Tuberculosis Control Concept in Nepal

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1. Tuberculosis is not an easy disease to treat in any country. In Nepal, where the terrain hardly encourages rapid mobility, and the annual expenditure on health per capita is one US dollar, the logistics of providing an effective Tuberculosis Control Programme are difficult but not, fortunately, impossible. The problems are formidable in any field of medicine or surgery, but because TB requires regular treatment for up to, or beyond, eighteen months, it is, perhaps, a special case.

2. THE PREVALENCE OF TB

Not a great deal is known, but some work has been done and is briefly discussed.

- (a) House to house surveys have been carried out at the same time as mass BCG vaccination programmes in several districts by TBCP and BNMT. In general, approximately half of the adult population were available for interview, and of these, about 4% were TB symptomatics, i. e. coughed for more than one month, haemoptysis, chest pain and fever. (Table 1). This gives a prevalence of 0.4-0.5% for PTB. In one Jilla, Dhankuta, we have broken down the case-finding into ages (Table 2). It can be seen that the number of sputum positives among the 25-40 year age group is the highest for the number of sputa examined. In our house to house surveys the male population aged 25-40 comprises, however, the largest age

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group not available for questioning and therefore for sputum examination. They are usually out at work.

- (b) Surveys in the Kathmandu valley and in the hills (Dr. Iwamura) showed an infective rate of sputum Pos. TB of 0.82 and 1.78 respectively (Table 3 and 4).
- (c) Dr. Phelps found in Kalimati that of the adult population contacted, 0.75% were sputum positive.
- (d) In 1945 Dr. J. Aspin reported that 1% of Gurkha Recruits had PTB.
- (e) Overall prevalence:

Microscopic examination does not quite give 100% accurate diagnosis of PTB even with 3 early morning sputum samples. Often the bacilli count is too low to be detected without culture. (However, in a clinic, of cases of PTB under therapy, probably a figure of 70% sputum Positive is acceptable.) Below 60% sputum positive may mean that either not enough slides are being examined, or that too many patients are being treated on x-ray diagnosis only.

Now, if prevalence surveys show that about 0.5% of the adult population have sputum positive tuberculosis, the prevalence for all types of the disease, including gland, abdominal, and pulmonary sputum negative may well be 1-2%. (This figure includes children.)

3. THE DIAGNOSIS OF TB

The pool of infectivity lies in the (usually adult) population who are coughing up the bacilli. Thus, the examination of the sputum of symptomatics is the most important method of selecting patients for therapy, accurately. It avoids the two problems that have been encountered in many countries where TB is common, (i) over-treating and (ii) under-treating. We, in Dhankuta, have unwittingly been treating two patients who were sputum negative over the past year with INH/TBI. Unfortunately, as time passed it became clear that the diagnoses were carcinoma of bronchus and Hodgkin's disease respectively. For neither of these two cases were the TB drugs very helpful. Sometimes a symptomatic with haemoptysis who is sputum negative has to be treated with anti-tuberculous INH/TBI as a trial of therapy. This has to be accepted as a realistic occasional diagnostic method in many parts of Nepal where x-ray facilities are lacking.

X-rays can be useful but it is clear that cases of **non-TB bronchiectasis, bronchitis etc.** are being treated as TB. As Sir John Crofton showed in the seminar in Kathmandu last February, in a survey among expert radiologists, there was little unanimity on what constituted PTB and a very low correlation of x-ray diagnosis with culture results.

GLAND TB.

It often seems easy to diagnose, but it is always well worth examining the scalp and throat, particularly in children with several weeks history of enlarged cervical glands, to ensure that the glands are not infected secondarily to the scalp.

TB MENINGITIS.

This is often difficult to distinguish from aseptic meningitis, or a viral infection. The CSF tends to be opalescent, but the important feature is the **lower blood sugar level**, and **AFB may be seen on a sputum sample** as well as in a centrifuged CSF specimen.

ABDOMINAL TB.

History, examination of the abdomen and trial of therapy.

4. THE CONTROL OF TB.

There are three ways in which TB prevalence may be brought down to an acceptable level in a community:-

- (a) Immunisation.
- (b) Case Finding and Treatment.
- (c) By improvement in the socio-economic status, (as in Europe in the last century.)

(a) IMMUNISATION (BCG)

Work carried out in the UK on a large scale by MRC has provided data that show that BCG gives **just over 79% protection against TB**. It is not clear in developing countries whether the same figure applies since there are two major differences in the conditions under which the vaccine is given, when such countries are compared with the U. K.:-

(i) STORAGE OF THE VACCINE AND MAINTENANCE OF THE COLD CHAIN.

1. The life span of BCG freeze dried vaccine is not more than 4 weeks outside refrigerations.
2. Reconstituted vaccine has a "life" span of only 4 hours in normal field conditions.

Thus, in Nepal, high temperatures for many months of the year may cause an even more rapid deterioration in the viability of the vaccine. In addition, lack of skilled manpower may mean that refrigeration units are not functioning properly if at all.

- (ii) The nutritional status of the children may be too low in an appreciably large section of the population to produce an adequate immune response. Our concern over this has led us to propose a trial of BCG efficacy, to determine whether the annual incidence of TB which should fall after a mass BCG vaccination campaign has the same order of magnitude in the two groups, adequately nourished and malnourished, as it is anticipated it will show before vaccination. In other words, whether applying the MRC figures, there is a drop of approximately 80% in the annual incidence of TB in both groups (adequately nourished and mal-nourished) under study. We anticipate that the study will take about five years for significant data to be collected or, perhaps more realistically, for a trend to be demonstrated.

In spite of the problems of storage and refrigeration, it is worth noting that only one sample of vaccine, taken from the field, that we have had tested in the U. K., showed a viability count of 50% more than the minimum required for an effective vaccine.

From 1965-1978, BCG has been carried out by TBGP, BNMT, IHS Missions, FP and MCH, EPI, NTBA, NCO/SCF on a total of 3.5 million children.

(b) CASE FINDING AND TREATMENT *

Intensive therapy, particularly applied to the sputum positive members of the community provides the quickest methods of reducing the prevalence of all types of TB by reducing the pool of infectivity. The trouble is that a high cure rate has to be attained before the chronic excretors are numerically reduced. (See Table 5). It can be seen that unless

* Note: In case finding by microscopy, approximately 40% of the infective cases will remain undetected unless multiple early morning sputum samples are examined.

a cure rate of about 70% is reached, the chronic excretor rate of 25% remains unaltered. And, in the presence of what is termed in the table as "unsatisfactory programme", most of these chronic excretors will be drug resistant also.

The type of therapy is not really relevant as long as it provides a cure rate of about 85-90%, i. e. that of Streptomycin INH/TBI for two months, and INH/TBI only for a further eighteen months. A regime that is 98% effective is only significantly more helpful when all the TB patients in a community are receiving therapy, and when the defaulting rate is virtually zero. The Table 6 shows the contrast in two hypothetical situations. The first is where there is a high efficacy in the drug regime, but poor compliance on the patients' part, and only a few of the sputum positive patients are under therapy. The second, shows the more marked reduction of TB in the community when there is an effective delivery of TB services, but not so effective or expensive a drug regime.

A further point about therapy is not merely that the patient with bacilli in his sputum is cured as a result of anti-tuberculous drugs, but that he becomes culture negative very early on in the treatment. Although bacilli appear in the sputum for up to three months in a patient who is responding to therapy, these bacilli are not infective. After two to four weeks' treatment, the microscope may demonstrate several bacilli per field, but the culture of the same sputum sample will yield no growth.

With these points in mind, let us have a look at some of Nepal's problems with specific reference to TB, present methods being used to combat the disease, and tentatively suggest further ideas for implementation, discussion, acceptance (or outright rejection.)

(c) SOCIO-ECONOMIC STATUS

The medical profession can only intervene in this particular problem by improvement in the general standard of preventive and therapeutic medicine, as well as acting as a pressure group for the political and socio-economic reform where relevant to Nepal's needs.

5. NEPAL'S PROBLEMS

- (a) The terrain of the country makes communications difficult over the major part. Medical services are difficult to support, and patients have difficulty in reaching curative centres.

- b) There is a doctor/patient ratio of about 1:37,000, and of course the ratio is much satisfactory still outside Kathmandu.
- (c) Health expenditure is about 12 NCR per annum per capita (as stated earlier) 1.2% health budget being spent on TB.
- (d) Poor nutrition and perhaps low socio-economic conditions. This has to mean resistance to infection.
- (e) Population movements have often meant bringing infection from areas outside Nepal (e. g. Assam) into the country.
- (f) Availability of drugs in the past and their distribution to treatment centres. Failure to request drugs from Kathmandu in time for uninterrupted therapy.
- (g) A high defaulting rate, which we will discuss in more detail later.

6. AVAILABLE FACILITIES

- (a) At present (1978 figures) there are 50 HMG and 15 other hospitals.
- (b) 483 health posts, 278 of which have been integrated.
- (c) 90 Ayurvedic hospitals and dispensaries.
- (d) 40 Centres or Laboratories with a microscope.
- (e) 19 x-ray units, not all of which are in operation.
- (f) Equipment, advice and facilities from WHO, UNICEF, missions and other organisations.
- (g) TBCP set up in 1965 to train, supervise TB drug distribution, advise on control methods and carry out field work, e. g. BCG, as well as evaluation of progress.
- (h) BNMT is responsible (amongst other things) to TBCP for TB control in E. Nepal, setting up clinics and laboratories attached to HMG hospitals and BCG vaccination.
- (i) FP/MCH, NCO/SCF, Integrated Health Services and EPI are involved with BCG.

7. PROBLEMS WITH MANAGEMENT OF TB

There is nothing startlingly new in this list; more could probably be added.

First difficulties in the treatment of TB; and then suggested remedies.

- (a) Drugs not available in the health posts or hospital.
- (b) Inadequate explanation by clinician of the need for long term therapy.
- (c) Incorrect management, e. g. changing one drug at a time if resistance is suspected.
- (d) Resistance because patient has already been buying tablets from bazar etc.

(b) Previous course of Pen/Streptomycin for recurrent chest infections

(c) Multiple therapy with vitamins, etc.

(d) Excess use of x-ray diagnosis.

Secondly, problems associated with the management and supervision of patients.

(a) Defaulting or non-compliance.

(i) Patients who live more than about three hours away are often either reluctant to come to the treatment centre in the first place, or reluctant to continue therapy.

(ii) A distrust of scientific medicine.

(b) Looking after patients during their initial intensive three drug period. They have nowhere to stay, hospitals have no room, and there is no food available.

REMEDIES

Some are being used now in parts of the country, and could be extended elsewhere.

(a) **Drugs not available.** If necessary international funds may have to be made available to ensure a regular supply of TB medicines. TB is not the kind of disease that can be treated irregularly because of the danger of resistance. It is not possible to stop for a couple of months and ask the patient to return when the drugs are available again. It might cause rejoicing among the TB bacilli, but not among the patients or medical profession.

(b) **Inadequate explanation.** We, as a profession, are rather apt to think that we are slightly superior to patients, particularly if we are providing what is described as a free health service. Here as in UK, doctors are liable to behave as if they were the source of the charity. We all make this mistake, and when explaining to a TB patient how essential it is to take regular therapy, it is important to recognise him or her as a fellow human being.

(c) **Incorrect management** Mistakes are easy to make in TB therapy. A book on TB chemotherapy is being printed in Nepal.

(d) **Resistance.** Over the next year, legislation may be considered necessary to control the sale of all types of antibiotics without a doctor's prescription. To re-state what was pointed out at the TB seminar last year in Kathmandu, one of our staff visited six pharmacy halls complaining of a cough. When he stated that he had coughed up blood,

or had the cough for several months, TB medicines were offered on each occasion, even rifampicin, two week's course only.

- c) **Penicillin / Streptomycin.** It is possible that Pen/Strep should be recommended, as unsuitable for use in chest infections in Nepal.
- f) **Multiple Therapy.** We feel that medicines additional to antituberculous therapy are usually confusing. They may have their place when the patient who is anaemic, for example, has a course of iron therapy after demonstrable improvement following, say, four weeks' Streptomycin, INH/TB1. Confusion occurs when the patient does not know what medicine has made him better.
- g) **X-RAYS.** Expert radiologists often do not agree on whether the lesions on an x-ray are due to TB or, if they are, whether they are active.

ii) THE SUPERVISION OF PATIENTS.

a) Non-compliance; (Table No. 8)

- i) Treat the patient as near home as possible, for example, using health posts. This was recommended last year in the TB Seminar, and table number 7 illustrates our results in Eastern Nepal over the years since we started this.
- ii) An adequate supply of TB drugs is essential for continuity of treatment.
- iii) Many trials throughout the world have shown conclusively that patient compliance is proportional to the amount of explanation provided by the clinician in the first place. We also try to get longer established patients to talk to the new patients.
- iv) Health posts are more likely to support the anti TB programme if given encouragement as a result of visits from a Health Inspector and, if he has time, the doctor.
- v) If defaulting still occurs, and however well the clinic is run this is inevitable. IHS has Village Health Workers in Integrated areas, who are taught to trace defaulters. Sometimes initial supervision of VHWs is necessary. Areas that are not integrated can usually manage by making full use of panchayat authorities or having a defaulter chaser attached to one or even two districts. Patients who live more than three hours away will use health posts if these centres are supplied with medicine and supervision.

- b) **A Distrust of scientific medicine.** This will: be modified by
 - i) time.
 - ii) seeing that it really does work.
- c) **Initial two month therapy.** Even when health posts are fully used, there are always a number of patients (usually averaging ten) who need to stay near the hospital for their daily injections. At present, we in BNMT are building some simple hostels in which the patients look after themselves. Since they are sited near the District Hospitals this does help to solve the accomodation, if not the food, problems.

We feel that urgent consideration should be paid to this problem particularly in the hilly and mountainous regions, where without some kind of hostel accomodation (not hospital) sputum positive patients cannot receive the initial intensive therapy they need to protect their community as well as to control their own disease.

SUMMARY

This paper looks at some of the difficulties in TB management. It also attempts to encourage the medical and paramedical professions to regard TB Control as something more than handing a TB suspect a supply of medicines, rather to regard case finding and case holding as challenges which can be overcome.

TABLE ONE

ACTIVE TUBERCULOSIS CASE-FINDING

No of Districts	Geographical areas	Population contacted 15 yrs+	Symptomatics	Sputum +ve	% of Symp among contacted	% of sputum +ve among symptomatics
3	Teria (Plain)	172,241 (51.9%)	6,061	370	3.5	6.1
10	Mid-mountain	401,000 (45.7%)	21,021	672	5.2	3.2
2	Himalayan	4,892 (48.2%)	1,779	37	36.4	2.1
15	TOTAL	578,134 (47.3%)	28,861	1079	4.7	3.8

TABLE TWO

AGE	Sputa Examined	Percentage of Total	Sputum Positive	Percentage sp. Positive
Under 15	20	1.25	None	None
15-19	38	2.3	1	2
20-24	93	5.8	4	8
25-29	121	7.5	7	14
30-34	123	7.6	6	12
35-39	142	8.9	8	16
40-44	209	13.0	—	—
45-49	175	11.0	4	8
50-54	191	11.9	8	16
55-59	140	8.75	4	8
60-64	147	9.2	4	8
65-69	92	5.75	3	6
70-74	67	4.2	1	2
75-79	24	1.5	—	—
80	14	0.9	—	—

An analysis of the house-to-house BCG/TB case-finding in Dhankutta
giving age and sputum details

LE THREE

VEY IN KATHMANDU VALLEY

Case-finding by Microscopic sputum Test	Lalitpur City Nov 70 to July 72	Chapagaon Dec to July 72	Badgaon May 1972 to July 1972	Bagmati May 1972 to July 1972
1. Interviewed	9,286	2,873	603	435
2. Sputum of symptomatic person tested	39	76	18	20
3. Sputum AFB+ve	29	57	12	12
4. Percentage of sputum AFB+ve in symptomatics tested	74.36	73.68	66.67	60.00
5. Percentage of sputum AFB+ve in the population interviewed	0.31	1.95	1.9	2.7

JNMA Oct-Dec. [1978]

TABLE FOUR

ISOLATED SPUTUM SURVEY IN THE HILLS

Case finding by Microscopic sputum Test	Palpa District Oct. 1962 to March 1971	Gorkha District Jan. 1968 to March 1971	Okhaldhunga District Jan. 1970 to December 1971
1. Interviewed	14,851	4,350	1,045
2. Sputum of symptomatic Persons tested	358	105	54
3. Sputum AFB + ve	247	82	29
4. Percentage of sputum AFB + ve in symptomatic tested	68,99	78,10	53,70
5. Percentage of sputum AFB + ve in the population interviewed	1,66	1,89	2,8

JNMA Oct-Dec. [1973]

TABLE FIVE
The following table illustrates this point :

Chemotherapy	Country & No. of Cases	Year	Duration of observation (years)	Bact. status	Death %	"Chronic" (sputum positive%)	"Crue" (negative sputum%)
None	U. S. A.	1919	4	B++	53.4	25	21.6
	1,653						
	India	1960	1.5-2	B++	48	25	27
Unsatisfactory programme	121		1.5-2	B+	31	26	43
	179						
	Taiwan	1962	2	B++	13.3	25.9	61.6
	302	1968	2	B++	10.5	24.1	6.4
	237		1.5-2	B++	11.1	25.0	62.9
Good quality programme	Korea	1968					
	288						
	Singapore	1969	1	B++	0.7	2.6	97.7
	Canada	1968	2	B++	7.7	1.4	90.9

By a "good" programme is mean one where decisions have been taken and instructions given for the administration, on a national scale, of effective regimens, and where supervision of their administration is carried out.

(This table is taken from an article by Ronillon et al, Tubercle 57 (1976) 275-299)

TABLE SIX

Consider the impact of programme when :

- (a) 10% of patients with PTB are actually discovered
- (b) 90% of them start treatment
- (c) 30% complete their therapy
- (d) There is a 100% effective drug regime

Then reduction of infectivity in the community =

New cases	Patients on therapy	Treatment completed	Cases "cured"
Existing cases	New cases diagnosed	Number put on RX	Treatment completed

Substituting.

$$\frac{10}{100} \times \frac{90}{100} \times \frac{30}{100} \times \frac{100}{100} = 2.4\%$$

Now consider the situation if a less effective drug regime were used that gave an 85% cure rate, also if 70% of the patients with the disease were found, and after starting 90% of these on therapy, defaulter-chasing etc., resulted in 85% completing their course of prescribed therapy, then, substituting: —

$$\frac{70}{100} \times \frac{90}{100} \times \frac{85}{100} \times \frac{85}{100} = 45.5\% \text{ reduction in infective TB.}$$

TABLE SEVEN

All types of TB.
Sputum POS TB

TABLE EIGHT

Definition of defaulting

(Rouillon and Toman in I. U. A. T.)

"DEFAULTING IS AN OMISSION ON THE PART OF THE PATIENT OR OF THE SERVICES WHICH INDICATES THE NEED FOR A CORRECTIVE INTERVENTION IN THE INTEREST OF THE PATIENT AND/OR THE COMMUNITY"

Algeria

	Rural patients 'Lost'	Town patients 'Lost'
Therapeutic trial	6.6%	3%
Routine therapy	50.0%	19%

Kenya

	Deaths 2%	Incomplete therapy 4%	Sputum Neg 98%
Therapeutic trial			
Routine therapy	8%	19%	76%

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