

RECENT ADVANCES IN TUBERCULOSIS CONTROL

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The tubercle bacillus was discovered 60 years ago. Since then, medical centers and distinguished scientists in both hemispheres have searched tirelessly for a preventive agent or a cure for tuberculosis. The search has not reached its goal. In many countries, however, the mortality from this epidemic disease has shown a consistent and gratifying decline. This is most marked where a modern public health service has been established and maintained.

One must not conclude that the clinical and pathological researches carried on with such patience and accuracy have been unproductive. The present program of control is based on the results of these studies. Refinement in methods of research are providing new foundation stones upon which to build for future discoveries. For example, in the field of therapeutics interest has recently been aroused by the evident inhibitory action on the tubercle bacillus of promin, one of the sulfa group of drugs. Its toxicity makes it of doubtful value for treating human patients, but its action arouses new hope that some close relative of promin without its disability may even now be awaiting discovery at the skilled hand of some research worker.

In the field of clinical research various newer developments in surgery have added notably to the effectiveness of accepted methods of treatment. Pneumothorax and other more severe forms of pulmonary collapse are thought of as an aid to the individual patient's recovery by promoting immobilization of the affected lung. In addition to its treatment value, collapse therapy has been found to have a wider usefulness. When effective, it converts the sputum in many patients rendering it non-bacillary in far shorter time than is the case with bed rest alone. Thus the procedure becomes an obvious advance in controlling the spread of infection.

In recent years bronchoscopy has been employed with increasing frequency as a diagnostic and treatment procedure in tuberculous infections of the bronchi. Certain hospitals consider it a routine in the thorough examination of a pulmonary case. There can be little question of the value of local treatment of ulcerated areas in preventing spread of the disease to other parts of the lungs.

Keeping pace with active medical research epidemiological and social investigations have made invaluable contributions to the knowledge on which a program of prevention and control must be based. These include questions of individual and racial susceptibility, incidence of infection and disease in different age groups, the protective value of BCG and similar studies. Social research has provided a vast amount of information regarding the effect on the frequency of tuberculous disease produced by poverty, malnutrition, crowded living quarters, hazardous occupations, ignorance or neglect of personal and community hygiene.

At the moment, the net result of the incredible amount of study both in the past and now in process may be simply stated. We are still dealing with a pandemic, infectious disease. We have no specific weapon with which to fight it. Individuals and races vary in susceptibility but there appears to be no such attribute as complete immunity. Underprivileged social and economic conditions favor spread of infection and produce a high mortality rate.

Nevertheless, disappointments in the field of research have not discouraged active campaigns for the control, and ultimate eradication of tuberculosis. Such

campaigns are based on the principle of prevention. Stop the spread of infection at the source. Starve out the tubercle bacillus. This has been accomplished in dairy herds by searching for and removing the carrier in the pre-infectious stage of the disease. In the human epidemic we can apply the first step. The second we achieve by isolation preferably in a hospital for the tuberculous or a tuberculosis ward in a general hospital.

A brief review of present public health practice in this country will give a background for comment on recent advances in the control program.

The public health program.—While quarantine and segregation of the infectious case applies just as truly today as in the past, it has long been recognized that this procedure alone could never control tuberculosis. Because of its insidious onset the disease often gives slight hint of its presence until it has reached the infectious stage and probably spread the infection to others. Long ago it became evident that a preventive program involved two major procedures. The first of these is the education of the public in the methods by which the infection is spread and the manner in which it may be avoided by building up resistance through healthy living. This means that the people must learn how the tubercle bacillus is disseminated, through coughing, sneezing, expectoration, kissing, using common drinking cups or infected eating utensils, sleeping with an open case and the use of common towels and handkerchiefs. Instruction of this negative character, however, is not enough. The teaching reaches into the whole field of personal and community hygiene and sanitation. This is a huge task and must be a continuous one as each generation must learn anew the principles of personal and community hygiene.

The second essential procedure is to devise ways of finding the early case, preferably in the minimal stage before the danger of spreading the disease to others has taken place. Out of this need has grown the case-finding programs which are among the outstanding activities of the public health service in its program of control.

The diagnostic clinic developed to meet this need. Such clinic was often attached to a hospital. As it has grown it now consists of a staff of physicians, nurses and laboratory technicians with social workers as well to aid in solving the numerous economic problems arising when the head of a family or some wage earner breaks down and must rest for a considerable period. Provision must also be made for complete X-ray and laboratory equipment.

In addition to the established clinics, recent practice has favored the development of motorized clinic facilities. These carry X-ray equipment and dark room and are staffed with a physician, a nurse and technician. They have the advantage of mobility and furnish periodical diagnostic clinics in rural areas at a distance from hospitals.

Recently, the United States Public Health Service has provided itself with a considerable number of portable 35 mm X-ray machines and is holding clinics in various population centers where special tuberculosis problems have long existed or have been created by war conditions.

Another device employed by certain public health services is the ambulatory pneumothorax clinic. It is generally conceded that it is safer to establish pneumothorax when the patient is in the hospital. However, when beds are lacking, this procedure may be undertaken in a clinic and the patient allowed to go home, returning periodically for refills. The advantage is the earlier establishment of collapse therapy which benefits the patient and protects the community since the bacillary content of sputum is frequently reduced more rapidly under lung compression.

A serious part of the clinic's work is the examination of contact cases, that is, those in a patient's immediate family or other associates who have been closely in

touch with him over some period of time. For this purpose, the public health nurse and the social worker are of the utmost value first in finding all such contacts and second in persuading them to have thorough examinations and chest X-rays. This procedure accomplishes two purposes: it may uncover an unsuspected case of tuberculosis that has been disseminating the disease, and it may reveal minimal cases whom the patient himself has infected. In the latter case, opportunity is afforded for immediate treatment and probable early recovery.

There are many details in the organization of such a program which cannot be described at this time. One, however, of major significance is the matter of record keeping and statistics which is of first importance in dealing with the epidemiology of the disease. Few of our public health services as yet have instituted a complete case registry for the area over which they have jurisdiction. This consists of a live record of all known cases whether those found in the clinics, those in sanatoria or discharged, arrested or otherwise, all private patients being treated at home and also cases in penal institutions, old people's homes or psychiatric hospitals. This is a difficult statistical procedure and therefore one in limited use. To achieve complete control of the disease in any public health area, however, such a case registry is indispensable. Without it, duplication of service is unavoidable and the escape of patients from continuous observation is inevitable, with the probability that they are at large and spreading further infection. Furthermore, it is the only method whereby accurate health statistics can be assured.

Rehabilitation of arrested cases of tuberculosis has in recent years become an important public health function. It has long been known that one half of the cases discharged from hospitals have recurrences and die with tuberculosis within five years after leaving the sanatorium. This is an unjustifiable waste of human life from the individual point of view, and it is also a serious public health menace since such cases, when they have a relapse, become again a danger to those in their communities with whom they come in contact.

The administration of an effective public health tuberculosis program is obviously an undertaking of considerable magnitude and no little expense. In the more prosperous states and large cities the public health service establishes a division of tuberculosis under a Director who by training and experience is equipped to supervise the work. He develops a department with clinical assistants, laboratory and X-ray technicians and public health nurses. He is aided by statistical assistants with some sort of case registry, assumes direction of tuberculosis clinics and in some cases sanatoria as well. In other regions, tuberculosis is included in the list of communicable diseases and here the program is carried forward much less aggressively and with generally poorer results.

Short paragraphs in comment on this outline of accepted procedure will serve to illustrate the modern trends in the program for tuberculosis control.

Diagnostic procedures.—While family and personal history as well as physical examination are still considered of great importance, chief reliance is now placed on two diagnostic procedures. These are the tuberculin test and the X-ray. Refinements in both procedures have been progressive. Laboratory research has provided a purified protein which is the active principle of tuberculin. This enables quantitative as well as qualitative testing and eliminates false reactions resulting at times from old tuberculin preparations. It also provides a means whereby comparable tests may be made in various localities and different countries.

Years of careful study in the Moore Scientific School of the University of Pennsylvania have enormously improved X-ray apparatus and technique. The resulting plates provide diagnostic accuracy far above that formerly attained.

Hospitalization.—Discovery of cases, however, is but the first step in a preventive program. Means must be provided for the prompt hospitalization of infec-

tious cases if we are to avoid further spread of the disease. In 1900 there were 6,000 beds for the tuberculous in this country. Today, there are 100,000. Strangely enough the great increase is proving insufficient to care for all the cases that need hospitalization. In other words, refined case-finding procedures have discovered new cases faster than beds can be provided for their segregation and treatment.

Health education.—There are many channels through which health education can be brought to the people. The public and private school furnish the most complete opportunity since the entire population of the country between the ages of six and 14 to 16 can be reached directly. High schools, colleges and universities supply a more restricted group but one which is of the greatest importance to approach. Industry furnishes another fruitful channel for influencing large masses of the people. There remain, however, certain large divisions of the public particularly in middle and later life that are outside of these categories, such as, housewives, farmers, isolated workers, the unemployed and others. For these, more reliance has to be placed on the newspaper, and other reading matter, club meetings, churches and now the radio and the cinema.

It is beyond the scope of this review to detail the many effective methods used to reach all these groups. They may be mentioned broadly under three headings; the spoken word, the printed word and visual education. Steady advance has been made by both the official health services and the voluntary tuberculosis associations in making more effective the media used in each procedure. Educational units for school use are undergoing constant change and refinement. Printed material is kept carefully up to date and produced in increasingly attractive form. Lectures are simplified and made attractive by the use of moving pictures, charts and other visual material. In recent years, the cinema has been used more generally and civic associations have produced a series of popular and often romantic educational films that have been seen by millions of people in the movie audiences. Charts and posters have proved of interest and value especially in factories. Until the war placed some limitations on its use, the radio showed rapid increase as a medium for the wide distribution of health education material and will be still more widely used in years to come. Well publicized teaching exhibits of educational materials have proved popular and effective means for reaching the general public. These are far more effective if a trained worker, preferably a physician or nurse, is in charge to demonstrate the medical and epidemiological facts presented and explain the layman's contribution to the campaign to make him aware of his part in the program.

Research.—The public health program for tuberculosis control and eradication has been based on a parallel program of research. In the field of medical science this has been carried on in many laboratories and schools while the public health service within the confined limits of its resources has contributed through epidemiological investigations. For the past 20 years the Medical Research Committee of the National Tuberculosis Association has planned and carried forward a cooperative series of studies in various universities and institutes, assisted in the work by certain firms of commercial chemists which have been generous in offering the resources of their own laboratories and workers. The plan has been to select a line of investigation, determine its several aspects, choose the scientist and the laboratory best fitted to conduct each, and supply the funds needed for such collaborative undertaking. Committee meetings including the workers themselves and a jury system to decide on the value of each procedure while in process, guide the progress of the work. Its work is unique in bringing together in a single cooperative research program the best talent that can be selected from widely scattered institutions in the country.

As already stated, two notable results have been achieved. The first is the isolation of a purified protein which is the active principle of tuberculin. This enables accurate standardization of all tuberculin marketed for diagnostic use and permits quantitative as well as qualitative dosage. The second marked contribution to the work of tuberculosis control is the standardization of X-ray techniques and many major improvements in the effective employment of this our most valuable diagnostic aid.

The stated aim of the Medical Research Committee is the discovery of a preventive agent or a specific cure for the disease. Chemists have fractioned the unknown substances. Biologists have tested these fractions in animals and revealed the tissue reactions which result. All this research has been carried out under conditions of critical scrutiny which render its results of permanent scientific value. It may be looked upon as foundation material upon which it is the hope that a structure may rise which will one day lead us to the desired goal of a cure for the disease.

Statistics.—Mortality rates continue to give us our most reliable statistics in appraising the results of a control program. The annual death rate from tuberculosis in this country has fallen from 202 per 100,000 of the population in 1900 to 44 in 1941. No accurate method has been developed to determine the present rate of infection which exists throughout the public as a whole but what evidence we have indicates a substantial decline in that as well, though probably not so rapid as is the case in the mortality record. Examination of patients dying from causes other than tuberculosis appears to show about one-half as many tuberculous scars as were found 40 years ago. This is in contrast to the mortality decline which has reached a point well below one-quarter of its level in 1900.

Rehabilitation.—Far greater attention to the follow-up and after-care of patients is a modern development in a control program of very great significance. Certain patients exhibit excellent resistance to tuberculosis and in due course become well again and able to carry on their life work much as before. In contrast, sanatorium records show that the case mortality among their patients has not declined notably, from 20 to 25% of hospital patients still being discharged dead. The large group between these two extremes will show many who remain permanently arrested but more still are those who either relapse or remain in a state of chronic invalidism. It is with this group that we are concerned in the rehabilitation program. While after-care is considered part of treatment, it has a most important bearing on prevention as well. The arrested or partially arrested case that through lack of follow-up and care breaks down again with active disease, becomes again a probable focus of infection.

Rehabilitation endeavors to prevent recurrence of active disease and at the same time to render the individual as capable as lies within his power of resuming in full or in part active and productive participation in the life of his community. While a passive interest in the recovery of patients has prevailed in the past, our present effort is to take far more active and effective measures to give permanence to the cure or arrest of the disease. The process is one of education in which the cooperation of the patient is of first importance. It is begun during hospitalization and consists in studying the individual's capacity and aptitudes as well as the probable state of health to which he may look forward after concluding his sanatorium treatment. Many useful devices are employed including bedside teaching, graded manual work while still in hospital and sheltered workshop employment or a year or so at special institutions for training and toughening convalescents. Each year sees an increasing number of these vocationally trained or retrained patients returned to useful community life. There is no question

that time will show a marked lowering of the relapse rate among this group. Their gainful employment in industry and business still remains something of a problem, but patient effort is breaking down the reluctance of employers to take on arrested cases and experience shows that such workers on the whole show less than average absence because of illness.

The general practitioner.—The significant part which the general practitioner or family physician, can play in the program of tuberculosis control has only lately been fully recognized. The public health service, aided by the voluntary tuberculosis associations, has made creditable progress but we are at a point where further gains are becoming increasingly difficult. We are now hunting a hidden disease. Unless the minimal case is discovered and its chance to infect others thwarted, the epidemic will continue to smolder and may become rekindled. To inspire the family physician with his duty and opportunity to make a more notable contribution toward eradication of the disease two methods are employed. Teaching undergraduate medical students more thoroughly the epidemiology as well as the social and economic aspects of the disease is the first. Post-graduate seminars and institutes for doctors in practice is the second. His personal physician sees the prospective patient when the earliest symptoms appear, malaise, loss of appetite and weight. If the doctor is alert and secures a chest X-ray at once, many more cases will be detected in the minimal stage before they are infectious and when there is every chance to ward off destructive disease. Among the modern trends in tuberculosis control none has more far reaching importance than the enlistment of the whole medical profession as an allied army to support the public health official in the fight to eradicate tuberculosis from his community.

The voluntary tuberculosis association.—The fight against a pandemic disease like tuberculosis is a people's fight. It cannot be won by a group of experts working for them. It can only succeed if an informed and willing public enlists as an army of privates ready to serve under the leadership of trained officers in the war against disease. This is the doctrine taught from the first by the National Tuberculosis Association. Through its financial resources and its professional and lay directors it has consistently promoted the policies recommended by experts in public health and medicine. It has interpreted to the popular mind the technical knowledge of the disease and the accepted methods for its control. Through experiment and demonstration it has often shown the way forward by building or securing sanatoria for the necessary isolation of infectious patients, establishing diagnostic clinics, providing public health nurses, training both doctors and nurses in tuberculosis control. This has been accomplished through broad channels of popular health education which it has helped to introduce in schools and colleges, in business and industry, and in the homes of the entire country. It has led the way in research and through membership in the International Union Against Tuberculosis, has kept itself and the nation in touch with world progress in tuberculosis control.

One by one the pioneer activities of the National Association have been incorporated in the official program as public money has become available. New opportunities for useful service have sprung up progressively. The need for health education has widened as our knowledge and experience has increased. The official service is far from being equipped as yet to assume all this gigantic task. The organization of health service in industry and the systematic development of rehabilitation are two of its newer tasks. The day may come when the social conscience of the world will decree that government shall take on full responsibility for the health and welfare of the people. This day is still distant and meanwhile the people of this country are recognizing, through their growing

support of the National Tuberculosis Association, the power to promote public health and welfare which resides in a voluntary health agency.

War and tuberculosis.—Finally, a word must be added regarding the probable effect of world war upon the incidence of tuberculosis. It has been the experience in all past wars that the tuberculosis death rate in the countries involved rises sharply. There is abundant evidence that this calamity is already taking place in European countries.

Two measures are recognized as essential to control a rising death rate. The first of these is the examination by means of satisfactory chest X-rays of all men enlisted in the armed forces, thereby keeping the troops themselves free from the menace of a spreading infection. The second is to examine similarly all war workers in industry, both men and women, to avoid the possibility of an epidemic in this essential branch of war activity.

The importance of health for the successful prosecution of war is fully realized. The essential need to prevent illness among both soldiers and civilians is being met at the present time more vigorously than ever before. The effect of popular health education is shown in the more complete realization of the special danger inherent in the renewed spread of so prolonged, disabling and costly a disease as tuberculosis.

SOME ASPECTS OF CONTEMPORARY VENERELOGY

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This is the decade of venereology. Never before was so much progress made in the knowledge and especially in the treatment of venereal diseases. There are three cardinal points in this era: (1) massive treatment of early syphilis; (2) the discovery of sulfonamides and their value in the treatment of certain venereal diseases; and (3) recognition that venereal lymphogranulomatosis is a general, not local, disease. The first two facts have had deep repercussion in some countries with a high venereal index; the third is still in the experimental stage, but has aroused anew medical interest in the disease first discovered in 1913 by Durand, Nicolas and Favre.

Massive arsenotherapy.—Ehrlich and Hoffmann's goal, of a *therapia sterilisans magna* in syphilis, has been made possible through the work of Hirschfeld, Hyman and Wanger on *speed shock*. Chargin and coworkers, following the teaching of these authors, started the use of the so-called *drip method* in early syphilis. Tzanck did similar work in France. The massive method of treatment and especially the epidemiological and medico-social possibilities attached to it awakened the interest of South American experts. Prunés sponsored Hevia and Medina's thesis on this subject, while he himself used a modification of Tzanck's technique. Vicuña of the Naval Hospital of Valparaíso, followed Chargin's technique; his work being summed up in the theses of González and Giacaman. In Rancagua, Grimberg treated 135 patients using neoarsphenamine without a single death in contrast to Vicuña, two of whose 39 patients died from nephritis and serous