TUBERCULOSIS IN MENTAL HOSPITALS*

BY

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In Great Britain the special problem which tuberculosis constitutes in mental hospitals has never been accorded the attention it merits. This is well illustrated by reviewing the bibliography on this subject in the world medical literature. Here one finds that of over thirty papers on this subject only a few (Snell *et al.*, 1943; Clark *et al.*, 1945; Early, 1950) have been published by workers in the United Kingdom; and the overwhelming bulk of contributions have been by United States and Canadian investigators. In the latter countries great interest has been evinced, and a most vigorous policy pursued in combating tuberculosis in this field, by the Federal Public Health Agency (*Public Health Reports, Wash.*, 1949), by State and mental hospitals, and by a variety of subcommittees (Committee on Tuberculosis in Mental Hospitals, 1946) concerned in the prevention of tuberculosis. In Great Britain an attitude of casualness bordering on indifference has arisen. Our first task, therefore, must be to find out whether tuberculosis really does constitute a problem in mental hospitals. The following evidence, culled from the publications of the Board of Control (1949), is submitted.

The Board of Control returns for 1949 show that there were 650 notifications of tuberculosis and 300 deaths from tuberculosis per 100,000 mental hospital patients. In 1948 there were 384 male and 190 female deaths among mental hospital patients (Board of Control, personal communication). Moreover, during 1948 approximately one out of every ten deaths occurring in male mental hospital patients was due to tuberculosis. While the above facts give some ground for concern, the most striking evidence of the gravity of this problem is illustrated by an analysis of the death rate in mental hospitals. Whereas 2.8% of the national deaths due to tuberculosis occur in mental hospitals, this community constitutes only 0.35% of the population of England and Wales.

Present Survey

In order to obtain more precise information about this problem a survey was conducted during 1950 in a large mental hospital in Yorkshire. Details of the sex and age distribution of this population are outlined in Table I. It

TABLE I.—Mental Hospital Population in Age Groups

Age	Females		Males	
	No.	%	No.	%
Under 20 years ..	12	0.74	10	0.83
20 to 39 " ..	260	16.1	304	25.3
40 " 59 " ..	671	41.6	495	41.0
60 and over ..	669	41.5	390	32.5
	1,612		1,199	

will be observed that a very large proportion of the population are 40 years or over; therefore such conclusions as emerge from this survey are not necessarily representa-

tive of mental hospitals throughout the country as a whole, though they may be helpful in indicating the pattern and possibly the magnitude of this problem.

Inquiry into the literature revealed that it would have been valueless to attempt to assess the tuberculin reactor rate of the population to patch or jelly tests. Leonidoff (1943), working on this problem in the United States, found that about one-sixth of such tests were damaged or removed by patients. It was therefore decided to inject intradermally all patients, apart from those known to be suffering from pulmonary tuberculosis, with a single dose of 1:100 old tuberculin.

The distribution of tuberculin reactors according to age, sex, and duration of residence in the mental hospital is outlined in Tables II and III.

TABLE II

Age	Percentage of Tuberculin Reactors in Mental Hospital	
	Females	Males
Under 20 years	—	—
20 to 39 "	89.6	95.7
40 " 59 "	91.3	95.0
60 and over	91.2	96.9
Overall Percentage of Tuberculin Reactors	89.95	96.5

TABLE III

Duration of Residence in Mental Hospital	Percentage of Tuberculin Reactors in Mental Hospital	
	Females	Males
Under 3 months	85.0	91.5
3 to 24 "	88.5	95.3
25 " 60 "	91.5	95.85
Over 60 "	91.4	96.1
Overall Percentage of Tuberculin Reactors	89.95	96.5

A number of interesting points emerged in the analysis of the above findings. First, there appeared to be no obvious difference in the reactor rate as between different mental diseases when classified according to the psychiatrist of the hospital. Secondly, when mental patients were classified according to the duration of their stay in mental hospitals, it would appear that males with less than three months' residence had a significantly higher percentage of *negative* tuberculin reactors. This does suggest that new admissions may have about the same exposure incidence to active pulmonary tuberculosis as the mentally normal civilian population, but that the reactor rate rose appreciably after three months' residence, probably because of the greater number of open male cases of tuberculosis in this mental hospital. This observation tends to support Oechsli's (1949) findings that of patients resident under six months the incidence of active tuberculosis is 1.6%, those resident under five years 3%, and those resident over five years 8.8%. Thirdly, it appeared that the reactor rate among females was always lower than among male patients.

The original intention was to take x-ray films of the entire mental hospital population. Unfortunately, owing to technical difficulties, this survey could be completed in the male wards only. Of the 1,199 male patients who underwent mass radiography no fewer than 67 (13 previously known and confirmed) were found with radiological evidence of pulmonary tuberculous lesions which were neither wholly calcified nor fibrotic. Among the 54 newly discovered cases with radiological lesions, 25 were designated as active (positive sputum or cavitation) and 29 as pulmonary tuberculosis of "undetermined activity."

Clinical examinations appeared to be an unusually fruitless field in the assessment of lung activity in mental patients. The schizophrenics were often very shallow breathers, and many of the low-grade mental defectives simply did not respire normally and were uncooperative with a strange

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physician. The only further investigations attempted in this survey were the sedimentation rate, two laryngeal swabs, and faeces examinations for tubercle bacilli in each of the 67 cases with pulmonary tubercle of active, quiescent, or undetermined activity (Table IV).

TABLE IV.—Results of X-ray Examination of Male Mental Hospital Population in 1950

Total No. of males x-rayed	1,199
Newly detected:	
Patients with positive sputum	12
Patients with radiological evidence of cavitation	13
Patients with radiological tuberculosis of undetermined activity	29
Previously detected and confirmed:	
Patients with active and quiescent pulmonary tuberculosis	13 (1.1%)
Total with pulmonary tuberculosis of active, quiescent, and undetermined activity	67 (5.6%)

Another interesting finding which emerged in the course of investigation was that this mental hospital had a sanatorium ward in the male wing for the isolation of 58 tuberculous patients. Radiological evidence of active or quiescent tuberculous disease was not revealed in 43 patients. The bulk of the latter were found to have healed pulmonary tuberculosis, bronchiectasis, chronic bronchitis with emphysema, and asthma. Only 13 of the inmates revealed evidence of active or quiescent lung tuberculosis; a further two patients suffered from intestinal tuberculosis. This experience is similar to that of Snell *et al.* (1943), who found that 19 of 48 notified cases of pulmonary tuberculosis in mental hospitals showed either healed lesions or no evidence of pulmonary tuberculosis.

A few general comments and clinical findings may be of value. It was remarkable to note the paucity of signs and symptoms in five mental patients with extensive bilateral disease with cavitation. Another surprising observation, revealed on inspection of the chest skiagrams, was the extensive lung scarring and calcification which had occurred in the absence of any special medical treatment. Whether the ordered mental hospital regime was a factor in aiding the patient's natural powers of healing is an interesting speculation.

Discussion

Problem of the Mental Hospital Patient.—In the overwhelming bulk of mental patients suffering from tuberculosis precedence must be directed to the treatment of the mental disorder of the patient. Next in importance, attention has to be focused on the prevention of the spread of tuberculosis from the infected to the non-infected mental patient, from the infected patient to the non-infected mental nurse, and from the infected patient to the mentally healthy community. Thirdly, tuberculosis therapy in the tuberculous mental patient has only limited application at the moment, and therefore ought not to command the same emphasis as the two other measures in coping with this problem.

Problem for the Community.—Only a minority of physicians have realized the profound transformation which has occurred in the therapeutic scene in psychiatry in the past two decades. At present, more than a quarter of the mental hospital inmates are discharged home annually, and this group may contain up to 200 patients suffering from pulmonary tuberculosis. Tuberculosis in the mental patient is therefore no longer simply a problem of the mental hospital, but has assumed epidemiological dangers for the community. Therefore it is important that there should be the closest liaison between the medical superintendent of the mental institution and the medical officer of health, so that the latter can be informed some weeks before a patient's discharge and arrangements made for separate accommodation and extra nourishment for the mental patient, the provision of a home help, B.C.G. vaccination of his contacts, etc.

Problem for the Mental Nursing Staff.—In the past, mental nursing staffs have received limited instruction in tuberculosis in the course of their training. Tuberculosis seems to

be but one of a number of subjects in the nursing syllabus covered by the broad term "general medicine." It would be a wise gesture if chest physicians were encouraged to give instruction on the hazards and prophylaxis of tuberculosis in mental hospitals.

In future, nursing staffs will be tuberculin-tested, B.C.G.-vaccinated, and periodically x-rayed along the lines recommended for the nursing profession in a recent Ministry circular. However, there seems to be an even greater need for safeguarding the health of nursing staff in mental hospitals than in sanatoria. In the latter institutions nurses are constantly on their guard against the hazards of infection. Sanatorium patients are educated on admission in simple hygienic measures like screening their mouth with the hand on coughing, yawning, and expectorating. In the general wards, especially in the admission block of the mental hospital, the nursing staff may not be quite as vigilant or aware of these dangers of infection, and, moreover, a considerable number of patients cannot be educated to control indiscriminate coughing. It would therefore be reasonable to require as high a standard of hygiene discipline from mental hospital nurses as that prevailing in sanatoria. Gowns and masks should be worn while wards are being swept and beds made. That these precautionary measures are necessary can be seen from examination of the findings of Katz *et al.* (1945), Deegan *et al.* (1942), Altshuler *et al.* (1941), and Burns *et al.* (1936), who discovered that among their nursing personnel 1.1%, 1.5%, 3.5%, and 3.7% respectively suffered from pulmonary tuberculosis.

Conclusion

By the adoption of the above measures, designed to limit tuberculosis in mental patients and its spread to mental nursing staffs and the outside community, we can hope to liquidate one of the principal foci of tuberculous infection which still remains in this country.

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At a recent meeting organized by the British Gelatine and Glue Research Association, Dr. John T. Edsall (Professor of Biological Chemistry, Harvard) discussed the process of blood clotting, which can be considered broadly as occurring in two stages, the first involving the complex series of processes whereby prothrombin is converted to thrombin, and the second the action of thrombin on fibrinogen to form the fibrin clot. The major constituent in the second stage is fibrinogen; it seems quite clear that thrombin acts catalytically. The size and shape of the fibrinogen molecules have now been studied by many methods—sedimentation and diffusion, viscosity, osmotic pressure, double refraction of flow, electron microscopy—and they appear to be rod-shaped, each about 700A by 40A, with a molecular weight of the order of 450,000. Recent work indicates the splitting off of a small peptide from fibrinogen by the action of thrombin, with the formation of free terminal α -amino groups of glycine residues in fibrin. The subsequent process of polymerization involves both end-to-end and side-by-side aggregation, the latter becoming relatively less important as the pH increases.