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WARTIME INCIDENCE OF AND MORTALITY FROM RESPIRATORY TUBERCULOSIS

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It is now possible to reach certain tentative conclusions about the sources of the increase in deaths from respiratory tuberculosis which occurred in 1940-1, although some years must elapse before statistical data are available to complete the picture. It may indeed transpire that other disturbing factors become so complex that we must remain content with such an incomplete answer as can now be given.

Until recently it was difficult to link together the statistics of notifications and deaths in order to estimate the rate at which new cases of respiratory tuberculosis subsequently proved fatal. One of us (Lewis-Faning, 1943) has now published some data of the durations between notification and death for patients who died of the disease in the County of Middlesex in the periods 1937-9 and 1940-1, by means of which the rates of dying in the immediate pre-war period can be estimated. Another helpful analysis of the survival rates of patients in whom tubercle bacilli were found has been published by B. C. Thompson (1943). In the notes which follow we have endeavoured to draw from the data at present available such conclusions as seem possible about incidence and mortality from respiratory tuberculosis during the first four years of the war. Throughout the discussion the term "notifications" means the formal notifications during life, and excludes the deaths of persons who had not previously been notified and transfers from one area to another.

declined continuously from 1925 to 1939, except in two of the "influenza" years, 1931 and 1937. Deaths declined less regularly, interruptions occurring in 1924, 1927, 1929, 1931, 1933, and 1937, when influenza was epidemic. The ratio of deaths to the notifications of the year preceding showed no consistent change between 1922 and 1939, ranging between 0.46 and 0.54. With the ratio based upon a simple weighted summation of the notifications in the current and three preceding years the variation was still smaller (0.473 to 0.527 in the period from 1922 to 1939). It is evident from this that more reliance can be placed on the statistics from 1922 onwards than was the case in the early days of tuberculosis notification, and that they are reasonably consistent with those of deaths. A sudden increase in these ratios occurred in 1940, to 0.61 and 0.59 respectively, followed in 1942 by a fall below the normal range of values, to 0.47 and 0.48, somewhat greater than that which occurred in the years following influenza epidemics. A further fall in the ratios in 1943 is indicated by the provisional figures. It may be that the ratios will not return to the pre-war level owing to the effects of selection for national service on the one hand and radiography on the other in bringing slighter cases into the notification net.

The Middlesex deaths from respiratory tuberculosis in 1937-9 of persons who had been notified at some time and were known to the local authority were found to be distributed according to duration since notification as follows: Less than 1 year, 42%; 1 year but less than 5, 45%; 5 years but less than 10, 10½%; 10 years and over, 2½%. Assuming the 60,443 deaths of notified persons in England and Wales in those years to have had the same proportionate distribution, they can be related to the numbers of notifications from which they were derived if we also make the simplifying assumption that the durations of 10 years and over were all included within the range 10-15 years. The latter assumption cannot introduce an appreciable error owing to the small frequencies after 15 years and the form of the frequency curve. The results of this calculation are shown in Table II.

TABLE I.—New Cases and Deaths, 1923 to 1943, England and Wales

Year	No. of Notifications	No. of Deaths of Notified Persons	Ratio of Deaths to New Cases	
			Of Year Preceding	Of Current and 3 Preceding Years†
1922	55,664	29,600*	0.50	0.492
1923	53,387	28,000†	0.50	0.490
1924	55,040	28,500†	0.52	0.515
1925	56,626	28,250†	0.51	0.512
1926	55,475	26,250†	0.46	0.473
1927	53,389	27,100†	0.49	0.491
1928	52,510	26,000†	0.49	0.479
1929	52,031	27,176	0.52	0.511
1930	49,187	25,769	0.50	0.492
1931	49,506	25,888	0.53	0.513
1932	46,579	24,240	0.49	0.491
1933	44,482	24,349	0.52	0.515
1934	43,034	22,633	0.51	0.496
1935	39,635	21,707	0.50	0.501
1936	39,336	20,779	0.52	0.504
1937	39,630	21,177	0.54	0.527
1938	37,879	19,473	0.49	0.496
1939	34,930	19,793	0.52	0.522
1940 1st half	19,470	11,483	0.61	0.588
2nd	16,681			
1941 1st	20,451	20,850	0.58	0.565
2nd	19,048			
1942 1st	21,002	18,465	0.47	0.484
2nd	19,627			
1943 1st	22,330*	18,750*	0.46*	0.470*
2nd	20,170*			

TABLE II.—Rates of Dying from Respiratory Tuberculosis after Notification in Four Duration Groups (1937-9 data)

Years from Notification	Deaths of Notified Persons, 1937-9		No. of Notified Persons from Whom Derived†	Death Rates per 100 Originally Notified	No. Dead of Respiratory Tuberculosis at End of Interval out of 100
	Middlesex*	England and Wales			
0	925	25,402	114,642	22.16	22.2
1	987	27,105	493,227	5.50	44.2
5	234	6,425	736,299	0.87	48.6
10-15 ..	55	1,511	820,068	0.18	49.5
	2,201	60,443			

* Provisional estimates.

† Estimated as 90% of total deaths, the proportion in 1929-33.

‡ (Current year + twice preceding year + sum of 2nd and 3rd years back).

Table I shows the numbers of notifications and of deaths of notified persons in England and Wales in each year 1923 to 1942, and provisional figures for 1943. The notifications

* Comprises deaths of all patients known to the local authority during life.

† At 0-1 year: ½ (1936) + 1937 + 1938 + ½ (1939).

‡ At 1-5 years: ¼ (1932 + 1938) + ⅓ (1933 + 1937) + ⅓ (1934 + 1936) + 3 (1935).

At 5-10 years: ¼ (1927 + 1934) + ⅓ (1928 + 1933) + ⅓ (1929 + 1932) + 3 (1930 + 1931).

At 10-15 years: ¼ (1922 + 1929) + ⅓ (1923 + 1928) + ⅓ (1924 + 1927) + 3 (1925 + 1926).

Fitting a smooth curve to the numbers of notified persons dead of the disease at the end of 1, 5, 10, and 15 years, the "trial" rates in column 1 of Table III were obtained. These rates were then applied to each year separately, as in Table IV, and the resulting deaths in 1937, 1938, and 1939 were aggregated at the four age groups and compared with the numbers required by the Middlesex proportions. The curve was then slightly adjusted so as to produce the exact aggregates required in 1937-9, the adjusted rates being as shown in columns 2 and 4.

TABLE III.—Rates of Dying from Respiratory Tuberculosis in Each Year After Notification (1937-9 data)

Interval After Notification (years)	Estimated No. Dead of the Disease at End of Interval Specified out of 100			No. Expected to Die of the Disease during Each Successive Year out of 100 originally Notified
	England and Wales		Middlesex	
	(1) Trial	(2) Adjusted	(3) Adjusted	(4) England and Wales
0- ..	22.2	22.2	18.5	22.2
1- ..	31.2	31.2	26.5	9.0
2- ..	37.2	37.5	32.1	6.3
3- ..	41.5	41.8	35.9	4.3
4- ..	44.2	44.5	38.3	2.7
5- ..	45.7	46.0	39.8	1.5
6- ..	46.8	47.1	40.9	1.1
7- ..	47.6	47.9	41.7	0.8
8- ..	48.2	48.5	42.3	0.6
9- ..	48.6	48.9	42.7	0.4
10- ..	48.9	49.2	43.0	0.3
11- ..	49.1	49.4	43.2	0.2
12- ..	49.3	49.6	43.4	0.2
13- ..	49.4	49.8	43.5	0.2
14- ..	49.5	49.9	43.6	0.1

The rates indicate that in the pre-war period about 22% of persons with respiratory tuberculosis died of the disease within a year of being notified, 44½% within 5 years, and 49% within 10 years; and that 50% died eventually of the disease. With this may be compared the survival rate of about one-seventh for sputum-positive patients after 10 years as found by Thompson (1943).

As a check on this result the same process was carried out for the County of Middlesex. In 1938-9 deaths of notified persons formed 91% of the total deaths of residents from respiratory tuberculosis, this being the same proportion as in England and Wales; it was assumed, therefore, that in the period 1922-37 the national proportions applied also to the county. Since the county population was growing rapidly in that period the notified persons from whom the deaths in 1937-9 were derived had not all been notified within the county, and it was assumed that the immigrant population had experienced in each year the notification rates of England and Wales less Middlesex. The result of this calculation is shown in column 3 of Table III. As might be expected in this southern county, whose standardized death rates in 1931-5 were only 85% of the national rate at ages 15-35 and 87% at ages 35 and over (Registrar-General, 1935), the rates of dying after notification were consistently lower than for England and Wales by about one-seventh, though the form of the two curves was very similar. Within 5 years 38% died of the disease in Middlesex compared with 44½%; and 43½% died of it eventually instead of 50%. It seems probable from this comparison that local variations in mortality are largely due to fatality differences and not necessarily to differential incidence. If the data were available for similar calculations in Wales, Liverpool, Tyne-side, and other areas of high standardized mortality, the resulting fatality rates would no doubt be found to be greater than the national figures, which represent averages for the whole country.

On the assumption that the deaths which occurred in England and Wales in each year 1935 to 1942 were related to the numbers notified in the successive periods mid-1925 to mid-1926, etc., in accordance with the adjusted rates of dying in Table III, the expected deaths would have compared with the numbers of deaths of notified persons actually registered as shown in Table IV. Provisional data are also given for 1943.

The last line but one in the table shows that there was an excess of about 440 deaths in 1937 over the expected number, followed by a deficiency of about 770 in 1938, due in all probability to the earlier deaths of many tuberculous persons brought about by the "influenza" epidemic at the beginning

TABLE IV.—Estimated Numbers of Deaths of Notified Persons from Respiratory Tuberculosis expected at each Duration and of all Durations, 1935 to 1943, compared with Total Annual Deaths Registered

Interval After Notification (years)	No. of Deaths (in Hundreds) expected from Pre-war ^a Rates of Dying, in								
	1935	1936	1937	1938	1939	1940	1941	1942	1943
0- ..	91.8	87.4	87.7	86.0	80.8	82.0	82.4	88.9	92.0
1- ..	39.4	37.2	35.4	35.5	34.9	32.8	33.2	33.4	36.0
2- ..	28.7	27.6	26.0	24.8	24.9	24.4	22.9	23.3	23.4
3- ..	20.7	19.6	18.8	17.8	16.9	17.0	16.7	15.7	15.9
4- ..	13.3	13.0	12.3	11.8	11.2	10.6	10.7	10.5	9.8
5- ..	7.6	7.4	7.2	6.8	6.6	6.2	5.9	5.9	5.8
6- ..	5.7	5.6	5.4	5.3	5.0	4.8	4.5	4.3	4.3
7- ..	4.2	4.2	4.0	3.9	3.8	3.6	3.5	3.3	3.2
8- ..	3.3	3.2	3.1	3.0	3.0	2.9	2.7	2.6	2.5
9- ..	2.2	2.2	2.1	2.1	2.0	2.0	1.9	1.8	1.7
10- ..	1.7	1.7	1.6	1.6	1.6	1.5	1.5	1.4	1.4
11- ..	1.1	1.1	1.1	1.1	1.1	1.0	1.1	1.0	1.0
12- ..	1.1	1.1	1.1	1.1	1.1	1.1	1.0	1.0	1.0
13- ..	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.0	1.0
14- ..	0.6	0.6	0.5	0.5	0.6	0.6	0.5	0.5	0.5
Total deaths expected from notifications..	222.5	213.0	207.4	202.4	194.6	191.6	189.6	194.6	199.5
Actual deaths of notified persons..	217.1	207.8	211.8	194.7	197.9	214.8	208.5	184.6	(187.5)
Excess or deficiency..	-5.4	-5.2	+4.4	-7.7	+3.3	+23.2	+18.9	-10.0	(-12.0)
Deaths of unnotified persons..	21.3	22.4	20.4	18.1	17.5	21.8	27.8	25.2	(26.0)

of 1937. Had there been no war and had notifications continued to fall at the same rate as between 1933-5 and 1937-9, the numbers in successive years 1940 to 1943 would have been 35.0, 33.8, 32.6, and 31.4 thousands instead of the numbers shown in Table I. The resulting deaths would then have been as follows, instead of the expected numbers shown in Table IV:

Interval after Notification	Deaths (in Hundreds) Expected if Downward Trend of Notifications had Continued.			
	1940	1941	1942	1943
0- ..	77.6	76.4	73.7	71.0
1- ..	32.8	31.5	31.0	29.9
2- ..	24.4	22.9	22.0	21.7
3- ..	17.0	16.7	15.7	15.0
4- ..	10.6	10.7	10.5	9.8
5- ..	19.5	18.5	17.9	17.5
10 and over ..	5.3	5.2	4.9	4.9
Total ..	187.2	181.9	175.7	169.8
Deficiency below deaths expected from actual notifications ..	-4.4	-7.7	-18.9	-29.7

This shows that if the rate of dying from the disease after notification remained unchanged, the extra incidence of respiratory tuberculosis brought about by war conditions must have resulted in about 1,200 deaths in 1940-1, about 1,900 in 1942, and about 3,000 in 1943, a total of 6,000 in excess of the number which would have resulted had the pre-war trend of notifications continued undisturbed. The increased fatality during 1940-1 would not affect this number considerably, since the bulk of the increase in incidence occurred later. While it is probably true that part of the increase in notifications has been merely due to a roping in of people suffering from the disease who would in normal times have escaped notification, there has been no compensating fall in the deaths of unnotified persons during the war, but rather a rise, as shown at the foot of Table IV. The reason for this may be that many immigrants have come into England and Wales from countries where tuberculosis incidence is high, and also that excessive movement of the population from place to place has led to more people escaping notification.

In addition to the 6,000 deaths attributable to excessive wartime incidence of new cases, Table IV shows that an excess of deaths over the numbers expected from the actual notifications occurred in 1940-1 amounting to 4,210, and this was followed by a deficiency in 1942-3 amounting to 2,200. The

only satisfactory explanation of this happening (which was anticipated, since it has been seen before in lesser degree in years with influenza epidemics and cold winters) is that the rate of dying of patients already notified was temporarily enhanced by the hard conditions of 1940-1. By this shortening of the normal survival period at least 2,200 notified patients apparently died of the disease during 1940-1 who under normal conditions would have not died of it until 1942-3. Probably the number was several hundreds greater than this, for tuberculosis deaths in the December quarter of 1943 were considerably increased by the influenza epidemic of November-December, thereby neutralizing part of the deficiency which would otherwise have been apparent for 1943 as a whole. That a considerable temporary increase in the short-term fatality rate did occur in 1940-1 and that it was followed by a compensating fall below the ordinary level in 1942-3 is shown by the last column of Table I. From 0.51 in 1936-9 the ratio increased to 0.59 in 1940 and 0.56 in 1941, falling to 0.48 in 1942 and 0.47 in 1943.

In the work on Middlesex deaths by one of us (Lewis-Faning, 1943) it was found that in 1940-1 1,610 deaths from respiratory tuberculosis of notified persons were distributed according to the interval since notification as follows: 701 under 1 year, 665 after 1 but less than 5 years, and 244 after 5 or more years. If all the deaths of notified persons in England and Wales during 1940-1 were similarly distributed the composition of the excess of 4,210 deaths according to interval since notification must have been as shown below.

	Under 1 Year	1-4 Years	5 Years or more	All Durations
Actual deaths 1940-1 in Middlesex proportions	18,430	17,480	6,420	42,330
Expected deaths (Table IV)	16,440	16,830	4,850	38,120
Excess over expectation	1,990	650	1,570	4,210

These figures are quite consistent with the supposition that some 2,500 patients died in 1940-1 instead of in 1942-3. Table IV shows that there must have been at least 10,000 patients notified less than a year living in 1940-1 who were expected to die in 1942-3, and 1,990 of them might well have died earlier; similarly there must have been at least 7,000 patients notified 1 to 4 years living in the first period who were expected to die in the second, and 650 of them might have died earlier as a result of the severities of 1940-1. This would more than account for the transfer of 2,200 deaths; and the rest of the increase could be explained by breakdown of patients in whom the disease had become quiescent and who in normal conditions would not have died of the disease at all, or not in this country. It is not to be supposed that in the disturbances of 1940-1 the Middlesex proportions were exactly representative of those in the country as a whole and that what happened was precisely as suggested above. The purpose of quoting the Middlesex 1940-1 data is mainly to correct an impression given by the paper in which they were analysed that they seemed inconsistent with the view that any considerable part of the increase in tuberculosis deaths in the early part of the war was attributable to shortening of life of patients who already had the disease. One would hesitate to proceed further than Table III in applying the method of analysis used here to those data, owing to the disturbed state of residence of the population of that county in 1940-1. But this more comprehensive analysis, based as it is on data for the whole country (where the objection does not apply) suggests that about 2,500 of the deaths in 1940-1, or three-quarters of the excess over the 1938-9 total, were accounted for by shortened duration.

Summary

In the period 1923-39, despite the rapid fall in the numbers of notifications of and deaths from respiratory tuberculosis, the average expectation, for a person just notified, of eventually dying of the disease remained remarkably constant at approximately one-half in England and Wales as a whole.

Immediately before the war the average expectation of dying within a year of notification was about 22%, and within 5 years about 44%. For Middlesex County the curve showing the rate of dying after notification was similar to that for the country as a whole, but at a lower level—43% eventually dying of the disease

instead of 50%. This lower fatality corresponds with the lower standardized death rates in the county as found for 1931-5.

Had the incidence of new cases continued to decline as in the pre-war period, instead of increasing, some 6,000 fewer deaths would have occurred during 1940-3 under normal conditions.

Owing to a temporary rise in short-term fatality during the severe conditions of 1940-1 some 2,500 notified patients probably died in those years instead of in 1942-3. Another 1,500 notified persons and about 1,000 unnotified persons who in normal circumstances would not have died of the disease at all in this country must have died of respiratory tuberculosis during 1940-1.

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THE RELATION OF DERMATOLOGY TO PSYCHIATRY*

BY

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The expansion of psychiatry in the Army has provided opportunities for liaison with other branches of medicine such as have never been available before, and, under the controlled and standardized conditions of Army life, the importance of the personality factor in all diseases is being more and more appreciated. It was therefore with great pleasure that I accepted an invitation to present the dermatologist's point of view to a gathering of psychiatrists; nor is this inappropriate, as, embryologically speaking at least, psychiatry is an offspring of dermatology, and a fundamental association persists into adult life.

The Hypersensitive Subject

L. Brocq divided skin conditions into two groups—skin diseases proper and skin reactions. The former usually have a specific aetiological agent which produces a characteristic lesion in anyone affected. Thus the *Spirochaeta pallida* causes the same kind of chancre in any uninfected person, and prolonged exposure to spinning-oil a classical epithelioma. When these lesions are treated adequately the condition is finished with and there is no increased likelihood of a fresh attack. In contradistinction to this, a skin "reaction" depends for its characteristic type on the make-up of the patient and not on the specificity of the external factor. Whealing may be produced in one patient by tinned salmon, in others by getting warm or cold or rubbing the skin, and in another because he is upset psychologically, but most people do not develop wheals at all under normal conditions. Here the personality of the patient is all-important; only if he is made in a special way will he produce a wheal with his characteristic stimulus, otherwise it will have no effect at all. A reaction may be simple, like flushing, or more complicated, like eczema or psoriasis, but all behave in essentially the same way. Thus one patient may develop psoriasis whenever he has a sore throat; another if his skin is injured by a scratch; another whenever he undergoes a period of stress, as instanced by one man I recall whose rash recurred every time he took a medical examination. The eczema patient similarly reacts badly to adverse circumstances. Soon after quitting the protection of the womb and meeting the troubles of the world for the first time, he develops infantile eczema. He may adjust himself to his environment, but the rash is likely to return at puberty, at the menopause, and in old age, or at any other time when things go against him. Just as some people react to stress with indigestion, headache, or asthma, so this patient reacts with an attack of eczema and his fellow patient with psoriasis or urticaria; they do so because they are made that way. It is an old gibe that "it is nice to be a dermatologist, because your patients never die, they never get you up in the night, and they never get better." This latter is only too true in many instances, because you can't cure a man of his own personality.

* Based on a talk given to a meeting of psychiatrists.