[Reprinted from the American Journal of Mental Deficiency, Vol. XLIX, No. 3, January, 1945.]

THE PROBLEM OF CONTROLLING TUBERCULOSIS IN A PUBLIC INSTITUTION

By Edward J. Engberg, M.D.

Superintendent, Minnesota School for Feeble-minded, Faribault, Minnesota

THE purpose of this paper is to review the problem tuberculosis has presented in this institution, the measures taken to combat it and the plan in effect at the present time to control this disease through the early recognition and isolation of active cases.

The Minnesota School for Feeble-Minded and Colony for Epileptics was opened as an experimental department for feeble-minded children in 1879, by the Board of Directors of the Minnesota Institute for Deaf, Dumb, and Blind at Faribault. It was established as a separate institution in 1887. The epileptics in our institution, except for the very low grade or seriously crippled, were transferred to the Colony for Epileptics at Cambridge when it was opened in 1925.

The present population of the institution is about 2,600. Provision is made for the admission of persons of all ages with all degrees of mental deficiency who have been committed as feeble minded. The lack of space is the only limitation imposed upon admissions from the waiting list. The institution owns about 1,200 acres, of which over 600 are under cultivation. It has a large dairy herd with modern barns, a central kitchen and bakery, laundry, power house, deep well, some buildings for employees, the usual shops and an administration building with a wing for the school department. Patients are housed in several buildings of the linear type, in two infirmaries, in several cottages for boys and girls doing the various types of work necessary and in a new 200 bed hospital opened in 1937.

The five functions of the institution are:

(1) Educating the high grade feeble-minded pupil by appropriate training in school, in shop, or on the farm, to fit him for life outside the institution, under favorable conditions.

(2) To provide useful employment, with congenial companionship and a good substitute home for the intermediate grade defective incapable of a satisfactory adjustment to the outside world.

(3) To care tenderly, humanely, and economically for the helpless child whose presence in the home entails a burden too heavy and exacting for the family to bear.

(4) To provide as adequately as possible for a difficult group which has gradually evolved as a result of the admission to the institution of delinquent defectives who are a menace to society or who are chronic, petty offenders, and who will not stay in an open building. They are housed in two locked cottages, one for males and one for females.

(5) Beginning in 1943 to act as an isolation unit for cases of active tuberculosis.

45-RCT-EJE

We have 356 staff positions and had an average of 340 employees per month during the year 1943. The new employees during the year numbered 139, of whom 46 were men and 93 women.

Since 1939, when the State Board of Control was replaced by the Department of Social Security, the institution has been one of seventeen in the Division of Public Institutions, of which Mr. Carl H. Swanson is the Director.

In 1942, Mr. Swanson created the Tuberculosis Control Unit in the Division and selected Dr. H. A. Burns as its Head. He resigned as superintendent of the State Sanatorium to accept the position and assumed charge November 17, 1942. Since then he has devoted his full time to working with Superintendents and their medical staffs for the sole purpose of improving the tuberculosis programs in their respective institutions. In the light of the increased efforts to control tuberculosis which has resulted, it is interesting to find in the biennial report of this institution for the period ending July 31, 1906, that Dr. A. C. Rogers, then Superintendent, and highly regarded by those members of this association who remember him, described as one of the improvements completed during that biennium a "Tuberculosis Hospital" in these words:

"This is the most satisfactory building upon the grounds. It is constructed after the Spanish Mission type, with its architecture giving it a distinct individuality among the other buildings. In arrangement it is thoroughly sanitary. Provides twenty-eight beds, a large sun room and ample outdoor courts paved with concrete. Forced ventilation, large windows and transoms provide for bountiful supply of air to patients unable to be out in the open courts. Tile and monolith floors, steam sterilizer so located that all clothing and bedding can be easily and quickly disinfected before leaving the building, hard plaster walls, finished with enamel paint, and all furniture thoroughly enameled, make it possible to keep everything thoroughly sanitary."

It is worthy of note that this was the first hospital in the state used solely for the isolation and treatment of cases of active tuberculosis. It continued to serve that purpose until in 1924 when the patients were moved from it to the institution's general hospital so that it might be converted into a dormitory to be used for feeble-minded on the waiting list in urgent need of institutional care.

In 1934 Dr. Burns, while Superintendent of the State Sanatorium, made a special study of the incidence of tuberculosis in this and other state institutions under the supervision of the State Board of Control (1). The laws of Minnesota provide that the persons afflicted with tuberculosis in penal or charitable institutions be cared for in separate rooms or wards from those used by other inmates, and the survey was made at the Board's request in order to determine the extent of the problem and to plan to meet it. As a result, units with special facilities to segregate and treat in them patients with active tuberculosis were established in certain state hospitals and thereafter it became the policy for such cases to be transferred, so far as possible. Fifty-five patients were transferred for that reason during the period following until 1943 when provision was made for the isolation and treatment of such

patients here. Of these 26 had died from tuberculosis at the end of 1943, 5 from other causes, 2 were returned to us as arrested cases in 1943 and 22 were still under treatment in the institutions to which they had been transferred. Eighty-three died in this institution, making a total of 109 deaths from tuberculosis during the 10 year period, of those who were patients here when the disease was discovered. Sixteen of these deaths (10 males, 6 females) occurred in 1934; 19 (15 males, 4 females) in 1935; 18 (15 males, 3 females) in 1936; 10 (8 males, 2 females) in 1937; 6 (4 males, 2 females) in 1938; 7 (3 males, 4 females) in 1939; 9 (5 males, 4 females) in 1940; 9 (3 males, 6 females) in 1941; 9 (4 males, 5 females) in 1942; 6 (3 males, 3 females) in 1943; excluding 2 females who died here following their transfer because of active tuberculosis for isolation and treatment. During this time our average inmate population increased from 2,296 in 1934 to 2,564 in 1943.

Previous to 1934 there was no provision for the detection of possible tuberculosis in a person working or to be employed in the institution, as no physical examination was required, nor was a routine Mantoux or chest X-ray made of patients upon their admission. Dr. Burns, however, during the survey of the institutions he studied in 1934 made a Mantoux test of all the employees and patients followed by a chest X-ray of all positive reactors, and this continued to be the routine for all new employees and all patients upon original admission or re-admission until February of 1939 when the State Board of Control directed that the Mantoux test for new employees should be replaced by a chest X-ray.

In addition to Dr. Burns' survey in 1934, a micro-film survey of the institution was completed in March, 1941, in cooperation with Dr. H. E. Hilleboe, Chief, Medical Unit, Division of Social Welfare, State Department of Social Security.

Soon after Dr. Burns assumed his present position, certain additions to the control program were adopted. The Mantoux test continued to be made on all new or re-admitted patients but a chest X-ray was required as well. In addition, laboratory studies of gastric lavage specimens were required for all patients and new employees not having negative chest X-rays unless satisfactory specimens of sputum were obtained for examination. Arrangements were made with the State Department of Health to make the increased number of gastric lavage studies that would be necessary and this service has been of great value.

A continuous card calendar file was established for each employee and patient in the institution for chest X-rays and a similar one for all on whom gastric lavage studies were to be made. An X-ray of each patient whose card was in the calendar file was taken during the proper month and each week as many of these as had been completed were sent to Dr. Burns for interpretation together with those taken of new employees and newly admitted patients.

Of 139 new employees studied before being accepted for permanent employment, 132 had negative chest X-ray reports, while 4 males and 3 females had minimal changes. One of these died following an attack of coronary

disease before the examinations could be made but the others had laboratory examinations of their gastric lavage specimens with negative results except for one who was then separated from service. Dr. Burns reported that her X-ray showed a small area of mottling in first right interspace, otherwise negative, with a diagnosis of Stage 1 observation. She had been regarded as an arrested case from the time of her discharge from a county sanatorium in 1936. No cases of active tuberculosis came to attention among other employees during the year.

All of the 188 first admissions and 48 re-admissions during 1943, exclusive of 9 active cases transferred to us for isolation and treatment, had chest X-rays upon admission, followed by gastric lavage studies, if indicated, and one of these was found to have active tuberculosis. She was our admission number 11,577, born May 20, 1921, admitted April 24, 1943, I.Q. not determined but clinically she was diagnosed as a spastic imbecile. Mantoux test negative April 29, 1943; report on chest X-ray September 21, 1943, was: pleural changes left upper, right negative. Conclusion: Stage 1 observation; gastric lavage specimen of October 12, 1943, was positive on guinea pig test.

A review of the entire patient population was completed during 1943. Two thousand five hundred twelve were X-rayed followed by laboratory tests of 147 who showed evidence of parenchymal involvement. One hundred forty-four additional patients had gastric lavage studies only because they were so deformed or uncooperative that it seemed unlikely that satisfactory X-rays could be secured. When all studies had been completed, we had identified 23 cases of active tuberculosis among patients. Fifteen were from those in whom the X-ray showed parenchymal involvement, eight being minimal, three moderately and four far advanced while six cases were among those for whom examination of stomach washings only were made. Another case was diagnosed as a result of positive laboratory findings but negative X-ray. In this case the laboratory study was made in spite of a recent negative X-ray when it was observed that his general physical condition was failing, without apparent reason, and it was known that he had been exposed to tuberculosis as several active cases had recently been found on his ward. He was our admission number 8889, a Mongol, born February 12, 1927, with I.Q. of .27 on June 21, 1932, admitted May 24, 1934. A Mantoux had been negative on August 24, 1938. On December 30, 1940, a chest X-ray had been reported negative by Dr. Harold O. Peterson, of the University of Minnesota Hospital, as had Dr. Burns of one taken on August 23, 1943. A gastric lavage specimen secured on September 13, 1943, was reported not to have had acid fast bacilli demonstrated in it, but on October 21 that the culture showed acid fast bacilli present, and on December 3, that the guinea pig inoculated showed tuberculous lesions in which tubercle bacilli had been demonstrated. He continued to fail and died on February 13, 1944. In the twenty-third case the diagnosis was one made by clinical study and X-ray only. This patient was our admission number 8130, a female born

September 5, 1912, admitted April 23, 1932; I.Q. .22 on November 21, 1938; Mantoux negative August 29, 1934; micro-film negative in March, 1941. In April, 1943, she began to fail noticeably and showed clinical symptoms suggestive of pulmonary tuberculosis. An X-ray taken April 14 was reported to show far advanced involvement. A gastric lavage study followed with a negative report received but, unfortunately, an animal inoculation test was not made. Death occurred June 24, 1943, from pulmonary tuberculosis.

The diagnosis of active tuberculosis was made or confirmed in all but one of the 23 cases by positive laboratory findings. In 20 cases the guinea pigs inoculated with gastric washings developed tuberculous lesions containing tubercle bacilli. In one case a specimen of gastric washings was negative on culture and no animal inoculation test made upon it, but one was made shortly thereafter on a specimen of aspirated pleural effusion with positive findings. In one case only were satisfactory specimens of sputum secured and proved to be positive so study of gastric washings was unnecessary. This was that of our admission number 4944, a female born March 29, 1892, admitted April 15, 1915; escaped August 5, 1917; re-admitted August 29, 1919; Mantoux negative August 31, 1934, but positive in May, 1938. Micro-film in March, 1941, showed abnormal shadows. Follow-up X-ray studies were made and Dr. Burns reported on the one taken January 6, 1943, that there was mottling in right apex and first and second interspaces; in left, mottling throughout.

As a result then, of intensive studies made in the institution in 1943, one active case was discovered in connection with the pre-employment examination of 139 new employees and 23 cases among all patients, exclusive of known tuberculous received by transfer. Only 3 in the entire patient population were in the hospital as suspected cases at the time while 20 were identified in their dormitories. One active case occurred in each of seven buildings or wards, 2 in an infirmary for females with a normal capacity of 110 but having about 130 patients at the time. However, the remaining 11 cases occurred in one building which housed 130 low grade male patients sharing two large day rooms but having a common sleeping dormitory and a common dining room. Among these eleven, two were found to have far advanced involvement, six minimal involvement, one was negative on X-ray but gastric washings were positive, while in two cases gastric washings only were done as they were unsuitable cases for X-ray studies.

One of the 23 cases discovered among the patients was admitted in 1943, as previously stated, while 22 had been received earlier, and 20 of these had been included in the 1941 micro-film survey with negative findings in 15. Suspicious markings had been reported in five and of these one was in the group of 3 isolated in the hospital prior to 1943 as suspected cases and found to be active, 3 were the only active cases found in their buildings and the fifth was one of the two active cases found in the infirmary, the other being the one admitted in 1943, already described. The two cases, who were here at the time of the micro-film survey but not

included in it, had been unsuitable then as they were for X-ray in 1943 when they were identified by gastric lavage studies. The first of these was the only active case found in his building and was our admission number 6697, born January 21, 1916, admitted March 1, 1927, I.Q. .47 on March 15, 1927; Mantoux positive on August 24, 1934; chest X-ray reported negative by Dr. Burns February 6, 1935, gastric lavage specimen of August 17, 1943, reported positive on animal inoculation; the other was one of 11 active cases found in his building. He was our admission number 9870, born April 26, 1899, admitted August 3, 1937, I.Q. .15 on December 3, 1936. The Board of Health reported on his gastric lavage specimen collected August 23, 1943, that no acid fast bacilli had been demonstrated but that culture showed acid fast bacilli present and on September 27, 1943, that the guinea pig inoculated showed tuberculous lesions in which tubercle bacilli were found.

It is striking to note in Dr. Burns' report of his 1934 survey (2) that there were 28 positive sputum cases identified here among patients as compared to 23 cases of active tuberculosis identified during 1943, but of these only one was diagnosed by the examination of sputum. In few, if any others in this group could satisfactory specimens of sputum have been secured by more persistent efforts instead of having the studies of gastric lavage specimens made. These proved to be of great value and made or confirmed the diagnosis in the case of 20 patients and of one employee. Three hundred and fifty-six such specimens were collected and sent to the Board of Health laboratories in the manner they recommended. Sixty-three of these were unsatisfactory and had to be repeated. Two hundred and seventy-two were negative on culture. Twenty-one were positive on culture with the guinea pig test positive in 20 and negative in one of these. In one case the culture was negative but the guinea pig test positive.

It was not possible to make a complete Mantoux survey during 1943 but we plan one soon so we may make comparisons with earlier tests and have the benefit of this additional knowledge for use in the control program. We believe it may be helpful in reducing the number of gastric lavage examinations necessary on those unsuitable for X-ray.

SUMMARY

During 1943 the institution load of tuberculosis was defined more clearly than in the past, as a result of the members of the medical staff having done the increased work necessary to complete the X-ray and gastric lavage studies in making a complete survey of all patients and initiating the continuous control program as directed by Dr. H. A. Burns, Head, Tuberculosis Control Unit, Division of Public Institutions. One active case was found in a new employee in the course of the pre-employment examinations required before she could be given permanent civil service status. One patient admitted in 1943 was found to have active tuberculosis shortly after admission. Twenty-two other active cases were identified among patients and of these 3 only were in the hospital as suspected cases

at the time the diagnosis was made. Of the 23 patients so identified, 4 died during 1943. On January 1, 1944, the remaining 19 were in isolation in the hospital together with 7 of the 9 active cases received by transfer from other institutions in 1943. Deaths from tuberculosis whether occurring in the institution or elsewhere, of those who were here when the disease was diagnosed, decreased from 16 in 1934 to 6 in 1943. During this 10 year period our average population increased from 2,296 in 1934 to 2,571 in 1943.

The cases with minimal and apparently inactive tuberculosis had stomach washings and will continue to have frequent X-ray and, if necessary, gastric lavage studies so that any who do break down may be detected quickly in order to isolate them for treatment and to eliminate them as a source of danger to others.

Provision was made in 1943 for a more careful study of all new patients in order to recognize or to eliminate the presence of active tuberculosis and by means of calendar files to repeat X-ray and laboratory studies as frequently as seems necessary but not letting this delay examinations where there are clinical indications for them. New employees were studied as completely as patients to avoid, if possible, employing any with active tuberculosis. A calendar file for all employees schedules a chest X-ray at least once a year and at three month intervals for those coming into intimate contact with known cases of active tuberculosis.

REFERENCES

1. Minnesota State Board of Control. Eighteenth Biennial Report, 1935, II, 72–76.

2. Burns, H. A. A Study of the Incidence of Tuberculosis in State Institutions in Minnesota. *The American Review of Tuberculosis*, Volume XXXIII, No. 6, June, 1936.