

TUBERCULOSIS IN A MENTAL HOSPITAL. FIVE YEARS' MASS
RADIOGRAPHY.

By DONAL F. EARLY, L.R.C.P. & S.I., D.P.H., D.P.M.,
Senior Psychiatric Physician, Bristol Mental Hospital.

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IN a previous paper (Early, 1946) I reported and commented on the preliminary mass radiography survey in the Bristol Mental Hospital in December, 1944. Each year since then the entire patient population has been subjected to mass radiography and in this paper the results of this work will be reported.

The procedure involved in subsequent years was considerably less cumbersome than in 1944, in that the Bristol Mass Radiography Department now has a mobile unit which visited the hospital, with consequent saving of time and expense. This fact explains why the total number of patients is slightly less in 1945 and 1946 than in 1944, the 1944 figures including the "floating population" in the hospital during the two months necessary to complete the survey. The subsequent surveys took about ten days to complete. The rising figure from 1945 to 1947 is an indication of the increase in overcrowding. The big increase in the 1948 figure is due to the fact that Barrow Hospital has been reopened, having been occupied by the Navy during the war.

To facilitate comparison the same method of classification will be used as previously. In reporting the 1947 and 1948 surveys it is considered unnecessary to include all the patients who were picked up in the original mass radiography and who have been regarded as inactive over a period of three years. Under the heading of "Inactive Tubercle (under observation)" will be included all patients who at one time have been considered active but have shown no radiological change over a period of three years, and all those who showed more than minimal infiltration although they never have shown any change in the X-ray or abnormal clinical tests to indicate activity. Included under "Total number examined radiologically" are those patients previously diagnosed or under observation who are followed up regularly on large films. Those not examined radiologically but showing no clinical signs of tubercle are regarded as non-tuberculous and the percentages worked out in relation to the total population. Included in the figures are patients who developed tuberculosis during the year and died during the same year.

RESULTS OF SURVEYS.

TABLE I.—*Mass Radiography Survey, 1944.*

Preliminary survey. 1944.	Males.		Females.		Total.	
	Number.	%.	Number.	%.	Number.	%.
Patients in hospital	540	—	700	—	1240	—
" X-rayed	540	100	676	96.6	1216	98.1
" not X-rayed—	—	—	24	3.4	24	1.9
Evidence of tubercle—all stages	46	8.5	27	3.9	73	5.9
Active tubercle	13	2.4	4	0.6	17	1.4
1. Minimal	1	0.2	—	—	1	0.08
2. Moderately advanced	2	0.4	—	—	2	0.2
3. Far advanced	10	1.9	4	0.6	14	1.1
Inactive tubercle	33	6.1	23	3.3	56	4.5
1. Minimal	24	4.4	17	2.4	41	3.3
2. Moderately advanced	9	1.7	6	0.9	15	1.2
3. Far advanced	—	—	—	—	—	—
Pleural involvement	3	0.6	—	—	3	0.2

1945 :

There were 1,209 patients in the hospital at the time of the survey (512 M., 697 F.), of whom 1,187, or 98.2 per cent, were radiologically examined (509 M., 99.4 per cent., and 678 F., 97.3 per cent.). Of these, 38, or 3.1 per cent. showed evidence of active phthisis (29 M., 5.7 per cent., and 9 F., 1.3 per cent.). There were 12 new cases amongst hospital "residents," 10 amongst male patients and 2 amongst the female patients; 3 new cases were new admissions; 8 patients previously considered inactive (4 M. and 4 F.) were now considered active; 4 male patients previously considered active were now graded as inactive; 5 male patients known to be suffering from phthisis died during the year, and 6 patients graded as inactive (2 M., 4 F.) died of other causes. In addition, 2 patients died of miliary tuberculosis and another developed tuberculous broncho-pneumonia, from which he died. None of these had previous radiological evidence of infection. Three male patients showed evidence of pleural involvement; 2 had a pleural effusion.

TABLE II.—*Radiographic Survey, 1945.*

1945.	Males.		Females.		Total.	
	Number.	%.	Number.	%.	Number.	%.
Patients in hospital	512	—	697	—	1209	—
" X-rayed	509	99.4	678	97.3	1187	98.2
" not X-rayed	3	0.6	19	2.7	22	1.8
Evidence of tubercle—all stages	62	12.1	22	3.2	84	6.9
Active tubercle	29	5.7	9	1.3	38	3.1
1. Minimal	9	1.8	4	0.6	13	1.1
2. Moderately advanced	8	1.6	3	0.4	11	0.9
3. Far advanced	12	2.3	2	0.3	14	1.2
Inactive tubercle	33	6.4	13	1.9	46	3.8
1. Minimal	22	4.3	9	1.3	31	2.6
2. Moderately advanced	9	1.8	4	0.6	13	1.1
3. Far advanced	2	0.4	—	—	2	0.2
Pleural involvement	3	0.6	—	—	3	0.2

1946 :

The population had risen to 1,238 (528 M., 710 F.) ; 1,212 (97.9 per cent.) of them were examined radiologically (520 M., 98.5 per cent., and 692 F., 97.5 per cent.) ; 20 M. (3.8 per cent.) and 11 F. (1.5 per cent.) showed evidence of active tubercle, i.e. 31 patients, or 2.5 per cent. of the hospital population. There were 5 new patients amongst hospital residents, 1 M. and 4 F. ; 1 new female case was a new admission ; 1 male previously considered inactive was now considered active ; 8 cases previously considered active (6 M. and 2 F.) were regraded to the inactive category ; 6 cases (5 M., 1 F.) of recognized tubercle died of the disease during the year. One female patient developed broncho-pneumonia following pleurisy and died ; 2 male patients previously not considered as tubercle developed the disease and died from it ; 1 male with active tubercle recovered mentally, resigned from hospital and was discharged. Four cases regarded as inactive (3 M., 1 F.) died of other causes ; 2 male cases showed pleural involvement ; 1 previously reported was considered non-tuberculous.

TABLE III.—*Radiographic Survey, 1946.*

1946.	Males.		Females.		Total.	
	Number.	%.	Number.	%.	Number.	%.
Patients in hospital	528	—	710	—	1238	—
" X-rayed	520	98.5	692	97.5	1212	97.9
" not X-rayed	8	1.5	18	2.5	26	2.1
Evidence of tubercle—all stages	53	10.0	25	3.5	78	6.3
Active tubercle	20	3.8	11	1.5	31	2.5
1. Minimal	7	1.3	6	0.8	13	1.1
2. Moderately advanced	8	1.5	3	0.4	11	0.9
3. Far advanced	5	0.9	2	0.3	7	0.6
Inactive tubercle	33	6.3	14	2.0	47	3.7
1. Minimal	23	4.4	12	1.8	35	2.8
2. Moderately advanced	7	1.3	2	0.3	9	0.7
3. Far advanced	3	0.6	—	—	3	0.2
Pleural involvement	2	0.4	—	—	2	0.2

1947 :

The hospital population had still further risen to 1,274 (530 M. and 744 F.) ; 1,249, or 98 per cent., were examined radiologically (526 M., 99.2 per cent., and 723 F., 97 per cent.) ; 33, or 2.6 per cent. of the total population, showed evidence of active phthisis (21 M., 4 per cent., and 12 F., 1.6 per cent.) ; 4 new cases were discovered amongst the residents (3 M., 1 F.) ; 10 cases of new disease were amongst new admissions (6 M., 4 F.) ; 4 male cases graded inactive were now considered active ; 6 cases (5 M., 1 F.) previously considered active were now graded as inactive, having shown no radiological change over a period of three years ; 3 active cases (2 M., 1 F.) died during the year of tuberculosis ; 2 inactive cases (1 M., 1 F.) died or was discharged. Pleural involvement was evident in 2 patients, as last year ; 3 female patients previously under observation were now considered to be non-tuberculous.

TABLE IV.—*Radiographic Survey, 1947.*

1947.	Males.		Females.		Total.	
	Number.	%.	Number.	%.	Number.	%.
Patients in hospital . . .	530	—	744	—	1274	—
" X-rayed . . .	526	99·2	723	97·0	1249	98·0
" not X-rayed . . .	4	0·8	21	3·0	25	2·0
Active tubercle . . .	21	4·0	12	1·6	33	2·6
1. Minimal . . .	8	1·5	3	0·4	11	0·9
2. Moderately advanced . . .	8	1·5	6	0·8	14	1·1
3. Far advanced . . .	5	0·9	3	0·4	8	0·6
Inactive tubercle (under observation) . . .	20	3·8	7	0·9	27	2·1
Pleural involvement . . .	2	0·4	—	—	2	0·2

1948 :

The hospital population had been swollen to 1,415 by the opening of Barrow Hospital (597 M., 818 F.) ; 1,383, or 97·7 per cent. were examined radiologically. Evidence of active tubercle was present in 40 patients (2·8 per cent.) (26 M., 4·4 per cent., and 14 F., 1·7 per cent.). There were 4 new cases discovered amongst the hospital population, 2 M. and 2 F. There were 7 new cases amongst new admissions, 6 M. and 1 F. ; 5 cases considered inactive were now graded as active, 4 M. and 1 F., and 5 patients, 4 M. and 1 F., previously under treatment for active phthisis were transferred to the "Inactive" category. 5 patients, 4 M., 1 F., died from tubercle during the year, and 1 case of active phthisis died from other causes. One female patient with active phthisis was discharged during the year.

TABLE V.—*Radiographic Survey, 1948.*

1948.	Males.		Females.		Total.	
	Number.	%.	Number.	%.	Number.	%.
Patients in hospital . . .	597	—	818	—	1415	—
" X-rayed . . .	592	99·2	791	96·7	1383	97·7
" not X-rayed . . .	5	0·8	27	3·3	32	2·3
Active tubercle . . .	26	4·4	14	1·7	40	2·8
1. Minimal . . .	9	1·5	6	0·7	15	1·1
2. Moderately advanced . . .	8	1·3	5	0·6	13	0·9
3. Far advanced . . .	9	1·5	3	0·4	12	0·8
Inactive tubercle (under observation) . . .	24	4·0	11	1·3	35	2·5
Pleural involvement . . .	1	0·2	—	—	1	0·1

DISCUSSION.

The increase of disease amongst hospital residents in 1945 may represent a late occurrence of the war-time increase in tuberculosis reported in the M.R.C. Report on tubercle in war-time, 1942. The factors incriminated such as overcrowding and war-time dietary have not appreciably improved. The black-out does not apply but the ventilation of old grossly overcrowded buildings

is unsatisfactory. Five of the male patients, newly discovered, and 3 of those showing signs of activity previously considered inactive came from the same ward as did the male case in 1946, 2 male cases in 1947 and 1 male in 1948. This ward contains 112 patients and provides accommodation for deteriorated chronic psychotics. In such conditions of overcrowding, diet cannot be adequately supervised and ventilation is unsatisfactory. The number of beds available for the treatment and observation of tuberculosis is inadequate and unsatisfactorily situated; it is not possible to set aside complete wards for this purpose. Hence, patients considered inactive and falling into the mental category served by this large ward were transferred back there into precisely the same conditions as those in which they fell ill. We consider that rather than distribute cases considered inactive to such large units, they should be kept under supervision to prevent relapse. In order to keep these patients under better supervision, we have had to make use of our infirmary ward and to move this ward elsewhere, a solution which has further complicated the bed problem.

The total admissions in the B.M.H., which was 448 in 1945, rose to 588 in 1946, to 659 in 1947 and to 1,002 in 1948. It continues to rise. The tuberculosis question, therefore, increases in importance as a psychiatric and public health problem.

The number of new cases brought to light in the 1945 Survey, and the number of patients who died of tubercle not evident at mass radiography should place one on one's guard against neglecting other methods of diagnosis. Whether the "new" tubercle developed during the year or not, mass radiography represents an invaluable aid in diagnosis. Its limitations are recognized by its advocates; it should not lull one into a sense of false security. The 1947 miniature films of the patients newly reported, were all reviewed, and in one film it was possible in the light of subsequent pictures to say that there was a small lesion. Other routine methods of diagnosis have also been utilized—stethoscopic examination, 3-monthly weight charts, B.S.R., pulse, temperature, respiration and examination of the lungs on large films after all illnesses referable to the chest. Routine X-ray of all new admissions, which has been adopted since May, 1947, is a most important adjunct to early diagnosis and control. This is not possible unless there is an X-ray department in the hospital.

Criteria of activity have offered the same difficulties as heretofore. After initial discovery of radiological lesions, physical examination, sputum, B.S.R. and other clinical signs may help. Serial X-rays, however, are the most valuable guide. As an index of inactivity we have adopted the absence of radiological change over a period of at least two years, and preferably three years.

INCIDENCE.

Amongst male patients the incidence of active disease remains consistently higher than amongst females. This fact was commented on in my previous paper. Alstrom, Gentz and Lindblom (1949) have reported similarly.

TABLE VI.—*Incidence from Year to Year Compared to Two Recently Published Surveys.*

Active pulmonary tubercle.	Males.		Females.		Total.	
	Number.	%.	Number.	%.	Number.	%.
Bristol Mental Hospital :						
1944	13	2·4	4	0·6	17	1·4
1945	29	5·7	9	1·3	38	3·1
1946	20	3·8	11	1·5	31	2·5
1947	21	4·0	12	1·6	33	2·6
1948	26	4·4	14	1·7	40	2·8
Alstrom, Gentz and Lind-						
blom (1949)	50	6·0	38	4·6	88	5·3
Lambiotte, Washington and						
Bozalis (1949)	100	5·6 to	..	..	..	5·6 to
		6·2				6·2

Alstrom *et al.* (1949) quote Blomquist (1936) whose figures in the Lellhagen Hospital in Goteburg were 9·25 per cent. of 919 long-stay patients and 4·99 per cent. of 941 patients recently hospitalized ; and Malmros and Wessel (1937) in the Saint-Lars Hospital in Lund 5·8 per cent. active disease amongst 1,060 patients.

INCIDENCE AMONGST NEW ADMISSIONS.

The incidence of active pulmonary tuberculosis amongst new admissions in 1945 and 1946 was appreciable in spite of inadequate methods of diagnosis. It is interesting that the figures should be higher during 1947 and 1948, when routine films of all admissions were taken. The admission rate during these years had risen greatly.

TABLE VII.—*New Cases Diagnosed Amongst New Admissions.*

Year.	Males.		Females.		Total.	
	Number.	%.	Number.	%.	Number.	%.
1945	2	1·0	1	0·4	3	0·7
1946 . . . . .	..	..	1	0·3	1	0·2
1947	6	2·3	4	1·5	10	1·5
1948	6	1·4	1	0·2	7	0·7

INCIDENCE AMONGST " RESIDENT " HOSPITAL POPULATION.

The incidence amongst hospital " residents " has shown a yearly decline.

TABLE VIII.—*New Cases Amongst Hospital Population.*

Year.	Males.		Females.		Total.	
	Number.	%.	Number.	%.	Number.	%.
1945	10	1·9	2	0·3	12	1·0
1946	1	0·2	4	0·6	5	0·4
1947	3	0·6	1	0·1	4	0·3
1948	2	0·3	2	0·2	4	0·3

Relation of length of hospitalization to tuberculosis has not been tabulated. Routine radiological examination of chest on admission will give a better source of the required information. There is no doubt that a considerable number develop tubercle in hospital.

Comparison between the number of new cases occurring amongst new admissions and new cases diagnosed amongst hospital residents (Table VII and Table VIII) is valid for the year 1948, the only complete year where routine admission films were taken. This year's figures and those of 1947 tend to agree with the findings of Blalock and Funkhouser (1943), that the incidence of tubercle amongst consecutive admissions is greater than in the preliminary survey.

Recently Alstrom, Gentz and Lindblom (1949) have reported that tubercle is more frequent amongst patients who have been hospitalized for a long time—3·1 per cent. of schizophrenics in the 0-5 year group and over 7 per cent. of those in hospital over 5 years. They assume from this that the incidence is higher amongst the hospital population than amongst new admissions. Lambiotte, Washington and Bozalis (1949) maintain that the majority of patients probably contract the infection as well as the disease after their admission. Neither of these groups of workers has reported routine radiological examination of admissions coupled with careful methods of control.

Mortality—expressed as a percentage of the total deaths in hospital.

TABLE IX.—*Tuberculosis Mortality Rate.*

Average for 3 pre-war years.	Average for first 5 years of war.	1944.	1945	1946.	1947.	1948.
11·6%	10%	8·9%	8·7%	7·0%	3·1%	6·0%

The comparable figure for mental hospitals in England and Wales in 1948 was 7·5 per cent (Board of Control Annual Report to the Lord Chancellor, 1948).

It is significant how the tuberculosis death rate has fallen, even with a falling death rate in the hospital. Two of the 3 cases who died of the disease during 1947 imported their disease into hospital and died of it during the year, as did 3 of the 5 patients who died in 1948. In this last year the total number of deaths in hospital was the lowest on record, so that the figure of 6 per cent. gives an exaggerated impression of the number who died of the disease. Only one hospital resident died of tubercle in 1947 and two in 1948.

The classification of patients according to their mental illnesses has not again been attempted. Alstrom (1942) has confirmed that tuberculosis mortality is equal amongst schizophrenics and non-schizophrenics.

TREATMENT.

Under prevailing accommodation conditions it has not been possible to treat patients on strictly sanatorium lines. We agree with Lambiotte *et al.* (1949) that most patients are amenable to active measures of treatment and

we have not had to stop such treatment because of mental reasons. We have found that with early diagnosis, conservative rather than active treatment is usually indicated. The question of fitness for active physical psychiatric treatment, such as E.C.T., must always depend on the urgency of the psychiatric picture. Definitely inactive tubercle can be treated with these measures with fair safety. Active pulmonary cases should not be so treated unless the psychiatric picture is urgent and there are definite indications that the patient will benefit by such treatment. Curare is probably indicated in these cases.

The most urgent matter at present is that of accommodation. This remains unsatisfactory. In a previous paper I considered that the difficulties in regionalizing Mental Hospital Tuberculosis Services were too great to warrant discussion. Although building has become no easier, the regionalizing of the hospital services has made such a solution feasible. We consider that this is the only way in which the problem can be satisfactorily dealt with. If tackled piecemeal each hospital can at best provide a moderate service. Buildings at present available are almost invariably unsuitable and the cost of building separate units in each hospital or of converting available accommodation will be greater than the building of a new, up-to-date modern sanatorium which takes into consideration the especial needs of psychiatric cases. We would propose separate bed-space for the more disturbed type of case, both for treatment and convalescence, with separate living, eating and occupation therapy arrangements for these patients. The problem of the number of beds which should be available is difficult. Hamilton and Kidner (1925) consider that not less than 5 per cent. of the total mental hospital beds should be available for the treatment of tuberculosis. Klopp (1927) places the proportion at about 5 per cent. We consider that the number of sanatorium beds available should be in the region of 2.5 per cent. of the total hospital population and should be planned in the ratio of 2 males to 1 female. The optimum size should be about 150 patients and medical, nursing, radiological and accessory services should be of the highest standard. The Visiting Chest Consultant should have a knowledge of the special problems involved in mental hospital practice. Arrangements for the training of suitable personnel at sanatoria could easily be arranged.

Leonidoff (1938) disagrees with this method of dealing with the problem because of the tendency that there would be to send every suspected or arrested case to the unit with resultant overcrowding without accomplishing its purpose. He also mentions the factor of distance, which is a less valid reason with us than in the Hudson River State Hospital. Admission and discharge would, of course, have to be carefully controlled, but with a well-organized service this should not be impossible.

Klopp (1927) and Wicks (1940) agree with the policy of centralization. The latter author says that those in charge of the hospital at Brampton "are convinced that centralization of such treatment facilities (incorporating sanatorium and mental hospital features) offers the only satisfactory solution to the problem."

Without such a central tuberculosis mental hospital in the northern half of the south-western region of England alone small units would be required

at each of the five hospitals in the region. In England and Wales 99 such units would be necessary. It is unlikely that each would be adequately staffed and equipped.

STAFF.

Yearly mass radiography facilities have been available to all the hospital staff—100 per cent. of the nursing staff have consistently presented themselves for examination. Nurses on wards accommodating tuberculous patients have been encouraged to present themselves for X-ray 3-monthly. In 1945 one physician and one female nurse developed tubercle; in 1946 one male nurse and in 1947 one male and one female nurse. In a Memorandum on the Supervision of Nurses' Health (1945) it is pointed out that nurses in general hospitals are not so well safeguarded against risk of infection as are nurses working in sanatoria. This applies equally to nurses in mental hospitals. A central mental hospital sanatorium with staff trained in sanatorium practice offers the best safeguard to nurses. The financial privileges offered to nurses in charge of tuberculous patients should then be payable. The value of the proposed scheme for B.C.G. Inoculation of Hospital Nurses (1949) remains to be proven.

SUMMARY.

1. The results of five annual mass radiography surveys are reported.
2. The high incidence amongst new admissions has been commented on.
3. A fall in hospital mortality from tuberculosis is noted.
4. The question of the advisability of centralizing mental hospital tuberculosis services is discussed.
5. A brief note and comment on tuberculosis amongst hospital staff is added.

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