Proposed State Tuberculosis Control Program*

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With the appearance of favorable federal legislation and grants-in-aid, tuberculosis control activities are being stimulated throughout the entire nation. Educational campaigns and surveys carried on through many years in the past have made the public tuberculosis conscious. In order to take full advantage of these favorable conditions, it now becomes necessary to make an inventory of present and past State control procedures and to make such changes and additions as will insure a successful long-term program.

Any control program, if it is to fulfill its mission, must embody the basic principles of disease control—case-finding, case-isolation, and case-prevention. Since at this writing, no immunizing method has been proved to be of long-time value, the prevention of secondary cases depends upon finding the source cases early and treating them before they become infectious. Current treatment implies initial hospitalization in a sanatorium.

Tuberculosis is a chronic disease and there are no specific cures as yet. Under certain conditions, such as defined in the Diagnostic Standards and Classification of Tuberculosis, patients may be classified as apparently arrested, arrested, and even apparently cured. No cases are classified as cured. Obviously then, the occupation, and the home and working conditions of a person with inactive disease must be evaluated and altered, if necessary, to prevent the reactivation of the disease. Thus, home welfare and vocational rehabilitation, where required, along with case-finding, case-isolation, and physical restoration must be provided if we are to improve our methods in the control of tuberculosis.

It therefore follows that an adequate tuberculosis control program should embody the following four basic functions:

(1) Case-finding,
(2) Isolation (hospitalization and treatment),
(3) Rehabilitation and family welfare, and
(4) Prevention.

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Case-Finding

Experience has shown us that tuberculosis develops in the lungs long before any physical signs or symptoms appear. The vast majority of patients are not aware of their condition until symptoms develop or until a chance examination of their chest reveals the disease. In many instances, the disease develops and becomes arrested without the patient being aware of any disease at any time.

It naturally followed that case-finding programs became founded and developed on tuberculin tests and chest x-rays. The time and money factors involved in such programs were obstacles to expected accomplishments on a State-wide basis. We still find over 85 per cent of the patients admitted to the sanatoria in the advanced stage of the disease.

For many years, the Minnesota Department of Health has been concerned with the large number of cases which were first reported at the time of or just prior to death. In 1945, 15 per cent of the deaths from tuberculosis were first reported at the time of death. Even though this percentage is a marked decrease from 45 per cent in 1923, the percentage is still too large. Mortality statistics for the United States reveal that in 1944 thirty-six (36) per cent of the tuberculosis deaths occurred outside of institutions and hospitals. Only 36.6 per cent of the tuberculosis deaths for that year occurred in tuberculosis hospitals or nervous and mental institutions. These figures represent only a slight betterment over the 1939-1941 averages. The implications of serious intimate exposure to contacts by these open cases is evident.

Obviously, newer methods were necessary for mass examinations.

As a result of the work of deAbreu, Potter, Hilleboe, and others, it is now possible for us to employ mobile photofluorographic units capable of taking large numbers of chest films daily. With the use of such equipment mass radiography or photofluorography can be done at lower costs and with economy of personnel and time. It is to be expected that further experiences in the field will bring further improvements in our mass attack on tuberculosis. The use of the mobile x-ray unit for mass chest surveys should not cause the elimination of other satisfactory case-finding procedures.

The ideal case-finding method would be not only to tuberculin test all persons in the community with either 1:1000 dilution (0.1 mg.) of O.T. or the two test dose of P.P.D., but also to chest x-ray all the persons regardless of the tuberculin reaction every year.

Obviously, a program of this type would not be practical. A very
An effective case-finding program can be carried out by applying these procedures on a need basis. Each area should plan its own program according to the local situation.

An effective case-finding program, then, should embrace these three activities:

1. Mass photofluorography (to include chest x-ray examinations of hospital employees and patients),
2. Tuberculin surveys, and
3. Case-contact follow-up.

Mass Photofluorography

The details for the operation of the State owned units are recommended as follows:

1. Personnel
   A. Fixed, on State payroll.
      (1) Technician-driver, responsible for the operation and the maintenance of the unit in the field.
      (2) Clerk-typist, responsible for the necessary unit clerical work, including completion of the required unit forms.
      (3) Public Health Nurse, with special organizational ability, responsible for the advance organization and stimulation of the survey project; also responsible for public relations. She will act as “advance agent” for the unit and enter the community well in advance of the unit. It is not intended that the nurse remain with the unit during the entire period of the survey but will move on to the next project area as soon as practicable. It is understandable that in surveys of industries, schools, and other selected groups it will not be necessary for the nurse to remain any length of time, and that in other areas it may be necessary for her to remain a longer period of time.
   B. Attached personnel, local.
      It will be necessary to obtain from local sanatoria, and local voluntary and official public health and welfare agencies such additional personnel as will be required to fill out an efficient organization. These workers may either be paid or voluntary, but if paid, they will have to be paid from local resources. The amount and type of assistance required and obtained will vary in different communities.

2. Planning the project
   A. Selection of the area for mass survey.
      It is expected that the appearance of the mobile unit in the field will stimulate a great deal of interest by lay and medical groups for the use of the unit in their area. The function of the unit is to find tuberculosis cases. In view of the fact that certain population groups have a greater tuberculosis potential than others, the selection of areas for mass survey must be carefully considered. It is not necessary to make a survey area county-wide, but the population group chosen should be accessible and large enough to
make the project practicable. In some areas the project may be solely industrial.

Requests from all lay or professional groups will be accepted. All requests for surveys will be submitted to the State Department of Health. These requests will then be screened by the Tuberculosis Control Officer, State Department of Health; and the Chief, Medical Services Unit, Division of Social Welfare. Final selection of the area to be surveyed will be determined by the Tuberculosis Control Officer, State Department of Health; Chief, Medical Services Unit; and Director of local sanatorium or State Sanatorium concerned. The component medical society will be consulted prior to placing the survey area on the calendar. Priorities will be determined from study of the tuberculosis problem, local cooperation and public interest, available local personnel for follow-up, and such other local conditions as may influence the success or failure of the project.

It therefore follows that areas or population groups chosen for mass survey should be selected on the basis of need. These are the indices which may be used to determine the need of such surveys:

1. Number of deaths from tuberculosis and its rate.
2. Ratio of number of new cases discovered to number of annual deaths.
3. Number of cases reported at time of death or shortly before death.
4. Number of sanatorium cases.

A study of these indices will give us a measure of the tuberculosis problem in various areas. However, it is to be recognized that in analyzing deaths and death rates, conclusions are apt to be faulty because of a number of variables which are difficult to control.

Since certain population groups have a greater tuberculosis potential than others, it is advisable that initially the following groups be used as focal points for mass surveys:

1. Known and suspected cases and their contacts.
2. Employees in industries. Mass surveys in this group are best by separate industry.
3. Employees of institutions and hospitals.
4. Persons residing in low economic areas.
5. Students in colleges and senior high schools.

B. Preparation for survey.

When the area or group for a mass survey has been selected, sufficient time should be allowed for preparation. The amount of time necessary will vary in different localities. Generally speaking, at least two months will be required in most places. However, it is understandable that in industries or in selected group surveys a great deal less time may be all that is necessary.

It is desirable that the local, district, or State Health Department sponsor the case-finding program. Every effort should be made to have the local or State Sanatorium participate actively in the program. The amount of sanatorium collaboration will depend upon the proximity of the sanatorium to the survey area and upon the active interest shown by the sanatorium director. The voluntary
Public Health Association (Christmas Seal Organization) and its local organizations should be invited to participate actively in the project. In counties not affiliated with the National Tuberculosis Association, the invitation should be rendered to the local independent association. Other official and voluntary health and welfare agencies should also be asked to participate.

The following procedure is recommended:

1. Selection of the area to be surveyed in accordance with instructions in 2-A above. Consideration should be given all requests received by the State Department of Health, but need should govern selection of the area.

2. Tuberculosis Control Officer should visit area selected and confer with Director of local sanatorium or State Sanatorium and determine with him degree of sanatorium collaboration. Conferences should then be held with the appropriate committee of the component medical society and then with the official and voluntary health and welfare agents and agencies. A general advisory committee will then be formed. The committee should consist of representatives of the medical profession, religious, fraternal and farm groups, management and labor, and civil and educational leaders. The exact make-up of the committee will vary in different communities in accordance with local conditions.

3. Well in advance of the date of the survey the public health nurse of the mobile unit to be sent to the area should enter the community and with a working sub-committee of the general advisory committee, organize the campaign. The organization should include the formation of groups of voluntary workers, each group of which should be given definite duties. The planning should include the following:
   (a) Intensive educational campaign consisting of speakers, posters, radio and newspaper notices, pamphlets, films, etc. The educational campaign should be under the supervision of the Educational Service Unit, State Department of Health, in collaboration with the voluntary Public Health Association.
   (b) Arrangements for the inclusion of local industries and schools in the survey.
   (c) Procedure for visiting homes in which there are cases and contacts.
   (d) Arrangements for an intensive drive to get in as many of the general public as possible, emphasis placed on barbers, beauty operators, food handlers, bartenders, and hotel and laundry employees.

The entire preparatory planning and work should be so arranged that the unit will arrive at the peak of the stimulation so that it can be kept busy during the period of its stay there.

4. Before the program is started in a community, arrangements must be made with the appropriate authorities for hospitalization of cases found and in need of treatment.

C. Role to be played by county sanatoria. This should be integrated with the Tuberculosis Committee of the State Medical Society.
3. Operation of units.

A. Miniature film, reading of film.

All examinees except cases should report to the unit in accordance with their appointment time. They will each report to the unit clerk and receive from her an identification card (mass radiography form No. 1), which they will complete if not previously filled out, and then give this form to the technician as they report to him for their x-ray.

Each evening, project films exposed during the day should be processed in the unit and then promptly sent to the place where the films are to be reviewed by the central office. In some localities, it may be necessary for the roentgenologist of the State Department of Health to visit the unit and read the films while there. The report of the project films should be sent without delay to the unit clerk. If the report returned is essentially negative, then the clerk will give the properly filled out tabs from mass radiography form No. 1 to the physician designated by the patient. The examinees will be notified to report to their physicians for the findings. If a retake on 14" x 17" celluloid film is indicated, the examinee will be notified by the unit clerk that a re-examination is necessary because the project film was found to be unsatisfactory.

B. 14" x 17" celluloid films.

Prior to the entrance of the mobile unit in the area, it should be determined by conference with the component medical society as to whether the x-ray examinations of cases and suspects and retakes of project film on 14" x 17" celluloid films should be done by the mobile unit or through local facilities. The unit is prepared to take 14" x 17" roentgenograms if such are desirable. The procedure should be followed whether the abnormal project film findings reveal suspected tuberculous or non-tuberculous lesions.

If the 14" x 17" films are taken by the mobile unit, they should be processed either at the nearest local hospital or sanatorium or sent unprocessed to the central office where they are processed, if necessary, and interpreted by the state roentgenologist. If the 14" x 17" films are taken by the local physician, clinic or hospital, then the local physicians should be urged to submit these films to the central office for interpretation.

All findings should be sent to the designated private physician or clinic or hospital and copies submitted to the Director of the local sanatorium (or State Sanatorium), and the District Health Unit or County Public Health Nurse.

4. Follow-up.

Following the operation of the mobile unit in the area it is necessary that immediate follow-up be made of the cases found through the survey, and of the cases and suspects and their contacts who have not reported for their examinations. The follow-up is an essential part of the program and should be done without delay in order to determine those who are in need of active treatment or observation. Appropriate disposition should be made of all cases or suspects as early as possible.
Tuberculin surveys:

Tuberculin surveys when properly conducted are necessary for a well-balanced control program. Their use is recommended as follows:

(1) to determine the rate of infection in a community,
(2) for epidemiological investigation,
(3) for case-finding in a low tuberculosis area.

If a tuberculin testing program is planned, those groups and ages should be tested which will accomplish the purpose intended. In all events, positive reactors should be used as a lead in tracing cases back to the homes, shops, and/or schools. If this is not done, then the real value of such programs is reduced.

If a large enough proportion of the general public is x-rayed at accepted intervals, most of the infectious active cases of tuberculosis will be discovered and removed from the community. Since, at the present time, there are an insufficient number of mobile units and personnel to operate these units, tuberculin surveys can be effectively employed in the interim. It is hoped that analysis of the x-ray surveys now being conducted will determine the optimum time for re-ray of a community.

Contact follow-up:

It has been established that the chances of developing reinfection tuberculosis is directly proportional to the degree and amount of exposure to an infectious case. For that reason, intimate contacts of active cases will require closer medical supervision than casual contacts or positive reactors from unknown sources. It has also been established that the vast majority of contacts over twelve years of age who subsequently develop tuberculosis do so within three years after exposure.

It therefore follows that all contacts should be closely supervised during the exposure period and for three years after the exposure has been interrupted. The interval for re-examination should be determined by the attending physician. However, after the three-year period, annual chest x-ray should suffice. Here again, the attending physician, because of previous findings or knowledge of the patient’s home conditions, may desire to continue the contact on closer medical supervision.

In addition, mass x-ray and tuberculin surveys will uncover a significant number of cases which will have to be studied clinically for diagnosis and activity.

The importance of the private physician should not be overlooked. He is the one who can find a large number of cases in the important population group not entirely reached by other procedures. He should be encouraged to employ a more aggressive anti-
tuberculosis action. In addition, he is consulted by the confirmed case as to treatment, etc.

At the last State Medical Association Annual Meeting, the Council and House of Delegates of the Minnesota State Medical Association approved the report by their Committee on Tuberculosis, in which was included the recommendation that medical and sanatorium care should be arranged for any active case of tuberculosis.

Isolation (Hospitalization and Treatment)

Isolation is an important procedure in our control program. The earlier a case is isolated the less probability the contacts will develop tuberculosis. At present over 85 per cent of sanatorium admissions have advanced disease on admission. This alone would indicate that a large number of persons are being needlessly exposed to tubercle bacilli in their homes, shops, schools, etc.

Minnesota has 14 county sanatoria serving 44 counties and one State Sanatorium serving the remaining 43 counties. The combined bed capacity of the 15 sanatoria is 2014 beds. In 1944 there were a total of 699 deaths. If we exclude the 165 deaths which occurred in the State mental hospitals, prisons and veterans hospital, there were 3.9 beds per annual death. This is well above the standard of 2.5 beds per annual death. Thus, at first notice, it would seem as though there were sufficient beds to take care of our case load. It is to be expected that with the use of the mobile x-ray units for case-finding the active case load in this State will be greatly increased. The total Minnesota experiences to date indicate that about 1.5 per cent of apparently healthy persons given x-ray examinations show significant tuberculosis shadows. However, about 0.1 per cent of all persons examined will require sanatorium care for observation or treatment.

If the 0.1 per cent rate continues in the rest of the State it is to be expected that instead of having bed vacancies in the sanatoria, present case-finding methods will uncover more cases than there are bed vacancies. It may be necessary in order to utilize all available beds that some patients unable to obtain hospitalization in their own area be hospitalized in an adjacent sanatorium for such temporary hospitalization. Fortunately, the large majority of cases found on x-ray surveys are in the early stage and should require only a short stay in the sanatorium. It is therefore estimated that the over-load of patients in the sanatoria will be only of a short duration, perhaps five years following a survey, after which time vacancies created in sanatoria will be of a more permanent nature. Perhaps for this period one may estimate the bed requirements at five beds per annual death.

To the question as to whether certain small sanatoria should
be closed, we believe the answer is to wait and see what the surveys will produce. It is no doubt true that the smaller sanatoria do not have all the facilities required for adequate surgical care of the tuberculous. Perhaps, in order to make such treatment immediately available to all Minnesota residents, it might be well to use the smaller sanatoria for the chronic ambulatory and rehabilitation cases and the larger sanatoria for the patients in need of a complete treatment center. At any rate, an effective tuberculosis program calls for the immediate hospitalization of all infectious cases (actual and potential). That is basic.

Rehabilitation

Because of the chronic nature of the disease, many patients are required to remain in a sanatorium for long periods of time and are physically incapable of full time employment upon their discharge from the sanatorium. Because of economic necessity, many of them are compelled to return to their employment earlier than is desirable or to employment which is detrimental to their future health.

The purpose of rehabilitation is two-fold; first, to return to the patient his self-respect by directing him into avenues of work in which he is not discriminated against nor vocationally handicapped and second, to return to him his economic independence as rapidly as his health permits.

The rehabilitation program should consist of the following functions:

(1) Mental restoration,
(2) Physical restoration,
(3) Vocational and medical guidance,
(4) Training,
(5) Placement.

Methods chosen to operate the rehabilitation program must be combined into an orderly process. It is necessary at all times to select carefully the patients eligible for rehabilitation care. Under no circumstances should anyone be compelled to accept rehabilitation.

The rehabilitation program in Minnesota is a function of the State Department of Education. Seventy persons, or 14.5 per cent of the total disabled persons rehabilitated in 1945 were former tuberculous patients. It is hoped that this service will reach more persons eligible for it. On July 6, 1943 Congress passed the Borden-LaFollette Act. This legislation made possible vocational rehabilitation to all disabled persons who can profit from this service and broadened the scope of the service under Federal-State program.
Voluntary health and welfare agencies can assist in the rehabilitation program in four ways:

1. Provide teachers and occupational therapists to the smaller sanatoria.
2. Provide supplemental financial and material assistance to dependents of patients.
3. Educate management and general public not to discriminate against the employment of selected ex-patients.
4. Provide supplemental financial or material assistance to trainees either as grants or loans.

**Prevention**

In the foregoing discussion under case-finding, hospitalization and treatment, and rehabilitation, one can readily recognize the value of early case-finding, early isolation, and adequate rehabilitation as potent factors in the prevention of the spread of tuberculosis.

The following additional remarks are worthy of emphasis at the risk of repetition:

1. The value to the community of isolating open cases is so great that it should be incumbent upon them to provide free sanatorium care for all their residents with active tuberculosis and to those non-residents who are found to be infectious. The cooperation of the attending physician, the consultant, the health officer and the community is necessary.
2. Once a patient has been admitted to the sanatorium, he should remain there until discharged by the Superintendent as having received maximum hospital care and being non-infectious.
3. Follow-up examinations of post-sanatorium cases or observation cases should always include submission of sputa specimens to the State Department of Health Laboratories.
4. Periodic chest examinations (or tuberculin tests) of teachers, school employees and contacts of cases. Teachers should be required to have their examinations at time of employment and at least every two years thereafter.
5. The annual chest x-ray examination of barbers, beauty operators, food handlers, bartenders and the like would assist in locating active tuberculosis in persons coming in close association with the general public. The value of this procedure in tourist or trade centers can not be overstated.
6. Improvement of nutrition and housing.
In this proposed expanded tuberculosis control program with the use of mobile x-ray units, it is expected that the combined coordinated attack on tuberculosis by the State Department of Health, sanatoria, and other official and voluntary health and welfare agencies will produce results. It is not the desire of the State Department of Health to interfere nor to hinder the good work of the sanatoria and other agencies which has been so fruitful in the past, but rather to lend them assistance and the authority which is at our means to provide.