

MEDICAL PRACTICE

Clinical Progress

Tuberculosis—Epidemiology in England and Wales

V. H. SPRINGETT

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The substantial reduction in tuberculosis in England and Wales during the past 25 years has given rise to potentially dangerous misconceptions about the present level of tuberculosis in the community. Some clinicians now regard tuberculosis as rare in this country, but with 11,280 notifications¹ in 1970 in England tuberculosis is clearly in a different class from smallpox (no cases), diphtheria (22 cases)—or even typhoid fever (159 notifications). Indeed, of the notifiable infectious diseases only dysentery (10,765), infective jaundice (18,383), measles (289,893), and whooping cough (16,244) are recorded as exceeding tuberculosis in number for the year 1970.¹ New cases of influenza and gonorrhoea, which are not formally notifiable, also exceeded tuberculosis notifications.

The 1,465 deaths attributed to tuberculosis in 1970 in England not only greatly exceed those due to any other notifiable infectious disease, but also exceed the total of deaths attributed to all other notifiable infectious diseases—though there were more deaths from influenza in that year.

An unjustified belief that a disease is rare leads to delay in diagnosis, with a consequent delay in the start of treatment and hence prolongation of the period of infectivity. Hence it remains important for all doctors to be aware that tuberculosis is still occurring in Britain with some frequency and that as the disease has become less frequent the epidemiological pattern has changed.

Notifications

Notification rates for respiratory tuberculosis have been declining in all age groups of both sexes for the past 20 years (Table I). The decline has been greatest in young adults, among whom the highest notification rates used to occur; there is some evidence that the rate of decline has been slowed in young men in the past 10 years.² This is probably associated with the high

TABLE I—Respiratory Tuberculosis; Mean Annual Notification Rates per 100,000 For Quinquennia 1945-9 to 1965-9, England and Wales

	Age groups							All ages
	0-4	5-14	15-24	25-34	35-44	45-64	65+	
<i>Males</i>								
1945-49	39	48	189	163	123	140	59	118
1950-54	50	47	158	143	112	135	77	110
1955-59	27	25	100	93	88	113	86	82
1960-64	19	14	45	58	58	76	69	51
1965-69	12	10	25	35	35	48	51	32
<i>Females</i>								
1945-49	35	50	231	147	68	35	17	83
1950-54	45	51	214	143	69	33	17	78
1955-59	28	28	118	90	53	28	17	49
1960-64	17	16	45	45	31	19	13	27
1965-69	11	10	21	25	21	13	10	15

notification rates in immigrants, who are, of course, predominantly young adults. The decline in notification rates has been less in older age groups, especially in men. The present position therefore is that tuberculosis is most commonly found in older people, especially men, who have always lived in this country, and in immigrants, especially from Asia, of any age.

Tuberculosis in immigrants differs in epidemiological pattern from tuberculosis in persons who have always lived in Britain. In the indigenous inhabitants of England and Wales about 10% of all notifications are of non-respiratory forms of tuberculosis, but among immigrants this proportion is 30%.³ Non-respiratory tuberculosis in immigrants may present in almost any tissue, or as a pyrexial illness with no localizing feature. Tuberculosis must therefore be considered in the differential diagnosis of any illness lasting more than a few days in an immigrant from Asia.

While the age and sex distribution of tuberculosis has shown great changes as its frequency has fallen, the social and environmental factors with which tuberculosis is associated have not changed. Thus tuberculosis is still likely to be found among the contacts of newly diagnosed cases of tuberculosis, though it is less certain that there is now a persisting high risk among contacts provided the source case is adequately treated. The association of tuberculosis with poor environmental conditions is shown by the frequency of its occurrence in older men living alone in inferior accommodation and taking an inadequate

diet; there is an association with alcoholism and with cigarette smoking. These are, however, only general associations and tuberculosis may still occur in any age group or social class.

Mortality

For many decades tuberculosis mortality rates were regarded as the most reliable index of tuberculosis. The introduction of effective chemotherapy has so greatly reduced case fatality that mortality rates are no longer so useful as an index of the general situation; the number of deaths in younger age groups is now so small that reliable mortality rates cannot be derived. In 1970, 44 deaths from all forms of tuberculosis were recorded for people aged less than 25 years, giving a rate of between 2 and 3 per million persons living in this age group.

Most deaths from tuberculosis now occur in older age groups, and a recent study¹ has shown that the commonest factor leading to a death from tuberculosis is failure to apply generally accepted standard practice. Such failure may occur in relation to diagnosis, because either the patient fails to seek medical advice or the doctor fails to consider tuberculosis as a possible cause of the patient's symptoms.

Treatment failures also occur, again either because of a patient's failure to accept treatment or because of the prescription of inadequate treatment regimens. A very few deaths attributable to the late effects of long-standing tuberculosis must probably still be regarded as unavoidable.

Infection or Tuberculin Index

In 1970 less than 9% of 13 year old schoolchildren tested before B.C.G. vaccination gave a positive response to tuberculin. This is almost certainly an over-estimate, because of the inclusion of low-grade reactions to the Heaf test in some areas, and also because some children previously vaccinated with B.C.G. present for testing in the schools' scheme. The true figure may well be very much less than 9%, but even this is substantially less than the 40.9% recorded tuberculin positive at this age in a national survey in 1949-50,⁵ and this in turn is much less than the few figures available from pre-war studies.

Undoubtedly the risk of infection has fallen greatly, and is continuing to fall. A further assessment of the annual infection risk in this country by an accurate tuberculin survey is urgently required. The importance of precise information on the annual infection risk has been shown by the work of the Tuberculosis Surveillance Research Unit,⁶ mainly on data from the Netherlands. In the latter country the main bulk of tuberculosis now and in the future will occur in people who are already infected. The same is almost certainly true for England and Wales, and this is important in relation to the relative merits of various control measures, especially in assessing the benefit from B.C.G. vaccination on a community basis.

Drug Resistance

On a national scale the incidence of drug-resistant bacilli in newly diagnosed patients with positive sputum has been assessed by similar methods on two occasions;^{7, 8} no significant change in the incidence was found between 1955-6 (4.5%) and 1963 (4.4%). Continuous yearly monitoring in Birmingham has shown⁹ no consistent change in the number of native-born patients excreting resistant bacilli on diagnosis—an average of six such patients per year throughout the 1960's. There has, however, been an appreciable increase in Birmingham in the number of immigrants from Asia found to be excreting resistant bacilli on first diagnosis, from an average of three per year in 1961-3 to 13 per year in 1968-70.

Possibly of greater importance is the number of individuals known to continue to excrete resistant bacilli for a considerable time, say, a year or more. The only national estimate¹⁰ for this is 3,500 in 1960-1; the number of such patients in Birmingham has shown a steady decline from 60 at the end of the 1950's to 14 in 1970, and there has probably been a similar decline throughout the country.

Epidemiological Control Measures

A changing situation requires frequent reassessment of the measures taken for control of the disease. The trend for tuberculosis is undoubtedly downwards, whether measured by infection risk, by notification rate, or by mortality.

The recent withdrawal of mass radiography (i.e., the examination of many symptomless persons not at special risk) is an example of a modification of control methods in a changing situation. As suggested above, the benefit to be derived from general B.C.G. vaccination also needs to be reviewed as the annual infection risk declines. Nevertheless, despite the improvements that have occurred, the current level of tuberculosis (with more than 10,000 cases being notified each year) is by no means satisfactory, and is greater than many doctors realize.

Both for the individual patient and for the control of infection, early diagnosis and prompt initiation of effective chemotherapy are of the greatest importance. Increasingly in all communities prompt diagnosis of patients with symptoms seems to be the most important single measure for effective control. To achieve this objective of early treatment of tuberculosis three things are required: (1) An awareness of the possibility of tuberculosis in the minds of all doctors; (2) ready access to means of confirming or refuting the diagnosis—in practice, easy access to chest radiography for the patients of all doctors; (3) prompt initiation of effective chemotherapy.

If fully used the combination of diagnostic facilities and effective chemotherapy now available in this country could result in tuberculosis becoming truly rare in England and Wales by the end of this century; on present trends there are likely to be a few hundred new notifications of tuberculosis in the year 2000 A.D.