AN EVALUATION OF 1987 TUBERCULOSIS DEATHS IN SINGAPORE

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ABSTRACT

Tuberculosis was responsible for 177 deaths in 1987. This study evaluated the accuracy of tuberculosis death certification by hospital doctors and general practitioners in 111 cases where hospital case-notes were available for verification. It revealed that only 49 cases (44%) died of active tuberculosis, 12 (11%) died of late effects of tuberculosis and 41 (37%) died of causes unrelated to tuberculosis. There was no evidence of tuberculosis in 9 cases. Only 39 cases (56%) of active tuberculosis certified by hospital doctors were correct compared to 10 (24%) certified by general practitioners. Hospital doctors certified 6 out of 9 deaths which had no evidence of tuberculosis. The actual tuberculosis mortality rate was estimated to be between 1.9 and 4.9 per 100, 000 instead of the officially published 6.8 per 100,000 for 1987.

Keywords : Tuberculosis mortality, Death certification

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INTRODUCTION

Tuberculosis mortality in Singapore has declined 84% over the past 3 decades[1], and over the last decade, the rate has fallen at an average of about 7% annually. In 1977, there were 340 reported tuberculosis deaths or 14.7 per 100,000 pupulation. In 1987 the figure was 177 or 6.8 per 100,000[2].

With the advent of effective modern anti-tuberculous chemotherapy, tuberculosis deaths are no longer considered an important indicator of the epidemiological status of the disease. However, the tuberculosis death rate, though falling steadily, is still quite substantial,and the fact that tuberculosis death is still officially ranked among the 10 major causes of death in 1987 warrants a closer look at our tuberculosis death statistics.

The purpose of this study is to evaluate the accuracy of the cause of death on the death certificates where the underlying cause of death was stated as due to tuberculosis.

METHOD

All deaths certified as due to tuberculosis, coded as 010 to 018 according to the 9th Revision of International Diseases and Causes of Death (ICD 1975), which occurred in Singapore during the year 1987 were included in the study. This information was obtained from the Births and Deaths Section of the National Registration Department, Singapore.

Parameters studied included age, sex and ethnic group. Cases were categorised as certified by hospital doctors or general practitioners. The place of death was ascertained as to whether it had occurred at home or in hospital. For those who died at home, the duration of discharge from the last admission was noted. Hospital case notes, where available, were traced in order to establish the actual causes of deaths.

An assessor from among the authors (K W C) was appointed to review the case-notes, X-rays and bacteriological status independently. His decision as to the cause of death in each case was assigned to one of the following categories:

1. active tuberculosis;
2. late effects of tuberculosis, inactive at the time of

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death;
3. causes unrelated to tuberculosis but with active or inactive tuberculosis at the time of death;
4. no evidence of tuberculosis, active or inactive.

RESULTS

A total of 177 cases were certified as tuberculosis deaths in 1987.

Thirty-eight cases certified by the coroner were excluded from the study because most of the medical notes were not available. Of the remaining 139 cases, 70 deaths (50%) which occurred in hospitals were certified by hospital doctors while 69 (50%) who died at home were certified by general practitioners (Table I). These 69 comprised 41 persons who had hospital records, 26 without hospital records, and 2 persons where there were insufficient data.

Table I
Certification of Deaths by Coroner, Hospital Doctors and General Practitioners

Certified by	Deaths	
	No.	(%)
Coroner	38	(21)
Hospital doctor	70	(40)
General Practitioner	69	(39)
Total	177	(100)

Table II shows the analysis of the 111 cases where hospital case-notes were available. Of these 111 cases, 49 cases (44%) died of active tuberculosis, while 12 (11%) died of the late effects of tuberculosis, inactive at the time of death, 41 (37%) died of causes unrelated to tuberculosis and 9 (8%) had no evidence of tuberculosis at all.

Of the 70 cases certified by hospital doctors, 39 (56%) were deaths actually due to tuberculosis as compared to 10 out of 41 deaths (24%) certified by general practitioners.

Eighteen deaths (44%) occurred within one month of discharge from hospital, while 8 (20%) died between the second and fifth month, and another 8 (20%) more than 6 months after discharge. Seven (17%) who were never admitted, had records of hospital outpatient attendance only (Table III).

The sex, ethnic and age distribution of the 49 deaths due to active tuberculosis shows that 36 (73%) were males and 13 (27%) females. There were 33 (67%) Chinese, 11 (23%) Malays and 5 (10%) Indians. Almost two-thirds of the deaths occurred in elderly patients 60 years and above (Table IV).

DISCUSSION

Prior to the 9th Revision of the International Classification of Diseases (ICD), provisions were made for categories of active tuberculosis and a separate category for "late effects of tuberculosis" to be used for deaths due to previous disease inactive at the time of death. The 9th revision of ICD adopted in Singapore since 1979 does not provide for such a differentiation, therefore leaving doubts about the activity of the disease at death.

Our population of 111 cases studied is small and the comments and interpretations may not be conclusive. However, this study does indicate that death certificates, at least with respect to tuberculosis, do not provide

Table II
Causes of Death Verified by Independent Assessor

Verified cause of death	Deaths certified by					
	Hospital doctors		General practitioner		Total	
	No.	(%)	No.	(%)	No.	(%)
Active tuberculosis	39	(56)	10	(24)	49	(44)
Late effects of tuberculosis (inactive at time of death)	6	(9)	6	(15)	12	(11)
Causes unrelated to tuberculosis (but with active or inactive tuberculosis at time of death)	19	(27)	22	(54)	41	(37)
No evidence of tuberculosis	6	(9)	3	(7)	9	(8)
Subtotal	70	(100)	41	(100)	111	(100)
Insufficient data					2	
No case-notes available					26	
Certified by coroner					38	
Grand total					177	

Table III
Death Certified by General Practitioners After Discharge from Hospital

Duration after discharge from hospital	Deaths No.	(%)
1st week	11	(27)
2nd week	5	(12)
3rd week	0	(0)
4th week	2	(5)
1st month (cumulative)	18	(44)
2nd month	3	(7)
3rd month	4	(10)
4th month	1	(2)
5th month	0	(0)
<6 months (cumulative)	26	(63)
> 6 months	8	(20)
Record of outpatient attendance only (no record of admission)	7	(17)
Total	41	(100)

accurate information. This was found to be so in other countries where such studies have been conducted. Aoki et al[3] surveyed the cause of death of patients in national sanatoria and chest hospitals in Japan, and concluded that about half the reported tuberculosis deaths were in fact caused by cardiopulmonary insufficiency and not uncontrolled tuberculosis. They also studied the cause of death of all tuberculosis patients in Niigata Prefecture in 1976 and found that out of the total deaths of 219,116 (53%) were incorrectly attributed to tuberculosis.

Hill[4] studied 570 patients in Hong Kong who were certified as having died of respiratory tuberculosis. Fifty-two cases were excluded because of inadequate information for diagnosis, and 15 cases had no evidence of any tuberculosis. Of the remainder, only 55% actually died of active tuberculosis, 23% of late effects of the disease and 22% of other causes.

A more extensive study also done in Hong Kong over three periods[5] showed that deaths due to active tuberculosis accounted for 42% to 53% of all certified tuberculosis deaths. 21% to 35% were deaths due to the late effects of tuberculosis, and in 7% to 8%, presence of tuberculosis was not established.

In our study, although hospital doctors were the attending physicians at the time of death, and had the advantage of the availability of case-notes, only 56% of certified deaths were indeed due to active tuberculosis. It was even more alarming to note that hospital doctors certified 6 out of 9 deaths as tuberculosis deaths where there was no evidence of tuberculosis.

The discrepancy in the deaths certified by general practitioners was even larger, as expected, since these doctors did not have access to hospital case-notes at the time of death certification.

There were 12 deaths from the late effects of previous tuberculous disease, inactive at the time of death. They reflected persons who initially had far advanced disease

Table IV
Sex, Ethnic and Age Distribution of 49 Tuberculosis Deaths

Demographic characteristics	No.	(%)
Sex:		
Male	36	(73)
Female	13	(27)
Ethnic group:		
Chinese	33	(67)
Malay	11	(23)
Indian	5	(10)
Age group:		
15 – 29 years	1	(2)
30 – 44 years	3	(6)
45 – 59 years	14	(29)
60 – 74 years	13	(26)
75+ years	18	(37)

but later died of cardiopulmonary failure because of extensive fibrosis and destruction of lung tissue in spite of treatment.

The 49 cases which actually died of active tuberculosis would give a mortality rate of 1.9 per 100,000 population. If the 12 cases of death due to late effects of the disease were included, the mortality rate becomes 2.3 per 100,000. Furthermore, even if we assume that the 38 cases certified by the coroner and the 28 cases with inadequate or no hospital records were indeed truly tuberculosis deaths, the maximum mortality rate would come to 4.9 per 100,000 instead of the officially reported 6.8 per 100,000[1].

RECOMMENDATION

To deal with this problem of inaccuracy of tuberculosis death certification, the responsible organisation, ie. Epidemiology Department in collaboration with the Department of Tuberculosis Control, should work out a strategy and mechanism to check on such death notification. In the event of receiving a death certificate where tuberculosis is the cause of death, it should be verified by an independent assessor. The certifying doctor should then be given feedback on the cause of death if it is not due to tuberculosis. With constant monitoring of death certificates in this way, it is hoped that doctors will be made aware of proper death certification for tuberculosis. In time to come, a more accurate record of our national tuberculosis mortality statistics will be obtained.

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