Tubercle

Tubercle (1991) 72, 284–290

Treatment of tuberculosis by private general practitioners in India

M. W. UPLEKAR and D. S. SHEPARD[1]

Foundation for Research in Community Health, Bombay, India and [1]Department of International Health, Harvard School of Public Health, Boston MA, USA

Summary — Early detection and optimal treatment constitute the most important measures in the control of tuberculosis. This study of prescriptions for tuberculosis recommended by 102 private doctors, practising in the slums of Bombay, shows a lack of awareness among doctors who treat tuberculosis patients in their own clinics about the standard drug regimens for treatment of tuberculosis recommended by national and international agencies. While there are a few standard, efficient, recommended regimens, 100 private doctors prescribed 80 different regimens, most of which were both inappropriate and expensive. The study highlights the need for effective communication between those implementing national tuberculosis programmes and the practising private doctors, continuing education of these doctors for updating their knowledge and their active participation in at least those national disease programme for which their curative functions could contribute significantly to control of a disease.

Introduction

India has about 10 million cases of tuberculosis, the largest number in the world, and it is estimated that nearly 400 000 persons die of the disease every year [1]. While there are pockets of high endemicity in some rural areas and urban slums, the prevalence rate is similar all over the country [2].

Respiratory tuberculosis remains the third major cause of death in Bombay where 45% population lives in the slums [3]. Health care services in Bombay, including the slums, are provided by a mixture of private and public health care providers and institutions and it is estimated that about 60% of the people of Bombay are cared for by the private medical practitioners [4].

Early detection and optimal treatment leading to the complete cure of patients constitute the most important measures in tuberculosis control [5]. Effective treatment of an infectious patient helps to prevent spread of the disease by breaking the chain of transmission and reducing the pool of infection [6]. Among the major advances in the past 25 years resulting from controlled clinical trials has been the demonstration that admission to hospital is not necessary to treat tuberculosis effectively [7]. The focus of research in tuberculosis in India for over 3 decades has been on chemotherapy of the disease and various combinations of available antituberculosis drugs have been tried and advocated for use under the National Tuberculosis Programme [8].

This article attempts to examine prescribing patterns of private medical doctors practising in low socioeconomic areas of Bombay. Drug regimens for pulmonary tuberculosis recorded by these doctors are presented, analysed and compared with those recom-

Correspondence to: Dr M.W. Uplekar, Foundation for Research in Community Health, 84–A, RG Thadani Marg, Worli, Bombay 400018, India.

This article is an outcome of a Research Fellowship awarded to Dr M.W. Uplekar under the Takemi Program in International Health at Harvard School of Public Health for the year 1988–1989.

mended by the National Tuberculosis Programme of India. The paper highlights the need for effective involvement of private medical practitioners in disease control programmes of national importance so that they may be more effective.

Materials and methods

A list of all doctors practising in a large low-income settlement of Bombay was prepared by making visible additions to an existing list obtained from the local medical association. The doctors practising here, including the members of the local medical association, are a mixture of those qualified in Western medicine, who are called allopaths, and those qualified in one or more of the indigenous systems such as ayurveda, homoeopathy and unani, who are called non-allopaths. All non-allopaths included in the study had had some exposure to the Western practice of medicine, either during the formal training in their respective systems of medicine or thereafter, before commencing private practice, usually in the form of an apprenticeship at private hospitals or dispensaries. A simple random sample of 143 doctors was selected from the list of 287, irrespective of their ages, qualifications or years of practice. The sample included 79 allopaths and 64 non-allopaths.

All the doctors included in the study were visited individually in their clinics and provided a slip with a request to 'write a prescription for a previously untreated adult case of sputum positive pulmonary tuberculosis weighing about 50 kg.' The slip included three columns for writing the drugs used, dosages and durations. They were asked to mention the total duration of treatment for the drug regimen prescribed and also to indicate whether they treated tuberculosis patients in their clinics. The completed slips were collected on the spot by the investigator and later compiled.

Analysis

EPI-INFO, a software package developed by Centers for Disease Control, Atlanta, Georgia, was used for analysis of the doctors' prescriptions. The retail consumer costs of the drug regimens prescribed by individual doctors were computed by means of a program written for the purpose which also converted Indian rupees to US dollars at an exchange rate of Rs.15 per dollar (January 1989). Current consumer prices of antituberculosis drugs were taken from the January 1989 issue of MIMS, India — a privately published monthly drug index which provides retail costs of most of the drugs available in the market [9]. The doctors' prescriptions were compared with those recommended by the National Tuberculosis Programme of India. The costs of recommended regimens were also computed using both the retail prices of drugs applied to doctors' prescriptions and the bulk prices at which drugs are made available to the peripheral tuberculosis clinics of the Bombay Municipal Corporation run under the National Tuberculosis Programme.

Results

31 doctors (22%), including 22 allopaths and 9 non-allopaths, refused participation in the study without giving any specific reason for their refusal. All those who completed the slips indicated that they treated tuberculosis patients in their clinics. The final analysis included prescriptions of 102 private doctors, obtained from 48 allopaths and 54 non-allopaths.

Table 1 shows the drug regimens recommended by the National Tuberculosis Programme of India [10, 11]. All except two of the doctors reported they employed modern chemotherapeutic agents for treatment of tuberculosis. The drugs used by the doctors were among those included in the list of essential drugs of WHO: streptomycin (S), isoniazid (H), rifampicin

Table 1 Current (1989) short-course regimens in National Tuberculosis Programme in India* and their costs in US dollars

No.	*Regimen* **	*Doses*	*Bulk costs (US dollars)***	*Consumer costs*
1.	2EHRZ/6EH	240	32	52.9
2.	2EHRZ/6TH	240	23	40.7
3.	$2HRZ/4H_2R_2$	94	22.5	38.3
4.	2HRZ/6TH	240	17	35.6
5.	$2S_2H_2R_2Z_2/4H_2R_2$	52	16	20.4
6.	$2H_2R_2Z_2/4H_2R_2$	52	13	16.3

S = streptomycin, H = isoniazid, T = thiacetazone, R = rifampicin, E = ethambutol.
*Using dosage schedules for patients weighing 50 kg. **The number before the first letter of a regime is the duration in months of the phase. The number in subscript is the number of doses each week of an intermittent regime. ***Bulk and consumer costs respectively of the drugs in January 1989.

(R), pyrazinamide (Z), ethambutol (E) and thiacetazone (T).

Drugs used and dosages

None of the private doctors either reported thiacetazone as a component of the drug regimens they used or employed any of the recommended intermittent drug regimens in their prescriptions.

Streptomycin. 70% of private doctors preferred streptomycin which is the only injectable antituberculosis drug available. For an adult weighing 50 kg, 0.75 g or 1 g of streptomycin per day is considered adequate. Dosages employed by 58 doctors were correct, 10 did not specify dosages of streptomycin while 2 doctors prescribed inadequate doses (0.5g). No doctors used streptomycin intermittently, all advocating it for daily use for the first 2–3 months.

Rifampicin and isoniazid. These drugs are also available in a combination form. All except 3 doctors included these two drugs in their prescriptions. Seven did not specify the dosages and 2 used excessive doses of rifampicin and isoniazid — 900 mg and 600 mg daily respectively — but most of them (88) employed these drugs correctly in doses of 450 mg and 300 mg a day respectively. No doctor prescribed intermittent use of either of these drugs.

Pyrazinamide. 34 doctors did not prescribe pyrazinamide. Of the 66 who did, 43 used it in correct dosages (1.5–2 g per day), 13 prescribed an inadequate dose (1 g per day), 2 employed excessive doses (over 2 g per day) while 8 could not specify the dose of pyrazinamide.

Ethambutol. 75 doctors used ethambutol as one of the antituberculosis drugs in their prescription. 55 employed correct dosages (800 mg or 1 g), 10 used it in excessive doses (over 1.5 g), 3 prescribed inadequate doses (400 mg) and 7 did not specify the dose. All used the drug continuously throughout.

Indigenous drugs. Two doctors used indigenous drugs exclusively for treating their tuberculosis patients: one employed homoeopathic drugs and the other administered ayurvedic preparations. These prescriptions were not analysed further.

Drug regimens used

100 doctors using 2 or more of the 5 major antituberculosis drugs prescribed 80 different regimens. Only 4 of these conformed with one of the 6 standard recommended regimens. All the others varied with regard to one or more of the aspects of a drug regimen, including the drugs used in the initial intensive phase and in the continuation phase, dosages employed and durations recommended. The different regimens prescribed by private doctors are classified in Table 2 according to the drugs and durations of the regimens.

Table 2 Drug regimens with durations reported by private doctors

*Regimens**	*Number of doctors*	*Duration in months*
SHRZE	13	12
	12	9
	4	18
	2	6
	2	12–18
	1	9–12
SHRZ	5	6
	4	9
	1	8
	1	12
	1	18
SHRE	7	12
	4	9
	3	< 6
	1	6
	1	9–12
	1	12–18
	1	18
	1	24
HRZE	8	12
	6	6–9
HRZ	8	9–12
HRE	6	12–18
SHR	3	12
SHE	1	6
SRE	1	6
HR	2	9

* All doctors using streptomycin employed it for the initial 2–3 months only. Use of pyrazinamide in the initial phase of 2–3 months was advocated by 67% of doctors employing the drug; the remainder recommended continuous use. Other drugs were reported to be used throughout the duration of regimens prescribed.

Among doctors prescribing 4-drug regimens, only 26% advocated use of all bactericidal drugs: streptomycin, isoniazid, rifampicin and pyrazinamide. Ethambutol was a part of 4-drug regimens in 73% of prescriptions as compared to pyrazinamide which appeared in 58% and streptomycin in 69% of prescriptions.

Use of all bactericidal drugs was noted among 57% of 3-drug prescriptions: 28% of these contained streptomycin, replaced in the rest by pyrazinamide. Ethambutol and pyrazinamide were employed in equal proportions of 42% among 3-drug regimens which constituted 19% of all prescriptions.

If continuous or appropriate intermittent use of 2 bactericidal drugs for a duration of 9–12 months or 3 bactericidal drugs for 6–9 months or 4 bactericidal drugs for 6 months is considered adequate, regimens prescribed by 87% doctors were more than adequate, those of 8% were adequate and half of these matched one of the recommended regimens, while 5% doctors prescribed less than adequate regimens.

Costs of drug treatment

The costs of treatment mentioned here do not include doctor's fees or fees for administering streptomycin injection whenever prescribed. Most doctors practising in these low income areas prescribe expensive drugs and supplement them with vitamins and tonics. Information about medication prescribed to the patients other than antituberculosis drugs was not collected for the present study. The patients buy prescribed medication from the pharmacists at retail prices which are, on average, more than double compared to national as well as local bulk prices at which drugs are made available to the peripheral tuberculosis clinics of the Bombay Municipal Corporation [10, 12].

The costs of drug regimens prescribed by the doctors varied greatly, as did their prescriptions (Fig. 1). The costs of standard recommended regimens computed after applying the consumer prices and the bulk prices are shown in Table 1. The total cost of the least expensive regimen recommended by the National Tuberculosis Programme is $13 while that of the least expensive but adequate regimen prescribed by a private doctor was $42. Costs of the 6 standard recommended regimens varied from $13 to $32, with a mean of $21 while the costs of 80 regimens prescribed by 100 doctors varied from $7 to $260 with a mean of $104. Thus, besides being less than optimal, the regimens used by private doctors for treating their patients with infectious pulmonary tuberculosis were much more expensive than those considered effective and recommended under the National Tuberculosis Programme.

Comparison between drug regimens prescribed by allopaths and non-allopaths

Figure 2 compares the drug regimens prescribed by allopaths and non-allopaths.

Drug regimens used. Of the 70 doctors who preferred regimens containing streptomycin injection, 40 were non-allopaths. 27% of allopaths chose 5-drug regimens and 4 of them prescribed it for over 1 year while 40% of non-allopaths prescribed 5-drug regimens, 15 recommending their continuous use for over 1 year. 38% of allopaths advocated 4-drug regimens, all prescribing it for less than a year. 52% of non-allopaths also prescribed 4-drug regimens, 2 of them recommending its duration to be over 1 year. 31% of allopaths and only 8% of non-allopaths preferred drug regimens containing 3 drugs. No non-allopath prescribed a 2-drug regimen though 2 allopaths did.

Costs of drug regimens. 45 of 52 (86%) non-allopaths and 35 of 48 (72%) allopaths prescribed drug regi-

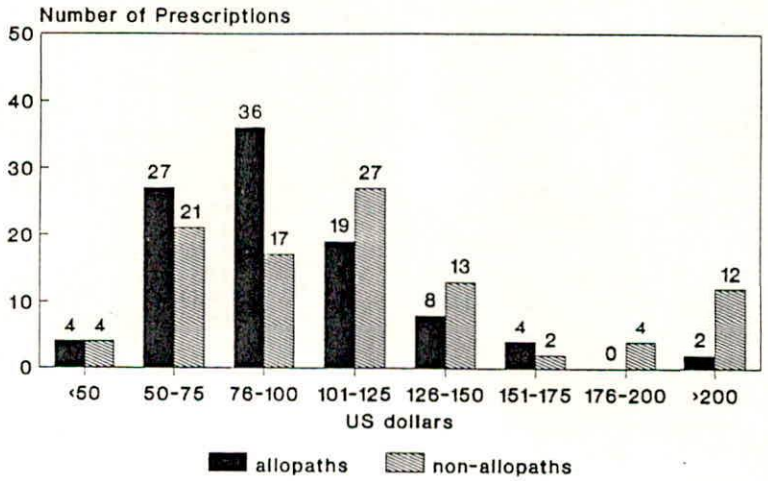

Fig. 1 Costs of doctors' prescriptions. A comparison of allopaths and non-allopaths.

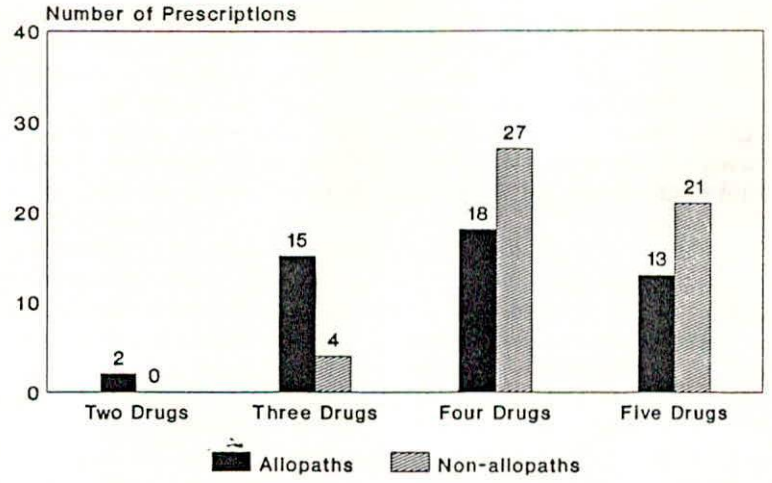

Fig. 2 Drug regimens used. A comparison of allopaths and non-allopaths.

mens more expensive than the most expensive standard recommended regimen. Prescriptions of 56% of non-allopaths were more expensive than the mean cost of all private doctors' prescriptions as against those of 33% of allopaths.

Discussion

Very few studies have taken into consideration the role of private doctors in tuberculosis control [13, 14]. Private doctors are often considered an obstacle and are said to have a negative impact on the implementation of national disease control programmes [15]. India has both the largest number of tuberculosis patients and a large private health sector. Moreover, people tend to prefer private doctors to free services offered by the government health services [4, 16, 17]. Among the poor urban populations, private doctors are usually the first contact of a patient seeking treatment and, since hospitalisation of tuberculosis patients is not only expensive but has also been shown to be unnecessary, the role of a private doctor who provides domiciliary treatment so convenient to a patient becomes even more important [7].

It is agreed that the present exercise is a test of knowledge of a general practitioner about treatment of tuberculosis rather than a test of his actual practice.

The lack of knowledge and awareness among doctors practising in the slums of Bombay about the correct and nationally recommended drug regimens to be used in the treatment of lung tuberculosis reveals their ignorance about important advances in the treatment of a very highly prevalent disease and an absence of communication between those involved in the implementation of disease control activities and the practising private doctors. The magnitude of the problem of tuberculosis in India is such that it is incumbent on every doctor practising medicine to be able to detect and treat a case of tuberculosis appropriately. It is difficult to find a scientific rationale for each of the 80 different regimens employed by private doctors.

The use of correct dosages of rifampicin and isoniazid in comparison with other drugs may be attributed to the availability of a correct type of combination which most doctors prescribe. This highlights the advantages that drug combinations may offer, if made available in a form suitable for easy administration, in improving both the patient and the physician compliance in treatment of tuberculosis. Fox, however, cautions against premature use of triple combinations widely available and promoted in this country in the absense of indisputable data about their possible deleterious effects on the bio-availability of the constituent drugs [10].

Continuous use of pyrazinamide was advocated by 33% of those doctors who included pyrazinamide in their regimens although efficacy of pyrazinamide in the continuation phase of a short-course regime is yet to be established. This too exhibits ignorance of doctors about the scientific rationale of the drug regimens they were using and their tendency to overmedicate.

Most doctors used more drugs than required for treating a case of tuberculosis. Clearly, patients of most doctors included in the study could receive unnecessarily prolonged chemotherapy if they would comply. Is there any possibility of the private doctors using excessive drugs intentionally to achieve rapid cure for patients, many of whom frequently change their doctors? It seems unlikely if the suggested dura-

tions of the regimens they prescribed are considered. 59 of 77 doctors who prescribed 4 or more drugs had recommended that their regimens be continued for over 6 months. About half the doctors were indiscriminately using drugs meant for short-course therapy for long durations of 12 months or more, as advocated for the conventional drugs used in older standard regimens. For most regimens that the private doctors were using, there is no point in prolonging well organised chemotherapy beyond 6 months.

An important outcome of research in chemotherapy of tuberculosis has been the demonstration that intermittent administration of drugs, in specific dosages and intervals, is as effective as giving them continuously [18–20]. None of the doctors in this study used any of the recommended or other intermittent regimens. This finding is consistent with Fox's observation on physicians in the UK who hardly ever used intermittent treatment as a routine even for the cases for which it would have proved advantageous [13]. The reluctance of private general practitioners to prescribe the much researched and recommended intermittent regimens needs further investigation.

A general notion is that since they are not adequately or as much exposed as allopaths to the practice of Western medicine and judicious use of chemotherapeutic agents, the non-allopaths tend to overmedicate and use injections excessively. This is apparent in drug regimens used by non-allopaths. However, a closer comparison (Fig. 2) between prescriptions by allopaths and those by non-allopaths with regard to drugs used, dosages and durations does not show any better performance of one group over the other, both being equally unsatisfactory. It is felt that non-allopaths too must be considered in any attempts to involve private doctors in tuberculosis control activities.

Much has been written about the cost of tuberculosis control. In fact, one of the major impediments in controlling tuberculosis in developing countries is said to be inability of these countries to earmark enough funds for mass application of the short-course chemotherapy [20, 21]. Clearly, the findings of this study demonstrate the inefficient use of scarce available resources on patients cared for by private doctors. This is illustrated by regimens prescribed by private doctors in this study which, besides being incorrect, were several times as expensive as the average cost of the recommended regimens.

Patient non-compliance is another major hurdle in effective control of tuberculosis. Estimates in India indicate that, of every 100 cases in the community, 30 are identified, about 10.5 remain under treatment for an adequate length of time and that only about 8 are cured [22]. To the best of our knowledge, studies on compliance of tuberculosis patients taking treatment in private clinics are non-existent. It has been well documented that, in general, doctors' prescriptions are often inappropriate, unnecessary, contain too many drugs and are unaffordable, leading to partial filling of prescriptions. The insufficiently informed health professionals prescribe a number of different drugs in the hope that one will be effective [23]. The medical implications of these practices, particularly in case of diseases like tuberculosis, become apparent only years later. Studies from many parts of the world including India show that indiscriminate prescription of these useful drugs leads to high levels of initial rifampicin resistance, in addition to high levels of isoniazid and rifampicin resistance [24]. The consequences of irregular drug intake and misuse of the available potent and powerful drugs could be serious.

The important issue is of establishing a meaningful communication between the private doctor and the public health services. It is well known that patients in India mostly report first to a private doctor [2]. Efforts could be made to see that the private doctors treat their patients with appropriate regimens and also that they make reasonable charges. It appears from this study that the private doctors are aware neither of the recommended less expensive but efficient continuous regimens nor of more suitable and effective 'supervised' intermittent regimens that help to ensure compliance. Doctors could give good treatment for the initial few months and then, if the patients cannot afford therapy, they should send them to the public health service which, in turn should willingly accept them and be prepared to continue appropriate chemotherapy rather than turning away the patients as having had previous chemotherapy. This will, of course, require input from private doctors as well as from the public health professionals.

Conclusions and possible interventions

The private doctors serving the urban poor in the slums of Bombay who treat patients of pulmonary tuberculosis in their clinics do not consider standard, cost effective drug regimens in the treatment of pulmonary tuberculosis, including those employed by the National Tuberculosis Programme of India. This shows ignorance among private doctors about the efficient treatment of a highly prevalent disease of major public health concern as well as the lack of communication between those implementing the National Tuberculosis Programme and general practitioners. In

light of this, it is important to educate private medical practitioners to bring and keep their knowledge of treatment of tuberculosis up to date.

Most private doctors, irrespective of their background and training, use modern chemotherapeutic agents in the treatment of tuberculosis. Those who are trained and qualified in the practice of Western medicine, as well as those trained in the indigenous systems, tend to prescribe excessive drugs often in inappropriate combinations and for periods longer than necessary. Mere dissemination of information about drug treatment of tuberculosis may not ensure its implementation. Ways need to be considered, such as adopting national drug regimens, making the necessary drugs available to all at uniform prices, and, at least for the major national disease control programmes, providing appropriate incentives and imposing sanctions to make private doctors participate in effective implementation of a programme of public health importance.

The drug regimens used by private doctors, besides being less than optimal, were several times as expensive as the standard recommended regimens. This inefficient use of scarce resources may be avoided both by continuing the education of private doctors by experts and by effective use of media and other possible modes of communication to educate lay people about the disease, the importance of regularity of treatment, and the efficient drug regimens to be taken under a doctor's supervision. This may also facilitate effective case finding and case holding, so important in the control of tuberculosis, by both public and private health sectors.

Acknowledgements

The first author deeply appreciates the support of Dr N H Antia, Director, and Mr Madhu Rokle, Research Investigator, of the Foundation for Research in Community Health, Bombay, in designing and conducting the study. Excellent comments on the earlier version of the manuscript by Professor Wallace Fox were extremely useful in revising the paper. We are most grateful to him for his contribution.

References

1. Health Atlas of India. Central Bureau of Health Intelligence, Directorate General of Health Services, Ministry of Health and Family Welfare, New Delhi 1986: 24.
2. Defeat TB: now and forever. Booklet issued by Directorate General of Health Services, New Delhi, on Silver Jubilee occasion of National Tuberculosis Institute, Banglore 1985.
3. Yesudian CAK. Primary Health Care planning in big cities with particular reference to Greater Bombay: Published by Unit for Extramural Studies, Tata Institute of Social Sciences, Deonar, Bombay 1984: 76.
4. Revankar CR, Jha SS, Dongre VV, Deshpande SS, Ganapati R. Integration of leprosy into general health services in an urban area — a feasibility study. *Lepr Rev* 1982; 53: 297–305.
5. Workshop Report: International workshop on 'Research towards global control and prevention of tuberculosis with an emphasis on vaccine development' Bethesda, Maryland, November 1987.
6. WHO technical report series No. 671, 1982: 12.
7. WHO expert committee on tuberculosis. Ninth report. WHO technical report series No. 552, 1974.
8. Fox W. Compliance of patients and physicians: experience and lessons from tuberculosis-I. *Br Med J* 1983; 287: 33–35.
9. MIMS INDIA: Monthly Index of Medical Specialties. New Delhi 1989; 8(10).
10. Fox W. Tuberculosis in India. Past, present and future. *Indian J Tuberc* 1990; 37: 175–212.
11. Chaudhari K. Introduction of short course chemotherapy under National Tuberculosis Programme. *NTI Newsletter* 1987; 23: 104–106.
12. Fox W. Short-course chemotherapy for pulmonary tuberculosis and some problems of its programme application with particular reference to India. *Lung India* 1984; II(2): 161–173.
13. Fox W. Compliance of patients and physicians: experience and lessons from tuberculosis–II. *Br Med J* 1983; 287: 101–105.
14. Hong Kong Chest Service/British Medical Research Council. Survey of the previous investigation and treatment by private practitioners of patients with pulmonary tuberculosis attending government chest clinics in Hong Kong. *Tubercle* 1984; 65: 161–171.
15. Roemer MI. Private medical practice: obstacle to Health For All. *World Health Forum* 1984; 5: 195–201.
16. Roth, Gabriel. *The private provision of public services in developing countries*. Published for the World Bank. Oxford: Oxford University Press, 1987, 122–157.
17. Uplekar MW. Private doctors and public health: the case of leprosy in Bombay, India. *Nat Med J India* 1990; 3: 162–166.
18. WHO collaborating centre for Tuberculosis Chemotherapy, Prague. A comparative study of daily and twice weekly continuation regimens of tuberculosis chemotherapy, including a comparison of two durations of sanatorium treatment 1. First report: the results of 12 months. *Bull WHO* 1971; 45: 573–591.
19. WHO collaborating centre for Tuberculosis Chemotherapy, Prague. A comparative study of daily and twice weekly continuation regimens of tuberculosis chemotherapy, including a comparison of two durations of sanatorium treatment 2. Second report: the results from 12 to 14 months. *Bull WHO* 1973; 48: 155–165.
20. WHO collaborating centre for Tuberculosis Chemotherapy, Prague. A comparative study of daily and twice weekly continuation regimens of tuberculosis chemotherapy, including a comparison of two durations of sanatorium treatment. 3. Third report: the results to 36 months. *Tubercle* 1976; 57: 45–48.
21. Grzybowski S. Cost in tuberculosis control. *Tubercle* 1987; 68 (supplement): 33–37.
22. Radhakrishna S. National Tuberculosis Program: relative merits of enhancing the operational efficiency of different components of treatment programme. *Indian J Tuberc* 1983; 30: 3–8.
23. World Health Organization. Report of the conference of experts on the rational use of drugs. Nairobi, 25–29 November 1985. Geneva: WHO, 1987.
24. Trivedi SS, Desai SG. Primary anti-tuberculosis drug resistance and acquired rifampicin resistance in Gujarat, India. *Tubercle* 1988; 69 37–42.

Tubercle

Tubercle (1991) 72, 284–290

Treatment of tuberculosis by private general practitioners in India

M. W. UPLEKAR and D. S. SHEPARD[1]

Foundation for Research in Community Health, Bombay, India and [1]Department of International Health, Harvard School of Public Health, Boston MA, USA

Summary — Early detection and optimal treatment constitute the most important measures in the control of tuberculosis. This study of prescriptions for tuberculosis recommended by 102 private doctors, practising in the slums of Bombay, shows a lack of awareness among doctors who treat tuberculosis patients in their own clinics about the standard drug regimens for treatment of tuberculosis recommended by national and international agencies. While there are a few standard, efficient, recommended regimens, 100 private doctors prescribed 80 different regimens, most of which were both inappropriate and expensive. The study highlights the need for effective communication between those implementing national tuberculosis programmes and the practising private doctors, continuing education of these doctors for updating their knowledge and their active participation in at least those national disease programme for which their curative functions could contribute significantly to control of a disease.

Introduction

India has about 10 million cases of tuberculosis, the largest number in the world, and it is estimated that nearly 400 000 persons die of the disease every year [1]. While there are pockets of high endemicity in some rural areas and urban slums, the prevalence rate is similar all over the country [2].

Respiratory tuberculosis remains the third major cause of death in Bombay where 45% population lives in the slums [3]. Health care services in Bombay, including the slums, are provided by a mixture of private and public health care providers and institutions and it is estimated that about 60% of the people of Bombay are cared for by the private medical practitioners [4].

Early detection and optimal treatment leading to the complete cure of patients constitute the most important measures in tuberculosis control [5]. Effective treatment of an infectious patient helps to prevent spread of the disease by breaking the chain of transmission and reducing the pool of infection [6]. Among the major advances in the past 25 years resulting from controlled clinical trials has been the demonstration that admission to hospital is not necessary to treat tuberculosis effectively [7]. The focus of research in tuberculosis in India for over 3 decades has been on chemotherapy of the disease and various combinations of available antituberculosis drugs have been tried and advocated for use under the National Tuberculosis Programme [8].

This article attempts to examine prescribing patterns of private medical doctors practising in low socioeconomic areas of Bombay. Drug regimens for pulmonary tuberculosis recorded by these doctors are presented, analysed and compared with those recommended by the National Tuberculosis Programme of India. The paper highlights the need for effective involvement of private medical practitioners in disease control programmes of national importance so that they may be more effective.

Correspondence to: Dr M.W. Uplekar, Foundation for Research in Community Health, 84-A, RG Thadani Marg, Worli, Bombay 400018, India.

This article is an outcome of a Research Fellowship awarded to Dr M.W. Uplekar under the Takemi Program in International Health at Harvard School of Public Health for the year 1988–1989.

Materials and methods

A list of all doctors practising in a large low-income settlement of Bombay was prepared by making visible additions to an existing list obtained from the local medical association. The doctors practising here, including the members of the local medical association, are a mixture of those qualified in Western medicine, who are called allopaths, and those qualified in one or more of the indigenous systems such as ayurveda, homoeopathy and unani, who are called non-allopaths. All non-allopaths included in the study had had some exposure to the Western practice of medicine, either during the formal training in their respective systems of medicine or thereafter, before commencing private practice, usually in the form of an apprenticeship at private hospitals or dispensaries. A simple random sample of 143 doctors was selected from the list of 287, irrespective of their ages, qualifications or years of practice. The sample included 79 allopaths and 64 non-allopaths.

All the doctors included in the study were visited individually in their clinics and provided a slip with a request to 'write a prescription for a previously untreated adult case of sputum positive pulmonary tuberculosis weighing about 50 kg.' The slip included three columns for writing the drugs used, dosages and durations. They were asked to mention the total duration of treatment for the drug regimen prescribed and also to indicate whether they treated tuberculosis patients in their clinics. The completed slips were collected on the spot by the investigator and later compiled.

Analysis

EPI-INFO, a software package developed by Centers for Disease Control, Atlanta, Georgia, was used for analysis of the doctors' prescriptions. The retail consumer costs of the drug regimens prescribed by individual doctors were computed by means of a program written for the purpose which also converted Indian rupees to US dollars at an exchange rate of Rs.15 per dollar (January 1989). Current consumer prices of antituberculosis drugs were taken from the January 1989 issue of MIMS, India — a privately published monthly drug index which provides retail costs of most of the drugs available in the market [9]. The doctors' prescriptions were compared with those recommended by the National Tuberculosis Programme of India. The costs of recommended regimens were also computed using both the retail prices of drugs applied to doctors' prescriptions and the bulk prices at which drugs are made available to the peripheral tuberculosis clinics of the Bombay Municipal Corporation run under the National Tuberculosis Programme.

Results

31 doctors (22%), including 22 allopaths and 9 non-allopaths, refused participation in the study without giving any specific reason for their refusal. All those who completed the slips indicated that they treated tuberculosis patients in their clinics. The final analysis included prescriptions of 102 private doctors, obtained from 48 allopaths and 54 non-allopaths.

Table 1 shows the drug regimens recommended by the National Tuberculosis Programme of India [10, 11]. All except two of the doctors reported they employed modern chemotherapeutic agents for treatment of tuberculosis. The drugs used by the doctors were among those included in the list of essential drugs of WHO: streptomycin (S), isoniazid (H), rifampicin

Table 1 Current (1989) short-course regimens in National Tuberculosis Programme in India• and their costs in US dollars

No.	*Regimen* ••	*Doses*	*Bulk costs (US dollars)*•••	*Consumer costs*
1.	2EHRZ/6EH	240	32	52.9
2.	2EHRZ/6TH	240	23	40.7
3.	$2HRZ/4H_2R_2$	94	22.5	38.3
4.	2HRZ/6TH	240	17	35.6
5.	$2S_2H_2R_2Z_2/4H_2R_2$	52	16	20.4
6.	$2H_2R_2Z_2/4H_2R_2$	52	13	16.3

S = streptomycin, H = isoniazid, T = thiacetazone, R = rifampicin, E = ethambutol.
•Using dosage schedules for patients weighing 50 kg. ••The number before the first letter of a regime is the duration in months of the phase. The number in subscript is the number of doses each week of an intermittent regime. •••Bulk and consumer costs respectively of the drugs in January 1989.

(R), pyrazinamide (Z), ethambutol (E) and thiacetazone (T).

Drugs used and dosages

None of the private doctors either reported thiacetazone as a component of the drug regimens they used or employed any of the recommended intermittent drug regimens in their prescriptions.

Streptomycin. 70% of private doctors preferred streptomycin which is the only injectable antituberculosis drug available. For an adult weighing 50 kg, 0.75 g or 1 g of streptomycin per day is considered adequate. Dosages employed by 58 doctors were correct, 10 did not specify dosages of streptomycin while 2 doctors prescribed inadequate doses (0.5g). No doctors used streptomycin intermittently, all advocating it for daily use for the first 2–3 months.

Rifampicin and isoniazid. These drugs are also available in a combination form. All except 3 doctors included these two drugs in their prescriptions. Seven did not specify the dosages and 2 used excessive doses of rifampicin and isoniazid — 900 mg and 600 mg daily respectively — but most of them (88) employed these drugs correctly in doses of 450 mg and 300 mg a day respectively. No doctor prescribed intermittent use of either of these drugs.

Pyrazinamide. 34 doctors did not prescribe pyrazinamide. Of the 66 who did, 43 used it in correct dosages (1.5–2 g per day), 13 prescribed an inadequate dose (1 g per day), 2 employed excessive doses (over 2 g per day) while 8 could not specify the dose of pyrazinamide.

Ethambutol. 75 doctors used ethambutol as one of the antituberculosis drugs in their prescription. 55 employed correct dosages (800 mg or 1 g), 10 used it in excessive doses (over 1.5 g), 3 prescribed inadequate doses (400 mg) and 7 did not specify the dose. All used the drug continuously throughout.

Indigenous drugs. Two doctors used indigenous drugs exclusively for treating their tuberculosis patients: one employed homoeopathic drugs and the other administered ayurvedic preparations. These prescriptions were not analysed further.

Drug regimens used

100 doctors using 2 or more of the 5 major antituberculosis drugs prescribed 80 different regimens. Only 4 of these conformed with one of the 6 standard recommended regimens. All the others varied with regard to one or more of the aspects of a drug regimen, including the drugs used in the initial intensive phase and in the continuation phase, dosages employed and durations recommended. The different regimens prescribed by private doctors are classified in Table 2 according to the drugs and durations of the regimens.

Table 2 Drug regimens with durations reported by private doctors

*Regimens**	*Number of doctors*	*Duration in months*
SHRZE	13	12
	12	9
	4	18
	2	6
	2	12–18
	1	9–12
SHRZ	5	6
	4	9
	1	8
	1	12
	1	18
SHRE	7	12
	4	9
	3	< 6
	1	6
	1	9–12
	1	12–18
	1	18
	1	24
HRZE	8	12
	6	6–9
HRZ	8	9–12
HRE	6	12–18
SHR	3	12
SHE	1	6
SRE	1	6
HR	2	9

* All doctors using streptomycin employed it for the initial 2–3 months only. Use of pyrazinamide in the initial phase of 2–3 months was advocated by 67% of doctors employing the drug; the remainder recommended continuous use. Other drugs were reported to be used throughout the duration of regimens prescribed.

Among doctors prescribing 4-drug regimens, only 26% advocated use of all bactericidal drugs: streptomycin, isoniazid, rifampicin and pyrazinamide. Ethambutol was a part of 4-drug regimens in 73% of prescriptions as compared to pyrazinamide which appeared in 58% and streptomycin in 69% of prescriptions.

Use of all bactericidal drugs was noted among 57% of 3-drug prescriptions: 28% of these contained streptomycin, replaced in the rest by pyrazinamide. Ethambutol and pyrazinamide were employed in equal proportions of 42% among 3-drug regimens which constituted 19% of all prescriptions.

If continuous or appropriate intermittent use of 2 bactericidal drugs for a duration of 9–12 months or 3 bactericidal drugs for 6–9 months or 4 bactericidal drugs for 6 months is considered adequate, regimens prescribed by 87% doctors were more than adequate, those of 8% were adequate and half of these matched one of the recommended regimens, while 5% doctors prescribed less than adequate regimens.

Costs of drug treatment

The costs of treatment mentioned here do not include doctor's fees or fees for administering streptomycin injection whenever prescribed. Most doctors practising in these low income areas prescribe expensive drugs and supplement them with vitamins and tonics. Information about medication prescribed to the patients other than antituberculosis drugs was not collected for the present study. The patients buy prescribed medication from the pharmacists at retail prices which are, on average, more than double compared to national as well as local bulk prices at which drugs are made available to the peripheral tuberculosis clinics of the Bombay Municipal Corporation [10, 12].

The costs of drug regimens prescribed by the doctors varied greatly, as did their prescriptions (Fig. 1). The costs of standard recommended regimens computed after applying the consumer prices and the bulk prices are shown in Table 1. The total cost of the least expensive regimen recommended by the National Tuberculosis Programme is $13 while that of the least expensive but adequate regimen prescribed by a private doctor was $42. Costs of the 6 standard recommended regimens varied from $13 to $32, with a mean of $21 while the costs of 80 regimens prescribed by 100 doctors varied from $7 to $260 with a mean of $104. Thus, besides being less than optimal, the regimens used by private doctors for treating their patients with infectious pulmonary tuberculosis were much more expensive than those considered effective and recommended under the National Tuberculosis Programme.

Comparison between drug regimens prescribed by allopaths and non-allopaths

Figure 2 compares the drug regimens prescribed by allopaths and non-allopaths.

Drug regimens used. Of the 70 doctors who preferred regimens containing streptomycin injection, 40 were non-allopaths. 27% of allopaths chose 5-drug regimens and 4 of them prescribed it for over 1 year while 40% of non-allopaths prescribed 5-drug regimens, 15 recommending their continuous use for over 1 year. 38% of allopaths advocated 4-drug regimens, all prescribing it for less than a year. 52% of non-allopaths also prescribed 4-drug regimens, 2 of them recommending its duration to be over 1 year. 31% of allopaths and only 8% of non-allopaths preferred drug regimens containing 3 drugs. No non-allopath prescribed a 2-drug regimen though 2 allopaths did.

Costs of drug regimens. 45 of 52 (86%) non-allopaths and 35 of 48 (72%) allopaths prescribed drug regi-

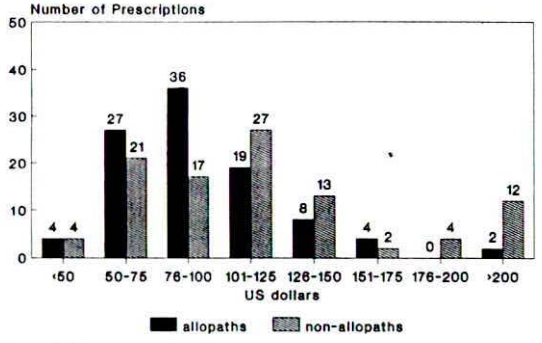

Fig. 1 Costs of doctors' prescriptions. A comparison of allopaths and non-allopaths.

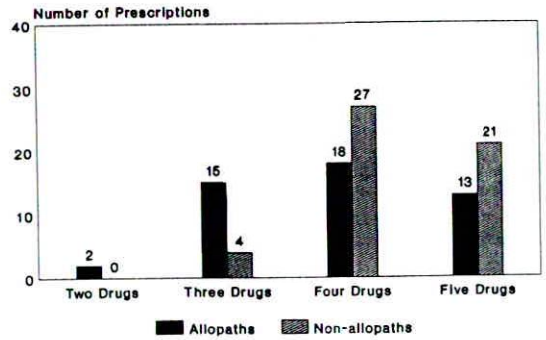

Fig. 2 Drug regimens used. A comparison of allopaths and non-allopaths.

mens more expensive than the most expensive standard recommended regimen. Prescriptions of 56% of non-allopaths were more expensive than the mean cost of all private doctors' prescriptions as against those of 33% of allopaths.

Discussion

Very few studies have taken into consideration the role of private doctors in tuberculosis control [13, 14]. Private doctors are often considered an obstacle and are said to have a negative impact on the implementation of national disease control programmes [15]. India has both the largest number of tuberculosis patients and a large private health sector. Moreover, people tend to prefer private doctors to free services offered by the government health services [4, 16, 17]. Among the poor urban populations, private doctors are usually the first contact of a patient seeking treatment and, since hospitalisation of tuberculosis patients is not only expensive but has also been shown to be unnecessary, the role of a private doctor who provides domiciliary treatment so convenient to a patient becomes even more important [7].

It is agreed that the present exercise is a test of knowledge of a general practitioner about treatment of tuberculosis rather than a test of his actual practice.

The lack of knowledge and awareness among doctors practising in the slums of Bombay about the correct and nationally recommended drug regimens to be used in the treatment of lung tuberculosis reveals their ignorance about important advances in the treatment of a very highly prevalent disease and an absence of communication between those involved in the implementation of disease control activities and the practising private doctors. The magnitude of the problem of tuberculosis in India is such that it is incumbent on every doctor practising medicine to be able to detect and treat a case of tuberculosis appropriately. It is difficult to find a scientific rationale for each of the 80 different regimens employed by private doctors.

The use of correct dosages of rifampicin and isoniazid in comparison with other drugs may be attributed to the availability of a correct type of combination which most doctors prescribe. This highlights the advantages that drug combinations may offer, if made available in a form suitable for easy administration, in improving both the patient and the physician compliance in treatment of tuberculosis. Fox, however, cautions against premature use of triple combinations widely available and promoted in this country in the absense of indisputable data about their possible deleterious effects on the bio-availability of the constituent drugs [10].

Continuous use of pyrazinamide was advocated by 33% of those doctors who included pyrazinamide in their regimens although efficacy of pyrazinamide in the continuation phase of a short-course regime is yet to be established. This too exhibits ignorance of doctors about the scientific rationale of the drug regimens they were using and their tendency to overmedicate.

Most doctors used more drugs than required for treating a case of tuberculosis. Clearly, patients of most doctors included in the study could receive unnecessarily prolonged chemotherapy if they would comply. Is there any possibility of the private doctors using excessive drugs intentionally to achieve rapid cure for patients, many of whom frequently change their doctors? It seems unlikely if the suggested durations of the regimens they prescribed are considered. 59 of 77 doctors who prescribed 4 or more drugs had recommended that their regimens be continued for over 6 months. About half the doctors were indiscriminately using drugs meant for short-course therapy for long durations of 12 months or more, as advocated for the conventional drugs used in older standard regimens. For most regimens that the private doctors were using, there is no point in prolonging well organised chemotherapy beyond 6 months.

An important outcome of research in chemotherapy of tuberculosis has been the demonstration that intermittent administration of drugs, in specific dosages and intervals, is as effective as giving them continuously [18–20]. None of the doctors in this study used any of the recommended or other intermittent regimens. This finding is consistent with Fox's observation on physicians in the UK who hardly ever used intermittent treatment as a routine even for the cases for which it would have proved advantageous [13]. The reluctance of private general practitioners to prescribe the much researched and recommended intermittent regimens needs further investigation.

A general notion is that since they are not adequately or as much exposed as allopaths to the practice of Western medicine and judicious use of chemotherapeutic agents, the non-allopaths tend to overmedicate and use injections excessively. This is apparent in drug regimens used by non-allopaths. However, a closer comparison (Fig. 2) between prescriptions by allopaths and those by non-allopaths with regard to drugs used, dosages and durations does not show any better performance of one group over the other, both being equally unsatisfactory. It is felt that non-allopaths too must be considered in any attempts to involve private doctors in tuberculosis control activities.

Much has been written about the cost of tuberculosis control. In fact, one of the major impediments in controlling tuberculosis in developing countries is said to be inability of these countries to earmark enough funds for mass application of the short-course chemotherapy [20, 21]. Clearly, the findings of this study demonstrate the inefficient use of scarce available resources on patients cared for by private doctors. This is illustrated by regimens prescribed by private doctors in this study which, besides being incorrect, were several times as expensive as the average cost of the recommended regimens.

Patient non-compliance is another major hurdle in effective control of tuberculosis. Estimates in India indicate that, of every 100 cases in the community, 30 are identified, about 10.5 remain under treatment for an adequate length of time and that only about 8 are cured [22]. To the best of our knowledge, studies on compliance of tuberculosis patients taking treatment in private clinics are non-existent. It has been well documented that, in general, doctors' prescriptions are often inappropriate, unnecessary, contain too many drugs and are unaffordable, leading to partial filling of prescriptions. The insufficiently informed health professionals prescribe a number of different drugs in the hope that one will be effective [23]. The medical implications of these practices, particularly in case of diseases like tuberculosis, become apparent only years later. Studies from many parts of the world including India show that indiscriminate prescription of these useful drugs leads to high levels of initial rifampicin resistance, in addition to high levels of isoniazid and rifampicin resistance [24]. The consequences of irregular drug intake and misuse of the available potent and powerful drugs could be serious.

The important issue is of establishing a meaningful communication between the private doctor and the public health services. It is well known that patients in India mostly report first to a private doctor [2]. Efforts could be made to see that the private doctors treat their patients with appropriate regimens and also that they make reasonable charges. It appears from this study that the private doctors are aware neither of the recommended less expensive but efficient continuous regimens nor of more suitable and effective 'supervised' intermittent regimens that help to ensure compliance. Doctors could give good treatment for the initial few months and then, if the patients cannot afford therapy, they should send them to the public health service which, in turn should willingly accept them and be prepared to continue appropriate chemotherapy rather than turning away the patients as having had previous chemotherapy. This will, of course, require input from private doctors as well as from the public health professionals.

Conclusions and possible interventions

The private doctors serving the urban poor in the slums of Bombay who treat patients of pulmonary tuberculosis in their clinics do not consider standard, cost effective drug regimens in the treatment of pulmonary tuberculosis, including those employed by the National Tuberculosis Programme of India. This shows ignorance among private doctors about the efficient treatment of a highly prevalent disease of major public health concern as well as the lack of communication between those implementing the National Tuberculosis Programme and general practitioners. In

light of this, it is important to educate private medical practitioners to bring and keep their knowledge of treatment of tuberculosis up to date.

Most private doctors, irrespective of their background and training, use modern chemotherapeutic agents in the treatment of tuberculosis. Those who are trained and qualified in the practice of Western medicine, as well as those trained in the indigenous systems, tend to prescribe excessive drugs often in inappropriate combinations and for periods longer than necessary. Mere dissemination of information about drug treatment of tuberculosis may not ensure its implementation. Ways need to be considered, such as adopting national drug regimens, making the necessary drugs available to all at uniform prices, and, at least for the major national disease control programmes, providing appropriate incentives and imposing sanctions to make private doctors participate in effective implementation of a programme of public health importance.

The drug regimens used by private doctors, besides being less than optimal, were several times as expensive as the standard recommended regimens. This inefficient use of scarce resources may be avoided both by continuing the education of private doctors by experts and by effective use of media and other possible modes of communication to educate lay people about the disease, the importance of regularity of treatment, and the efficient drug regimens to be taken under a doctor's supervision. This may also facilitate effective case finding and case holding, so important in the control of tuberculosis, by both public and private health sectors.

Acknowledgements

The first author deeply appreciates the support of Dr N H Antia, Director, and Mr Madhu Rokle, Research Investigator, of the Foundation for Research in Community Health, Bombay, in designing and conducting the study. Excellent comments on the earlier version of the manuscript by Professor Wallace Fox were extremely useful in revising the paper. We are most grateful to him for his contribution.

References

1. Health Atlas of India. Central Bureau of Health Intelligence, Directorate General of Health Services, Ministry of Health and Family Welfare, New Delhi 1986: 24.
2. Defeat TB: now and forever. Booklet issued by Directorate General of Health Services, New Delhi, on Silver Jubilee occasion of National Tuberculosis Institute, Banglore 1985.
3. Yesudian CAK. Primary Health Care planning in big cities with particular reference to Greater Bombay: Published by Unit for Extramural Studies, Tata Institute of Social Sciences, Deonar, Bombay 1984: 76.
4. Revankar CR, Jha SS, Dongre VV, Deshpande SS, Ganap. R. Integration of leprosy into general health services in an u ban area — a feasibility study. *Lepr Rev* 1982; 53: 297–30
5. Workshop Report: International workshop on 'Research t wards global control and prevention of tuberculosis wit an emphasis on vaccine development' Bethesda, Marylan November 1987.
6. WHO technical report series No. 671, 1982: 12.
7. WHO expert committee on tuberculosis. Ninth report. WHO technical report series No. 552, 1974.
8. Fox W. Compliance of patients and physicians: experience and lessons from tuberculosis-I. *Br Med J* 1983; 287: 33–35.
9. MIMS INDIA: Monthly Index of Medical Specialties. New Delhi 1989; 8(10).
10. Fox W. Tuberculosis in India. Past, present and future. *Indian J Tuberc* 1990; 37: 175–212.
11. Chaudhari K. Introduction of short course chemotherapy under National Tuberculosis Programme. *NTI Newsletter* 1987; 23: 104–106.
12. Fox W. Short-course chemotherapy for pulmonary tuberculosis and some problems of its programme application with particular reference to India. *Lung India* 1984; II(2): 161–173.
13. Fox W. Compliance of patients and physicians: experience and lessons from tuberculosis–II. *Br Med J* 1983; 287: 101–105.
14. Hong Kong Chest Service/British Medical Research Council. Survey of the previous investigation and treatment by private practitioners of patients with pulmonary tuberculosis attending government chest clinics in Hong Kong. *Tubercle* 1984; 65: 161–171.
15. Roemer MI. Private medical practice: obstacle to Health For All. *World Health Forum* 1984; 5: 195–201.
16. Roth, Gabriel. *The private provision of public services in developing countries*. Published for the World Bank. Oxford: Oxford University Press, 1987, 122–157.
17. Uplekar MW. Private doctors and public health: the case of leprosy in Bombay, India. *Nat Med J India* 1990; 3: 162–166.
18. WHO collaborating centre for Tuberculosis Chemotherapy, Prague. A comparative study of daily and twice weekly continuation regimens of tuberculosis chemotherapy, including a comparison of two durations of sanatorium treatment 1. First report: the results of 12 months. *Bull WHO* 1971; 45: 573–591.
19. WHO collaborating centre for Tuberculosis Chemotherapy, Prague. A comparative study of daily and twice weekly continuation regimens of tuberculosis chemotherapy, including a comparison of two durations of sanatorium treatment 2. Second report: the results from 12 to 14 months. *Bull WHO* 1973; 48: 155–165.
20. WHO collaborating centre for Tuberculosis Chemotherapy, Prague. A comparative study of daily and twice weekly continuation regimens of tuberculosis chemotherapy, including a comparison of two durations of sanatorium treatment. 3. Third report: the results to 36 months. *Tubercle* 1976; 57: 45–48.
21. Grzybowski S. Cost in tuberculosis control. *Tubercle* 1987; 68 (supplement): 33–37.
22. Radhakrishna S. National Tuberculosis Program: relative merits of enhancing the operational efficiency of different components of treatment programme. *Indian J Tuberc* 1983; 30: 3–8.
23. World Health Organization. Report of the conference of experts on the rational use of drugs. Nairobi, 25–29 November 1985. Geneva: WHO, 1987.
24. Trivedi SS, Desai SG. Primary anti-tuberculosis drug resistance and acquired rifampicin resistance in Gujarat, India. *Tubercle* 1988; 69 37–42.

Same as 1991 study

Tubercle and Lung Disease (1993) **74**, 332–337

Tubercle and Lung Disease

Planning and Practice

Private doctors and tuberculosis control in India

M. W. Uplekar, S. Rangan

Foundation for Research in Community Health, Worli, Bombay, India

SUMMARY. **Over three quarters of the 8 million registered doctors in India are engaged in private medical practice. In urban and rural areas alike people prefer private doctors to public health services for their health care needs. A majority of patients and those with suspected tuberculosis also report first to private doctors. Nevertheless private doctors seem to be alienated from national efforts towards control of tuberculosis, there being no well-defined role for them in the National Tuberculosis Programme. This study of private doctors practising in the low income areas of a metropolis of India reports on the knowledge of private doctors about diagnosis and treatment of tuberculosis and their awareness and perceptions about the public health services available for tuberculosis control.**

The study reveals gaps and weaknesses in the private doctors' reported practice of managing lung tuberculosis, the most important and persistent problem of public health concern in India. The need for organized efforts towards involving private doctors in disease control programmes wherein their curative functions could contribute significantly is stressed.

RÉSUMÉ. **Plus de trois quarts des 8 millions de médecins enregistrés en Inde exercent en pratique privée. En région urbaine comme en région rurale les habitants préfèrent se faire soigner par les médecins privés plutôt que dans les secteurs de santé publiques. La majorité des patients et des personnes soupçonnés d'être infectés par la tuberculose s'adresse d'abord aux médecins privés. Néanmoins, les médecins privés semblent éloignés des efforts nationaux de lutte contre la tuberculose, puisqu'il n'existe aucun rôle clairement défini pour eux dans le Programme National contre la Tuberculose. La présente étude sur les médecins privés exerçant dans les régions économiquement faibles d'une métropole indienne analyse leurs connaissances sur le diagnostic et le traitement de la tuberculose et sur leur information et perception des services de santé publique disponibles pour le contrôle de la tuberculose.**

L'étude révèle des lacunes et des faiblesses chez ces praticiens en ce qui concerne leur prise en charge de la tuberculose pulmonaire ; ceci constitue le probléme le plus important et le plus tenace de santé publique en Inde. Est soulignée ici la nécessité d'impliquer davantage les médecins privés dans des programmes de lutte contre la maladie où leur action thérapeutique pourrait être d'une grande utilité.

RESUMEN. **Más de las tres cuartas partes de los 8 millones de médicos registrados en India ejercen en práctica privada. Tanto en las áreas urbanas como rurales, los habitantes prefieren ser atendidos por los médicos privados más bien que por aquéllos que trabajan en los servicios públicos de salud. La mayoría de los enfermos y de los sospechosos de tuberculosis ven primero a los médicos privados. Sin embargo, los médicos privadios parecen estar alejados de los esfuerzos nacionales de control de la tuberculosis, no existiendo ningún rol definido claramente para ellos en el Programa National de Control de la Tuberculosis. El presente estudio sobre los médicos que ejercen en las áreas de bajos ingresos de una metrópoli de India informa sobre sus conocimientos sobre el diagnóstico y el tratamiento de la tuberculosis y sobre su información y percepción acerca de los servicios públicos de salud disponibles para el control de la tuberculosis.**

El estudio revela lagunas y carencias en los médicos privados en lo que respecta al manejo de la tuberculosis pulmonar, el problema más importante y persistente de salud pública en India. Se hace énfasis en la necesidad de implicar mayormente a los médicos privados en los programas de control de la enfermedad, en los cuales sus funciones curativas podrían ser una contribución importante.

Correspondence to: Dr M. W. Uplekar, Consultant, Foundation for Research in Community Health, 84–4, RG Thadani Marg, Worli, Bombay 400 018, India.
Paper received 22 June 1992. Final version accepted 29 March 1993.

INTRODUCTION

Despite the massive proliferation of government health services after independence, the private health sector in India is by far the largest medical sector and is responsible for almost three quarters of all medical care.[1] In rural and urban areas alike, people prefer to pay fees to a private doctor — modern or traditional — rather than obtain free care at a Western-type public hospital.[2] Not much, however, is known about the contribution of private doctors to improving the health of the populations they seek to serve. How well do they perform their primary function of providing curative services? What is their role in the national disease control programmes?

In the absence of a truly effective vaccine, early detection and optimal treatment — the primary functions of a practising doctor — are also the most important measures for tuberculosis control. Tuberculosis thus provides a classic example for studying the role of private doctors in controlling diseases of public health importance. The National Tuberculosis Institute, responsible for designing, launching and monitoring the National Tuberculosis Programme, has identified the involvement of private medical practitioners as a key to the success of tuberculosis control in India.[3] Few studies, however, have looked into the extent of their involvement in tuberculosis control activities.[4,5]

This paper examines the role of private doctors in tuberculosis control. The response of private general practitioners (GP) practising in low income areas of Bombay to questions aimed at assessing their knowledge and practice as regards the diagnosis and treatment of lung tuberculosis, their awareness of the national tuberculosis control programme and their impressions of public health services for tuberculosis control are presented, analyzed and discussed. Such information may, it is hoped, contribute to a better understanding of the present contribution of private doctors in tuberculosis control, help delineate the responsibilities of private medical practitioners and identify possible ways and means to involve them in the implementation of tuberculosis control activities as well as other disease control programmes of public health importance.

MATERIALS AND METHODS

The island city of Bombay, spread over 603 km^2 and housing a population of 9.9 million, was the location of the study. The city is predominantly a trading, commercial and industrial centre which plays a vital role in the country's economy. Since it offers better job opportunities, there is a continuous influx of rural migrants into the city who get absorbed into the poorly paying informal sector and settle down in shanty settlements in all kinds of vacant areas. It is estimated that about 51% of the city's population lives in such settlements. One such large low income settlement in Bombay, Dharavi, which has half a million people living in an area of one square kilometer, was selected for the study. Apart from an adjacent teaching hospital, health care facilities available within this area include an urban health centre, 3 peripheral dispensaries and outreach services run by the municipality and numerous private doctors practising in each of its lanes and by lanes. A small part of this settlement housing an estimated 200 000 people was randomly selected. A list of all the doctors practising in the area, allopathic (trained in Western medicine) as well as non-allopathic (Ayurvedic, Unani, Homeopathic, etc.) was made and a random sample of 143 doctors was drawn from the list of 287 doctors. A semi-structured interview schedule was prepared by the first author — a practising physician himself — and administered to the selected doctors by himself and a research investigator oriented in relevant aspects of TB and trained and experienced in conducting private doctor interviews (Table 1). The recorded responses were later compiled and analyzed. For a question on the treatment of pulmonary tuberculosis, a slip was provided for the respondent to fill in a prescription for an adult, infectious (sputum positive for acid-fast bacilli), previously untreated patient of pulmonary tuberculosis weighing 50 kilograms. These responses were analyzed separately using EPI-INFO, a software package developed by the World Health Organization and Centers for Disease Control, Atlanta, Georgia, and have been published earlier.[6]

Table 1. The Interview Schedule.

1.	Do you come across tuberculosis patients in your clinic?
2.	Do you treat them?
3.	How many patients of pulmonary tuberculosis are under your treatment at present? (State approximate numbers)
4.	Is tuberculosis notifiable?
5.	Could you name some other notifiable diseases?
6.	What are the early manifestations of pulmonary tuberculosis?
7.	How would you manage a patient presenting with productive cough of 3 weeks' duration and no other symptoms?
8.	How do you confirm diagnosis of tuberculosis in adults?
9.	Where do you send your suspected tuberculosis patients for investigation?
10.	How much does it cost to diagnose a case of tuberculosis?
11.	What investigations do you perform on your tuberculosis patients during the course of anti-TB treatment, and how often?
12.	What percentage of your patients do you think fail to complete the prescribed treatment?
13.	Could you tell us the two most common reasons for default?
14.	Do you refer your tuberculosis patients to municipal or government clinics? When?
14a.	If you do what is your opinion about the public health services?
14b.	If not, why not?
15.	Could you tell us the approximate average cost of medical treatment for a tuberculosis patient?
16.	What do you know about the National Tuberculosis Programme?
17.	Who updates your knowledge about tuberculosis?

RESULTS

31 doctors refused interviews without giving any specific reason for their refusal, and 10 doctors could not give enough time to complete the schedule at one

stretch. Completed schedules were obtained from 102 doctors — 48 allopaths and 54 non-allopaths — with an overall response rate of about 70%. There was no significant difference between the answer rates of allopaths (90.97%) and non-allopaths (88.27%). Doctors were given a choice not to respond to any question if they so wished. While 26.74% of responses from allopaths fell into the categories of 'do not know' or 'no response', those of non-allopaths falling into these categories amounted to 47.38%.

Tuberculosis patients in private clinics

All private doctors did come across patients suffering from pulmonary tuberculosis in their practices and treated them in their clinics. The number of pulmonary tuberculosis patients being treated in a private doctor's clinic at the time of the study varied from 0–20 (Fig. 1). In response to notification of cases of tuberculosis, 25 out of 102 doctors did not know whether tuberculosis is notifiable, 23 said that TB is not notifiable, 27 felt it may be notifiable but it is not compulsory to do so, while 7 chose not to reply. When asked to mention a few other notifiable diseases, 29 could not. Others mentioned one or more including smallpox, cholera, food poisoning, meningitis, diphtheria and tetanus.

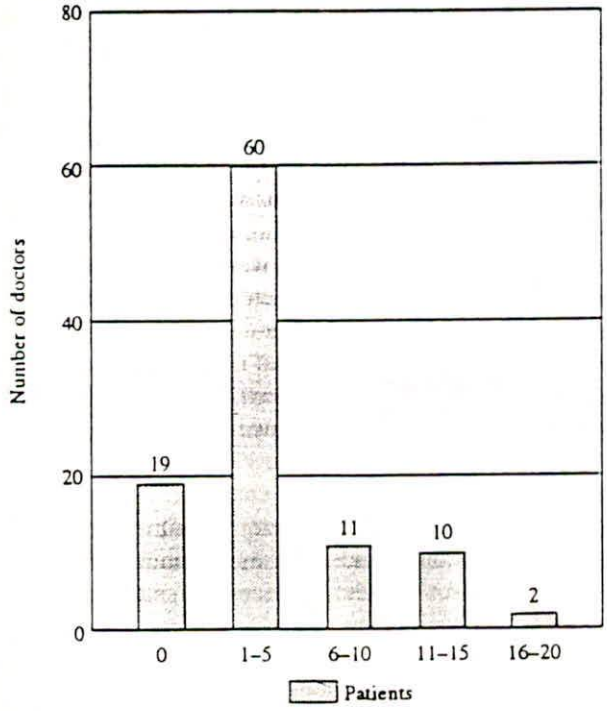

Fig. 1—Tuberculosis patients in private clinics

Management of lung tuberculosis

All doctors replied correctly about the early manifestation of pulmonary tuberculosis. When questioned about the management of a patient presenting with productive cough of over 3 weeks' duration, 43 doctors said that they would treat the patient with antibiotics and cough mixture and wait for the response before investigating further; 11 would dispense only cough mixture, requesting the patient to report if cough persists; 17 would send the patient off with only a course of antibiotics, and only 20 replied that they would first investigate the case before starting treatment. The practice of first treating any patient with a long standing cough for pulmonary tropical eosinophilia was being observed by 11 doctors. In response to the question about confirmation of clinical diagnosis of tuberculosis, the necessity of performing a Chest X-ray, Complete Blood Counts (CBC) and Erythrocyte Sedimentation Rate (ESR) was felt by 99 doctors. Three doctors would rely on X-ray alone, while sputum examination for the diagnosis of tuberculosis was mentioned by only 39 doctors.

All, except for two doctors who employed indigenous drugs in the treatment of tuberculosis, prescribed drugs used in short-course chemotherapy, irrespective of the sputum status of the individual. No doctor mentioned use of thiacetazone or any of the older standard

Table 2. Drug regimens and durations reported by private doctors

Regimens*	Number of doctors	Duration in months
SHRZE	13	12
	12	9
	4	18
	2	6
	2	12–18
	1	9–12
SHRZ	5	6
	4	9
	1	8
	1	12
	1	18
SHRE	7	12
	4	9
	3	< 6
	1	6
	1	9–12
	1	12–18
	1	18
	1	24
HRZE	8	12
	6	6–9
HRZ	8	9–12
HRE	6	12–18
SHR	3	12
SHE	1	6
SRE	1	6
HR	2	9

*All doctors using streptomycin employed it for the initial 2–3 months only. Use of pyrazinamide in the initial phase of 2–3 months was advocated by 67% of doctors employing the drug; the remainder recommended continuous use. Other drugs were reported to be used throughout the duration of regimens prescribed.

S = Streptomycin; H = Isoniazid; R = Rifampicin; Z = Pyrazinamide; E = Ethambutol.

Source: Uplekar M W, Shepard D S. Treatment of tuberculosis by private general practitioners in India. Tubercle, 1991; 72: 284–290.

regimens in the treatment of pulmonary tuberculosis. While there are several efficient recommended standard regimens, 100 doctors prescribed 80 different regimens, most of which were both inappropriate and expensive (Table 2). A detailed analysis of the reported prescriptions of private doctors for pulmonary tuberculosis has already been published.[6]

Costs of diagnosis and treatment

Patients suspected of suffering from pulmonary tuberculosis were being sent for investigation by all of the doctors to either private laboratories or charitable institutions, and none of them referred the suspects for diagnosis of tuberculosis to the public health facilities available in the vicinity. Doctors' estimate of the costs of diagnosis of pulmonary tuberculosis varied from Rs.50 (US$3.3) to Rs.200 (US$13.3). 41 doctors were observing the practice of referring all of their newly diagnosed cases to private consultants for advice on treatment, thus adding to the costs. The most expensive short-course chemotherapy regimen recommended by the National Tuberculosis Programme cost less than Rs.1000 (US$66.6) at the time of the study. A wide variation was observed among the doctors' estimates of costs of drug treatment of pulmonary tuberculosis, from a minimum of Rs.1500 (US$100) to Rs.5000 (US$333.3) (Fig. 2). 17 doctors could not give an estimate.

Patient compliance in private practice

Only 7 doctors reported that all of their pulmonary tuberculosis patients completed the prescribed treatment. 52 doctors put the treatment completion rate of their patients at 50%, 22 reported it to be between 25% and 50% and 21 admitted that less than a quarter of their pulmonary tuberculosis patients complete the prescribed treatment. The private doctors' perceptions of some of the causes of treatment default by tuberculosis patients are given in Table 3.

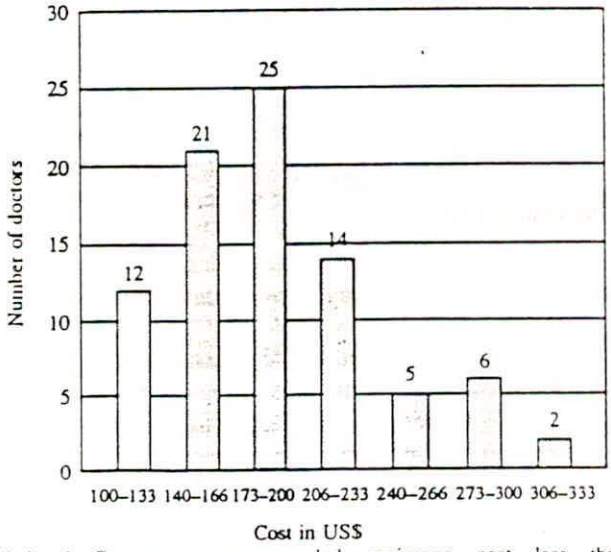

Fig. 2—Costs of drug treatment of tuberculosis (private doctors' estimates)

Table 3. Private doctors' perceptions about the common causes of patient default.

	Perception in brief	Number of Doctors sharing the perception
1.	Patients are illiterate. They do not realize the importance of regular treatment.	32
2.	Drugs are expensive. Patients can not afford complete treatment.	25
3.	Patients are careless. They spend all their money on alcohol, smoking, gambling.	22
4.	Patients get better very soon and do not feel the need to continue treatment.	20
5.	Patients are ignorant and do not bother about the consequences of not taking treatment.	3

Use of public health facilities

The nearest municipal clinic, which offers both diagnostic (X-ray and sputum examination) and treatment facilities to patients of tuberculosis free of charge under the city tuberculosis programme, has one trained doctors who visits the clinic twice a week, one treatment organizer and one health visitor. The clinic has around 500 registered cases, with an average daily attendance of about 35 patients.

A large majority of the 91 doctors were referring only those patients who could not afford treatment in private clinics and those who wished to use public health facilities for treatment at municipal or government clinics. When these doctors were asked about their opinion of the public health service's treatment of tuberculosis, 38 doctors put it as 'average' and 53 doctors recorded 'not satisfactory' on a 5 point scale ranging from very good to bad.

11 doctors would never refer their tuberculosis patients to municipal or government clinics for treatment. The reasons they put forward included poor service (4), bad treatment (2), poor quality of drugs (3) and non-availability of drugs (2).

Awareness of the National Tuberculosis Programme

When asked whether they had heard about the National Tuberculosis Programme, 32 doctors replied in the negative and the rest in the affirmative. All of those who replied in the affirmative, however, expressed their inability to elaborate on their knowledge about the activities under the National Tuberculosis Programme.

Updating knowledge about tuberculosis

In response to a question about means of updating their knowledge on tuberculosis, 67 doctors mentioned medical representatives of drug companies as their main source of acquiring new knowledge on drug treatment of tuberculosis. 24 doctors relied on conventional textbooks, 6 updated their knowledge through lectures and meetings arranged by medical associations, while 5 chose not to reply to this question.

DISCUSSION

In India, it is common knowledge that although doctors trained in different systems of medicine are enagaged in private practice, they are not prohibited from practising any other system in which they are not trained. As Western medicine, identified with quick cures, is most popular, most non-allopaths practise allopathic medicine.

One of the major reasons why studies on private doctors are few and far between is their reluctance to cooperate in providing information related to their practices. In our past experience, attempts at eliciting detailed personal information reduced answer rates considerably. In this study, therefore, no personal details of any kind were requested. Even the names and qualifications of doctors were noted from the name boards always prominently displayed by the doctors. Also, since the main objective of the study was to assess knowledge and practice of all practising doctors treating tuberculosis patients, and not to compare the performances of allopaths and non-allopaths, the first questions asked each doctor were whether he came across and whether he treated tuberculosis patients in his clinic; the interview proceeded if the answer was in the affirmative.

Notwithstanding the fact that utilization of peripheral government health services in urban as well as in rural areas is poor, most national disease control programmes are solely run by and through the public health services. Few attempts have been made to involve private doctors in implementing disease control programmes. As a consequence, some private doctors are unaware even of the existence of such national efforts of great relevance to their own sphere of activity. This is clearly demonstrated in the present study, where about 30% of the doctors had never heard of the National Tuberculosis Programme (NTP), while all of them treated tuberculosis patients in their own clinics.

The importance of the notification of communicable diseases cannot be overemphasized. Private doctors' laxity in reporting notifiable diseases is known for all such cases and it is not surprising that none of the private doctors included in the present study ever reported a case of tuberculosis. When over 60% of tuberculosis patients report to doctors of modern medicine,[3] it is imperative that some effective mechanism for the notification of diseases of public health importance by private health providers be established and implemented.

Banerji puts the blame of the NTP's modest achievements squarely on the health providers, public as well as private, who send tuberculosis patients home with bottles of cough mixture.[7] Less than 20% of the doctors included in the present study were adhering to the practice of first investigating a case of chronic cough before instituting definitive treatment; the remaining majority prescribed non-specific symptomatic therapy hoping that the patient, if he failed to respond, would return.

Overdependence of private doctors on chest X-ray as the diagnostic tool for pulmonary tuberculosis is noteworthy. It is likely that this may lead to overdiagnosis, overmedication and wastage of short-course chemotherapeutic drugs on patients who may not need such treatment. This aspect needs to be investigated further. Use of sputum examination for confirmation of clinical diagnosis of pulmonary tuberculosis by only 39 doctors highlights not only their ignorance of the value of this simple test in clinical practice but also their indifference to the public health implications of the sputum status of a tuberculosis patient. This is also demonstrated in their blanket application of short-course chemotherapy to all cases of pulmonary tuberculosis. Another probable reason for most of the doctors' dependence on X-rays for diagnosis may be because, being more expensive, the X-ray could prove to be financially more viable to the referring doctor than the cheaper sputum examination – especially in cases where there is some financial arrangement between the doctor and the diagnostic centre. This may also be the reason why none of them prefer to refer patients for investigation to the nearby public health facilities where both these tests are offered free of charge to the patient.

While the most expensive anti-tuberculosis treatment regimen recommended by the National Tuberculosis Programme, applying retail prices of the drugs at the time of the study, cost less than Rs.1000 (US$66.6), all the private doctors estimated the cost of drug treatment of tuberculosis to be over Rs.1500 (US$100) (Fig. 2). The observation that most doctors were prescribing short course chemotherapy for a longer than necessary duration possibly explains their overestimate of the cost of tuberculosis treatment (Table 3). This practice is not only an inefficient use of scarce resources but could also adversely affect the compliance rates of low-income patients.

No information is available on treatment completion rates of tuberculosis patients seeking treatment in private doctors' clinics. It is reasonable to expect improved compliance from patients taking treatment from their preferred providers. Estimates of treatment completion rates of their patients reported by the doctors themselves are contrary to this expectation, most doctors stating that very few of their patients completed the prescribed treatment. The doctors, however, have put the blame of default entirely on the patients themselves (Table 2). As

was to be expected, none of the doctors had any mechanism for tracing the defaulters and putting them back on treatment, since they neither recorded the patients' complete addresses, nor did they utilize their clinic assistants, when they had any, to visit the defaulters. The private doctors' concern about the problem of patient defaulting and the imput they could provide to minimize this problem is another area which merits further investigation.

A tuberculosis patient referred by any private doctor to the public health service is treated no differently from anyone presenting to the clinic directly, and no record of the referral source of patients is maintained. Looking at the poor utilization of public health services and the low opinion doctors have of them, no links appear to exist between private doctors and public health services, both of which on the contrary condemn each other respectively for money-mindedness and inefficiency.

Much could be written about the training conditions of doctors in India. The poor performance of private doctors clearly shows the inadequacy of their undergraduate as well as in-practice training. The content and quality of undergraduate training with regard to diseases of public health importance leave much to be desired, but elaboration on these aspects would be out of the scope of this paper. One fact deserving mention here is the total lack of any organized effort at providing continuing medical education for practising doctors, a situation which is further accentuated by the fact that no system for the renewal of practice licences exists here. It is regrettable that many doctors have to depend on drug company representatives to update their knowledge of therapeutics, a task that could be very effectively undertaken by their own associations and medical colleges, as well as by the programme managers of the national disease control programmes.

It is evident that private doctors cannot be wished away, as the people themselves opt for their services, but at the same time they must not be granted total freedom to act as they see fit without heeding the wider repercussions of their actions. What can be expected of private doctors if they do not see any place for themselves in tuberculosis control activities; if the public health services do not even attempt to reach out to them and attempt collaborative efforts; and if no incentives are provided for conducive performance nor sanctions imposed for actions detrimental to the health of the people?

In the virtual absence of any collaborative effort between private doctors and public health services, several specific areas for mutual cooperation could be identified. These include inviting representatives of private doctors to participate in the planning process of tuberculosis control activities; involving them in case-finding activities within the areas of their practice; providing them with free or subsidized diagnostic facilities; making drugs available, at least for the poorest patients diagnosed and referred by private doctors, at the public centre, or supplying drugs to individual doctors on submission of reports and records and perhaps undertaking the verification of the proper use of durgs; and to improve case holding, providing them with educational material and the services of a social worker for imparting health education, motivating patients to complete the prescribed treatments and tracing defaulters. Adequate orientation and training of private doctors on various aspects of tuberculosis control, and the vital contribution they could make in facilitating it, must precede the undertaking of any specific interventions and continue on a regular basis. Unfortunately any attempts at involving private doctors in tuberculosis control are conspicuous by their absence today. Pilot experiments employing strategies aimed at eliciting doctor participation could provide the much needed information on the strengths and weaknesses of private doctors in contributing meaningfully to tuberculosis control.

There is a need for better communication between private doctors and those implementing disease control programmes. It is unreasonable to expect private doctors to follow appropriate clinical and public health practices without adequate knowledge of the correct ones. The commercial interests of private practitioners may not always come in the way of obtaining their cooperation in a few specific disease control programmes to begin with. In the case of tuberculosis in particular, where the experience of private doctors could significantly contribute to disease control, the wider public interest must take precedence over the narrow concerns of private doctors.

Acknowledgements

The authors are deeply grateful for the support of Dr N. H. Antia, Director, and Mr Madhu Rokle, Research Investigator, of the Foundation for Research in Community Health, Bombay, in designing and conducting the study.

References

1. Duggal R, Nandraj S, Shetty S. State sector health finance — A Database: All India. The Foundation for Research in Community Health, Bombay 1992: 12.
2. Roth G. The private provision of public services in developing countries. Published for the World Bank. Oxford: Oxford University Press, 1987: pp 122–157.
3. Defeat TB: now and forever. Booklet issued by Directorate General of Health Services, New Delhi, Silver Jubilee of the National Tuberculosis Institute, Bangalore: 1985.
4. Fox W. Compliance of patients and physicians: experiences and lessons from tuberculosis – II. BMJ 1985; II: 161–173.
5. Hong Kong Chest Service/British Medical Research Council. Survey of the previous investigation and treatment by private practitioners of patients with pulmonary tuberculosis attending government chest clinics in Hong Kong. Tubercle 1984; 65: 161–171.
6. Uplekar M W, Shepard D S. Treatment of tuberculosis by private general practitioners in India. Tubercle 1991; 72: 284–290.
7. Banerji D. Tuberculosis as a problem of social planning in India. NIHAE Bulletin, 1971; 4: 9–25.