapeutic Society and the Atlantic County Medical Society, Atlantic City, New Jersey, June 4, 1937.

Public Health come together in dealing with infectious diseases. It not only requires that the province of these two forces be more accurately established but also that the rights of individuals as compared with the rights of society be accurately defined and set forth. This conflict is particularly evident in such chronic infections as syphilis and tuberculosis, but arises, no less, in the treatment of other infectious diseases which require restrictive measures for the protection of society.

#### PUBLIC HEALTH VERSUS CLINICAL IDEALS

In the case of tuberculosis this conflict is emphasized by the fact that the disease is long drawn out, is particularly prevalent among the families of working men, and goes hand in hand with low incomes and inadequate standards of living; and furthermore by the fact that in our present economic status from 70 to 90 per cent of tuberculous patients require public or private aid to enable them to secure the advantage of established treatment. Since most of the public sanatoria are under the jurisdiction of Departments of Health, this brings the treatment of most tuberculous patients under the care of physicians whose facilities for treatment are usually wholly inadequate for giving the best care to the individual, and whose training and practice lead them to recognize that the protection of society is paramount to the rights of the patient.

Where the prevention of the spread of infection is given greatest attention, the course followed may not always coincide with best clinical practice. Prevention is especially stressed among the poor because it is so much more necessary to protect the children in these families than in those of higher economic standards who live in a better environment and who are treated by private physicians. Treating those who receive public care presents the problem not only of devising methods which will as quickly as possible render them incapable of infecting others, but, the same as those who are more fortunate economically, the problem of restoring them to the greatest possible degree of future independence. This latter problem is often insufficiently considered in the desire to accomplish the first objective.

If the plan of treatment proves to be less favorable to the patient than that offered by the best clinical practice, the course is defended on the ground that the sacrifice which is made on the part of the individual will be compensated by the reduced danger of infection among those who associate with him, consequently in the lessened amount of disease in the next generation; and further by the fact that communities do not

have the necessary funds to provide the facilities for dealing with their tuberculosis problems in the most satisfactory manner. However, we must always bear in mind that hygienically treated patients who fail to secure a healing live much longer than those who are not the recipients of such care, and that this increases both the problem of prevention and the cost of care; so the only economy in treating tuberculosis is early diagnosis and immediate adequate treatment.

Under present practice communities meet their tuberculosis problems largely by yielding to the demands of Public Health and overruling to a certain extent the ideals of clinical practice. They are too often forced to allow public good to overshadow the rights of the individual; and expediency to determine the course to be pursued. The necessity of making expediency override clinical ideals cannot be eliminated until governments provide ample sanatoria and ample medical and nursing service for all patients who require community care. This might be done at a saving to the community if a program were devised which would insure the treatment of tuberculosis in its early stages; and at this time a much larger percentage of patients can be restored to usefulness by an expenditure of money far less in amount than that which is being expended on advanced cases to-day.

It is frequently said that artificial pneumothorax is the greatest advance that has been made in the treatment of tuberculosis. It is evident that: (1) More patients who suffer from advanced tuberculosis can be treated successfully with pneumothorax than by physiological principles alone; (2) patients' sputum may be rendered bacillus-free quicker by its use than by physiological principles alone; (3) more physicians are suited to the employment of such mechanical measures than to the daily routine of encouraging and guiding the patient so that he secures the benefit of a high physiological balance; (4) it gives the physician control over the patient as long as it is administered, which is frequently sufficiently long for healing to be brought about; (5) the patient is obliged to cooperate at least to the extent of returning for refills. It is equally evident that many patients who are treated by pneumothorax could secure a healing without it.

Every tuberculosis specialist to-day recognizes the value of compression in the treatment of tuberculosis, and finds it absolutely necessary at times to the healing of the disease. They differ, however, in their opinion as to when it is necessary. By not rushing into collapse therapy it is often found that patients who at first seem to require it heal without

it; and, on the other hand, we must also admit that certain ones who seem to be favorable for spontaneous healing fail to heal and must be aided later by some form of compression.

EFFICACY OF PHYSIOLOGICAL MEASURES AND DIFFICULTY  
IN APPLYING THEM

Those who have been successful in carrying out physiological treatment by the usual hygienic-dietetic, open-air regimen realize how unimpressive it is, with its lack of spectacular appeal, how difficult it is to make the patient realize that nature will heal the lesion if he will live a restricted and directed life for a sufficient period of time. The patient is much more impressed by such operative procedures as injecting air or gas into the pleural cavity, crushing the phrenic nerve, intrapleural pneumonolysis and thoracoplasty.

Nevertheless, it is not tuberculosis that requires operative procedures so much for its healing as advanced tuberculosis; and, except when far advanced, it is not the disease that provides the problems of therapy so much as the patient. Proper guidance of the patient, no matter what therapy is used, will increase the number of favorable results; and proper after-care will make permanent many arrestments which, without it, will be followed by relapse.

The indications which are accepted as requiring compression to-day are too broad. They are present in many patients who may better be treated without it. In case a waiting period is established, to see if healing will take place without mechanical aid, it is often much shorter than is warranted by the known slowness with which pathological changes take place in clinical tuberculosis. The natural resistance of the patient, aided by the compensating mechanism with which he is normally provided, is sufficient to meet most of the demands of early lesions and many of the demands of more advanced disease. Where mechanical measures are to be employed, a temporary phrenic will often suffice; in which case the healing which follows is accomplished with little or no unnecessary permanent damage to the patient's respiratory mechanism. The efficacy of phrenic interruption is increased by keeping the patient in bed, with weights such as shot or sand-bags over the chest, following the operation. When these measures fail, pneumothorax, either with or without pneumonolysis, will often succeed. Probably because of our success in bringing serious cases to a successful issue, it is not sufficiently emphasized that the more advanced the

lesion the longer the required treatment; the greater the danger of complications; and likewise the greater the reduction in the patient's future efficiency. This has one very important meaning in a community program. It costs dollars, and many of them.

I sometimes wonder if we, as specialists, are not so impressed by the favorable results that may be obtained in advanced tuberculosis that we fail to grasp the seriousness of advanced disease and the serious consequences which often follow its treatment.

Empyemata, nonexpanded lungs, and extensive fibrosis with compensatory emphysema are the prices that many tuberculous patients pay, even though they recover from the disease; and a prolonged treatment, a prolonged life, an extended dependence and an increased danger of scattering infection is the price which the community pays for failing to treat the disease early. If early diagnoses were made and immediate treatment instituted, whether it be physiological measures alone or physiological measures supplemented by compression, there would be a minimum of lung injury and a maximum of favorable results at a great saving of time and expense. The medical profession as a whole can render as great a service to tuberculous patients as it has to those suffering from appendicitis by recognizing the disease in its early phases and seeing that proper therapeutic measures are immediately applied.

#### THE USUAL METHOD OF DETERMINING WHEN PATIENTS ARE BACILLUS-FREE IS UNSATISFACTORY

It is frequently stated that by compressing the lung we quickly render patients bacillus-free. Until we know how many of these patients whom we are treating so vigorously to-day will be restored to permanent economic independence, we cannot be sure of the efficacy of our program.

The Ziehl-Neelsen method of examining sputum is recognized as inadequate as a basis for declaring a patient bacillus-free. It requires the presence of about 100,000 bacilli per cubic centimetre of material examined for the specimen to be positive by direct smear (Corper). Consequently patients carrying less bacilli than this number would not yield a positive microscopical result by the old method.

We have had recourse to the dilution-flotation method, which is a refinement of the well known concentration techniques in which hydrocarbons are employed. This method with picric acid as counterstain has been demonstrated by quantitative methods to be approximately seventy-five times more sensitive than the direct smear made

from likely particles, where methylene-blue is used as a counterstain. This would reduce the number of bacilli demonstrable by the microscope to a little over 1,000 per cubic centimetre. Beyond this it is necessary to employ a guinea pig or culture methods in order to make a diagnosis.

The dilution-flotation method has been used in our institution for twenty-three years as a routine procedure. We have noticed that we were not able to get our patients who were doing well free from bacilli in as high a percentage as had been reported by others. A tabulation of patients shows that less than five per cent of those who enter with bacilli pass the flotation test successfully, while under treatment. In a further tabulation of 1,700 separate examinations, all of which were positive by the dilution-flotation method, only about one-fifth would likely be positive by direct smear.

The inaccuracy of the usual methods of determining when a patient is no longer casting off bacilli has given a wrong interpretation of results obtained under treatment and has probably blinded us to the true cause of relapse in certain patients who had been pronounced arrested. The fact is that many of these patients who have been discharged from treatment after a few months with supposedly negative sputum were still shedding bacilli; some probably daily, others every few days, some only every few weeks, and still others only under extraordinary conditions such as following a cold or bronchitis. Our experience demonstrates that patients may be bacillus-free for three or six months on three-day specimens and then have them reappear for a time, and repeat the process of disappearing and reappearing, yet all the time the patient is improving in a satisfactory manner. Furthermore, it is impossible at times to determine the point in the lung from which bacilli come. They may come from the contralateral lung when the lung with the most severe lesion has been compressed.

#### A LONG PERIOD OF TREATMENT BEST PREVENTIVE OF RELAPSE

A decided advantage in pneumothorax treatment as compared with hygienic measures alone, lies in the fact that treatment is carried on longer, it is not uncommon to keep a lung compressed for three or four years. In patients who are favorable for cure under nonoperative measures I rarely find it necessary for even the advanced ones to carry out a strict regimen for more than eighteen months or two years; and the latter portion of this time is used in preparing them to resume work. I supplement the intensive treatment when they are resuming work

by a modified regimen during the first two or three years following discharge. This consists of much rest and an adequate amount of walking, the principle consisting of having the patient live within his daily store of energy and do the things which will keep up his strength.

Frequent relapse is one of the most disappointing features of the treatment of tuberculosis. The cause can mostly be found in inadequate treatment, and a return to unfavorable environment with the resumption of a too strenuous life. We find that very few of our patients who are treated in the above manner suffer relapse of their disease; and furthermore, most of those with rare bacilli eventually become bacillus-free.

The greatest advances in the future treatment of tuberculosis should come through its early recognition and immediate treatment. The tendency to heal is strong in most cases as long as the pulmonary tissues are elastic and capable of compensating.

There are two main questions which determine the prognosis in a given case of tuberculosis: one local; the other general. The local factor is the ability of the pulmonary tissues and the enveloping structures to compensate for the loss of tissue by lessening the size of the thoracic cage and by a compensatory enlargement of air cells on the part of the lung, so as to maintain a proper equilibrium between the size of the thoracic cavity and the contracting lung. This compensating mechanism is the one which collapse measures imitate. The general factor is the patient's physiological equilibrium. Remembering that healing is a physiological process, it is necessary to maintain the highest possible state of physiological activity on the part of the patient while healing is going on. It is around these two factors that an adequate therapy in tuberculosis, either knowingly or unknowingly, has always been built.

Early methods of treating tuberculosis were based wholly on an attempt to improve the general physiological state of the patient; and they proved sufficiently successful to establish the curability of tuberculosis. This applied even in matters immunological, because immunological reactions have a physiological basis. However, the failures in these early attempts were many, especially in the later stages of the disease when mechanical hindrances are prominent. The methods of treatment which have been devised more recently have been directed largely toward overcoming the mechanical hindrances which interfere with healing; often, too, with neglect of the physiological factors.

Because compression is successful in early cases and also in many



of the later and more advanced ones where there is little hope of successful treatment without it, there is a tendency on the part of many clinicians to disregard or underestimate the results that may be obtained by utilizing the patient's own physiological forces in treating cases which present no serious mechanical factors. Some of the most brilliant results in the application of pneumothorax have been obtained in early exudative lesions without widespread adhesions which have been responding to the hygienic-physiological regimen since Brehmer's time.

EXPEDIENCY SHOULD NOT BE SO PROMINENT A FACTOR IN THE  
TREATMENT OF THE FUTURE

We now have much of the necessary information at hand to determine more carefully than we have been doing the cases of tuberculosis which will heal with physiological measures alone and those which require surgical aid. Our opinion of the treatment which is to be employed, however, is always subject to modification by the circumstances under which treatment will be carried out. In order to be accurate in our estimate of these methods, we should differentiate between measures of necessity and measures of expediency. Because a patient can sometimes be better controlled by compression, and because compressing a freshly formed exudate and cavity results in healing, must not be interpreted as meaning that these conditions of necessity call for compression. It goes without saying that if all patients could be treated ideally, that is, early and under ideal circumstances, and could be depended upon for a whole-hearted coöperation, compression would rarely be found necessary to the actual healing of their lesions. However, this does not imply that expedience would not demand that many such cases be compressed.

While expediency must, at the present time, dominate the treatment of those who fall under the Public Health branch of medicine, if for no other reason than the inadequacy of facilities for treatment, it should require no discussion to establish the right of each patient whenever possible to secure that treatment which is best suited to restore him to health and at the same time to enable him to secure the greatest degree of efficiency commensurate with the pulmonary involvement present.

Not only immediate results but the permanency of results depends much upon the economic and social status of the patient. He who can return to a well regulated home, with pleasant surroundings and good food, has a great advantage in his future course. Few patients remain

in institutions long enough for cure to be accomplished. Their future depends much upon whether they can continue to live under conditions similar to those in institutions or whether they must go back to unhygienic conditions and unfavorable environments. These facts must always be considered when choosing the type of treatment which shall be instituted in a given case. The treatment of tuberculosis, whenever possible, should be dominated by the best possible accomplishments of clinical medicine, but expediency, on the other hand, at times is the only factor capable of producing a result.

In recent times the political aspects of tuberculosis have become of tremendous importance. Governments have been forced by advances in the scientific understanding of both the clinical and preventive phases of tuberculosis to provide large sums of money for prevention and cure; sums, however, which still fall far short of being adequate. Laws have been passed establishing hygienic conditions in workshops and homes that infection may be reduced to a minimum, and that those who are ill may be better cared for. Organizations are also seeking out the infected and providing treatment for those who require it. Thus science has called upon society to spend millions of dollars that posterity may escape the ravages of tuberculosis. It is up to medicine to see that this money is spent wisely, and that the best interests of both patient and society are conserved.