

Exposure to Sputum Positive Cases of Tuberculosis in a Government Hospital

D Jeyakumar, MRCP, Medical Department, Ipoh Hospital, 30990 Ipoh, Perak

Summary

A retrospective study was carried out to ascertain the degree of exposure to the tubercle bacillus within Ipoh Hospital. This study reveals that, over a one year period, 92 sputum positive cases were admitted to the general wards. In 11 of these cases, drug resistance was considered to be possible. The mean time from admission to the commencement of treatment was seven days for the newly diagnosed cases. This study thus documents a significant degree of in-hospital exposure to the tubercle bacillus.

Key Words: Tuberculosis, Nosocomial transmission, Respiratory isolation

Introduction

Several studies^{1,2} have documented that the tubercle bacillus can be transmitted from person to person through casual exposure. Kline E et al for example documented a case where 41 out of 97 regular patrons of a bar in Minneapolis, USA, were infected by a regular patron who was sputum positive, and further, that 14 of these patients went on to develop tuberculosis. DNA "fingerprinting" revealed that 12 out of the 14 had genetically identical bacilli confirming that they were all infected by a common source³.

Studies done in the 1960's in Madras⁴ have shown quite convincingly, that patients become rapidly non-infectious to others once they are started on effective anti-tuberculosis medicines even though they might remain sputum positive for several months.

Around 330 patients are started on TB treatment at the Ipoh Hospital Chest Clinic each year. Patients referred to the Chest Clinic are generally investigated and treated as outpatients unless they are ill. However a significant number of patients are found to have tuberculosis only after admission to the hospital for respiratory or other complaints. The purpose of this

study was to determine the extent of exposure of patients and staff in Ipoh Hospital to untreated sputum positive patients in the general wards.

Materials and Methods

All sputum positive inpatients in Ipoh Hospital from 1st April 1996 to 31st March 1997 were identified from the Chest Clinic laboratory record book. In Ipoh Hospital all requests for Ziehl Neelson staining from both inpatients and outpatients are sent to the Chest Clinic laboratory. The date of admission, the date when patient's sputum was first found positive, dates of start of treatment and of discharge of these patients were then obtained from the ward admissions records and from the treatment folders at the Chest Clinic.

From these dates the durations of time from admission to diagnosis and from diagnosis to the start of treatment were obtained for each patient.

Results

There were a total of 92 sputum positive inpatients in Ipoh Hospital in the year of study. Of these, 89 were

admitted to the general medical wards, there being no separate wards for tuberculosis cases in Hospital Ipoh, and 71 (77%) of these were males.

Sixty-eight of these patients were newly diagnosed cases of tuberculosis, their diagnosis being established at this admission. Another 12 cases were also newly diagnosed but their treatment had been started in the week prior to admission. The remaining 12 cases were old cases of tuberculosis who had been on treatment for periods ranging a month to three years. Some of them were defaulters and several of them were suspected to be harbouring drug-resistant strains.

The durations of time from admission to diagnosis and to treatment for the 68 cases newly diagnosed after admission are given to Table I. As can be seen in the table the average duration from admission to diagnosis was 4.2 days, and from admission to commencement of treatment was 7.0 days.

It was not possible to determine the route of admission for all these 68 newly diagnosed cases. However, for the 42 cases for whom the records could be obtained, only 9 had been admitted via the chest clinic and one from the general medical clinic. Thirty-two (76%) had been admitted from the A & E and the Outpatients Departments.

The 12 cases who had already been on treatment for one or more months prior to this admission, stayed as inpatients for a total of 249 days collectively. Sensitivity testing later revealed that only one of them had drug resistant tuberculosis (MDR).

Discussion

This study reveals that there was a significant degree of exposure of staff and other patients to untreated sputum positive patients in the general medical wards. In the year analysed, there were 68 cases who were found to have sputum positive tuberculosis after admission to the hospital. These 68 patients were commenced on anti-tuberculosis treatment after a period of 7 days on the average. This works out to a total of 476 patient days of exposure to untreated tuberculosis.

In addition there were another 12 sputum positive patients among whom several had a history of irregular treatment due to poor compliance or other reasons, and in whom drug resistance was a real possibility. This second group of patients stayed for a total of 249 days in the general medical wards and presented a formidable management dilemma - is it appropriate to continue with the standard anti-TB regimen, until susceptibility results are reported (and this often takes 4 months); or should such patients be started on expensive and

Table I
Durations from admission to diagnosis and to commencement of treatment for 68 newly diagnosed cases of pulmonary tuberculosis (days)

	Mean	25th Percentile	50th Percentile	75th Percentile
From admission to detection of AFB in Sputum	4.4	2.0	3.0	5.0
From first detection of AFB in Sputum to start of treatment	3.1	1.0	2.0	5.0
From admission to start of treatment	7.0	3.0	6.0	9.0

potentially toxic second-line drugs until proven not to be MDR by the susceptibility. This problem could be greatly ameliorated if there were facilities to isolate sputum positive patients who might be harbouring drug resistant strains in rooms with negative pressure, external venting and facilities for intermittent ultraviolet lighting as advised by the Centers for Disease Control, Atlanta, Georgia³. Cases that should be isolated thus would include confirmed drug resistant cases, defaulters, those who have relapsed, as well as all immigrant workers with sputum positive TB.

It might not be as easy to solve the problem of exposure to newly diagnosed cases of sputum positive tuberculosis. The 7-day lapse between admission and diagnosis could and should be shortened by measures to streamline the diagnostic process and by continually reminding medical staff of these measures. However, even if the average duration from admission to treatment could be halved to 3 days, there would still be an unacceptably high level of exposure to untreated sputum positive cases. The US Center for Communicable Diseases has put out guidelines that all patients for whom tuberculosis is among the differential diagnoses, should be isolated in single rooms with negative pressure and external venting until 3 sputum direct smear examinations are reported negative.⁵ An audit done at the Grady Memorial Hospital in Atlanta, Georgia,⁶ established that for every sputum positive case isolated by this CDC protocol, another 7 cases who did not have tuberculosis had also to be isolated for several days. The CDC guidelines will obviously be quite difficult to implement in our already overcrowded general hospitals. A reasonable compromise could be the setting up of a respiratory isolation ward for suspected tuberculosis cases. All cases with pulmonary tuberculosis as one of the main differentials should be kept in this unit until either 3 sputum examinations are negative, or until they are started on anti-TB treatment. Such a measure would reduce the exposure of medical staff as well as other medical patients.

A survey done in Canada⁷ covering 4830 contacts of sputum positive cases of tuberculosis found that the risk of getting infected by the tubercle bacillus is higher in younger people, in those with prolonged contact with the index case, and if the index case is smear positive (as opposed to only culture positive). The researchers

estimated that around 20% of non immunised adults "occasionally" exposed to a sputum positive case will be infected and Mantoux convert, and of these converters, around 2% will go on to develop tuberculosis disease, the majority within two years.

The rates of infection and development of tuberculosis disease are probably lower in our staff population because the vast majority of our staff would have received the BCG vaccination which is believed to give about 80% protection⁸. Furthermore, once a person Mantoux converts, the risk of developing disease from subsequent exposures to the tubercle bacillus is probably much lower than when that person was immunologically naive to tuberculosis. Nevertheless, 13 staff members of Ipoh Hospital developed tuberculosis from 1994 to 1996 inclusive, giving an annual incidence of tuberculosis in the Ipoh staff population of 220 per 100,000, or 5 times the rate of for the general population of Perak. This does suggest that tuberculosis disease due to in-hospital exposure to the tubercle bacillus is a significant health hazard to the hospital staff and to other non-TB patients and that the measures outlined above to reduce the risks of in-hospital transmission should be implemented as soon as possible, not only in Ipoh Hospital, but also in other hospitals with a similar risk burden.

Regular screening of health care workers by means of annual chest X-ray might help pick up the personnel who develop tuberculosis. But it would be cumbersome as one would have to screen 1000 personnel to pick up 2 cases. Annual Mantoux testing of staff members, might help reduce the number of personnel who require radiological screening. The utility of isoniazid prophylaxis for those who become strongly Mantoux positive, but have no clinical or radiological signs of tuberculosis might also be worth assessing, as studies overseas have shown that isoniazid chemoprophylaxis reduce⁵ the rate of tuberculosis disease by between 30 to 90%. But regular Mantoux testing and isoniazid prophylaxis would add to the workload of the TB control programme, and the latter does carry a small but not insignificant risk of causing hepatitis, especially in those with pre-existing viral or alcoholic liver disease. Also there is a danger that such prophylaxis might lead to greater INH resistance in the population. More studies are required to settle these issues.

Conclusion

There is an unacceptably high degree of exposure of staff and other patients to untreated and possibly inadequately treated sputum positive cases in the general medical wards in Ipoh Hospital. This exposure is probably the most important factor causing the incidence of TB among Ipoh Hospital staff to be 5 times that of the general Perak population. Efforts need to be taken to reduce the degree of in-hospital exposure to the

tubercle bacillus. Protocols for regular staff screening need to be evaluated.

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