

Deaths from Pulmonary Tuberculosis in the Age of Chemotherapy

A RETROSPECTIVE ANALYSIS OF 192
CONSECUTIVE CERTIFIED DEATHS

BY

D. H. SHENNAN, M.D., D.P.H., D.T.C.D.
Tuberculosis Specialist, Nyasaland Region;

AND

E. ROBINSON, M.B., CH.B., T.D.D., D.P.H.
*Tuberculosis Specialist, S. Rhodesia Region, Federal
Ministry of Health.*

According to Crofton (1960), adequate chemotherapy, given in time, cures all cases of pulmonary tuberculosis, provided that their organisms are initially drug-sensitive. The present study has been made to find out why failures occur in Africans in Bulawayo, Southern Rhodesia, and vicinity. It includes all deaths at Mpilo chest (tuberculosis) hospital from the time when the hospital opened in December, 1954, to December, 1960. All cases of pulmonary tuberculosis in Bulawayo during this period were admitted initially to the Mpilo chest hospital, except for about 20 beds for children under six used for all forms of tuberculosis in Mpilo central hospital, which opened in August, 1958.

This investigation in no way gives a death rate from tuberculosis in Africans. For instance, a number of cases were sent, after their initial treatment, to a subsidiary unit run by the city council as from September, 1955. Although these patients continued under medical care from Mpilo, any deaths were certified by the city M.O.H. This unit had 80 beds in 1960 as compared with 258 for which deaths occurring were certified at Mpilo. Thus the figures obtained from the analysis are not an exact reflection of the proportions of deaths from different causes, particularly in that they will over-state the percentage due to coming too late to hospital. Furthermore, a few patients absconded from hospital during treatment and it is likely that a high proportion of these have subsequently died. The absconders, however, comprised less than 10 per cent. of all patients treated.

From the time when Mpilo chest hospital opened in December, 1954, until March, 1959, treatment consisted of rotating chemotherapy, changing pairs of drugs every three months, starting with INH and streptomycin for the first three-month period. The dosages given

were: streptomycin 1 g. daily, INH 200 mg. daily and PAS 16 g. daily. From March, 1959, all three drugs were given initially for three months prior to starting rotating chemotherapy. No satisfactory drug-sensitivity tests were available at any time.

The average duration of treatment in 1955 was five months, and in 1958 18 months; by 1960 it was more than 18 months.

ANALYSIS OF DEATHS

Exclusions

Two hundred and twenty-four deaths were certified during the six years. Of these, 28 were from non-tuberculous causes or from non-pulmonary tuberculosis; in three the diagnosis of tuberculosis was not definite, and in one the patient's notes could not be found in the hospital records. This left 192 for study.

Determination of Cause of Failure of Chemotherapy

In several cases it was difficult to choose between two possible causes. For instance, four patients had radiological silicosis as well as a history of previous treatment. If a patient died from a haemoptysis in the early weeks of his treatment, this was regarded not as a "complication," but as "latecomer," since it is most likely that death would have been prevented had he reported for treatment in good time.

In Table I are listed the 17 deaths to which two alternative causes might have been attributed, the cause chosen in each case being shown in the left-hand column.

The existence of primary drug resistance could not be diagnosed in any particular patient. The only course open was to find a residue of deaths for which there was no known cause.

Table I
DEATHS WITH MORE THAN ONE POSSIBLE CAUSE

Reported Cause	Possible Alternative Cause								TOTAL
	Causes Other than Pulmonary Tuberculosis		Previous Treatment	Silicosis	Liver Failure	Mental Illness	Age		
	Chronic pyelo-nephritis	Tuberculous pericarditis					58 or over	50 to 52	
Complication of tuberculosis (hepatic failure, possibly due to drugs)	1			4					1
Previous treatment							1		5
Silicosis							2		2
Latecomer to hospital		1			2		2		5
No obvious cause			1			1		2	4
TOTAL	1	1	1	4	2	1	5	2	17

These might have had previous treatment which they did not reveal, or a number of other factors could have been the source of their failure. It is not possible to deduce to what extent, if any, primary drug resistance was responsible.

CAUSES OF FAILURE OF CHEMOTHERAPY

Table II shows the causes, with their proportions of the whole series, in the 192 cases.

Table II

CAUSES OF DEATH IN 192 TUBERCULOSIS PATIENTS

Latecomer (died within seven weeks)	121 (63%)
Complication of tuberculosis	10 (5%)
Previous treatment	14 (7%)
Silicosis complicating	9 (5%)
Mental abnormality (negativism)	2 (1%)
Infancy (10 months)	1 (1%)
Age only discoverable cause (estimated on admission at 58 or over)	12 (6%)
No evident cause	23 (12%)
	192

Latecomers to Hospital

The high proportion (63 per cent.) of patients dying within seven weeks of admission indicates that late arrival in hospital was a potent cause of death. Table III, which shows the numbers of patients dying in each of these weeks, confirms this. The numbers fell off rapidly to the fourth week, then levelling off for the last three. The number dying in the first four weeks was 107, or 56 per cent. It is, in fact, open to question whether the term "latecomer" should not have been restricted to those dying in the first four weeks instead of the first seven. The last three weeks have been included because there was a further considerable fall-off of numbers per week after this. Of the 14 patients dying in the fifth, sixth and seventh weeks, five were known to have other possible causes (see Table I).

Table III

NUMBERS OF DEATHS IN EACH OF THE FIRST SEVEN WEEKS AFTER ADMISSION

Week:	1	2	3	4	5	6	7	All weeks
No. of deaths	52	31	16	8	6	4	4	121

The proportion dying in the first seven weeks fell from 65 per cent. before cortisone was introduced for severely ill new cases in 1959 to 58 per cent. after this time. There may have been a causal relationship, though the difference is well below the 16 per cent. required for significance at the level $P=0.05$.

Complications of Tuberculosis

In the 10 patients considered to have died from complications, these were as follows:

Haemoptysis	2
Drug toxicity	1
Hepatic failure	1
Empyema	1
Spontaneous pneumothorax	1
Cor pulmonale	4

Previous Treatment

The 14 patients who admitted that they had had therapy before had been treated as follows:

Inadequate duration of chemotherapy	13
(Four of these also had silicosis.)	
Course of six months, followed 18 months later by a course of 13 months	1

Silicosis with Tuberculosis

Of the 13 cases in which silicosis was demonstrated radiologically, nine were considered to have died because of it; in the other four the previous inadequate drug treatment was assumed to have produced secondary resistance to the drugs.

Mental Abnormality

Two of the deaths were in females showing marked negativism, with refusal of food and a lack of any will to survive. This was considered to be the reason for failure of chemotherapy.

Age

There was a considerably higher death rate among the group aged (on estimation) 58 or over. In two other patients, whose ages were estimated at 50 and 52, there was also no other explanation for the death; they were, however, placed arbitrarily in the group "No evident cause."

DISCUSSION

It must be freely admitted that this investigation, like all retrospective studies, is defective in that the material was not prepared at the time of death with the object of including it in an analysis. The information available is, nevertheless, good enough to confirm, in numerical form, certain impressions held by those treating tuberculosis. Because of this it gives a basis for firm action to reduce the number of failures of chemotherapy.

The very large proportion of "latecomers" is artificially augmented by the "siphoning-off" of cases by the municipal unit; but even if allowance is made for this, it is evident that the majority of patients who died could have been saved if they had come to hospital in good time.

After this category the largest group of deaths was in patients who had had previous inadequate treatment and presumably had acquired resistance to the drugs (7 per cent.).

The silico-tuberculosis group (5 per cent.) can be, and is being, reduced by more careful control of dust in mining and similar occupations. Apart from this, and in the present state of our knowledge, there is no clear-cut action to be taken to prevent the remaining 25 per cent. of deaths.

CONCLUSIONS

Much the largest cause of failed chemotherapy leading to death is late reporting for treatment. Education and propaganda are required to correct this.

In addition, 7 per cent. of deaths are known to be due to inadequate courses of chemotherapy. Clearly a large part of the blame for this rests with the patient, who may fail to take one of his drugs or may take his discharge or abscond from hospital when the course is incomplete. Nevertheless, no improvement will come about unless the medical practitioner assumes the responsibility, doing all in his power to give correct and complete courses, to ensure that all drugs are taken, to encourage and persuade patients to stay and finish their courses of treatment and to make hospital life as far as possible attractive and interesting.

SUMMARY

An analysis is made of 192 consecutive certified deaths from pulmonary tuberculosis.

The preventable causes of failure of chemotherapy leading to death are found to be late reporting for treatment (63 per cent.) and previous incomplete treatment (7 per cent.).

REFERENCE

CROFTON, J. (1960). *Brit. med. J.*, 2, 170.

Acknowledgment

We are indebted to the Director of Medical Services, Southern Rhodesia, for permission to publish this paper.
