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Editorial

ISSUES IN TUBERCULOSIS CONTROL

Perhaps, it is time to review some of the issues connected with tuberculosis programmes. The issue regarding mentioning 'control' in the programme title itself would not be material if it were not for the embarrassment caused when the disease Control Programme fails to register even some measure of success after decades. Worse still, when a Control Programme is upgraded to an Eradication Programme, but after eating the humble pie, the title is changed back to 'control' without any brighter hope of success. In 1962, when the title for the national tuberculosis programme cobbled together by the NTI, Bangalore was being considered, the word 'control' was deliberately omitted. For one, there was no consensus on whether or not a technical intervention alone could control tuberculosis without socio-economic progress and better living conditions; apart from the lack of agreement on when tuberculosis could be regarded as controlled. For another, the near-term goal of bringing tuberculosis services to the door step of urban as well as rural people and the mid-term objective of integrating tuberculosis services into general health services were equally important, if not more so. However, a vertical programme has justification for having the word 'control' in the title provided it issues periodic reports on the progress being made in control. Performance-of-work reports (numbers found and treated) and estimated numbers of infections prevented and deaths avoided alone cannot carry much weight because it has been shown that most first-time infections take place long before a case is found (and treated) and the present day anti-microbial therapy has made mortality statistics unreliable, therefore obsolete.

For reporting on success, relating the work performance to the population covered is imperative, it is customary to declare a population as covered by the programme after the administrative order for it has been issued. Adequate coverage, however, requires that the services have been made available within walking distance of the people, that the area people are availing of the services, by and large, with minimal referral to distant centres since that leads to virtual inaccessibility of the services, and that case-finding / treatment practices are reasonably efficient. In India, there is sufficient evidence that the mentioned criteria are seldom met and that around 60% of the cases are first contacting private medical practitioners. Even if some of them may contact the programme centres later, could the excellent cure rate reported among the comparatively fewer cases under the programme lead to control of tuberculosis in the area?.

Of course, achieving the highest possible cure / success rates after treatment is awfully important. Otherwise, technical intervention would become meaningless, barring the relief of suffering in some. That case-finding and treatment must go in tandem for achieving control of tuberculosis has been stressed times out of number. Attempts to delink them, for whatever reason, have to be regarded as disingenuous because of the likely penalty in term of delayed control or even no control. Thus, finding as many cases from prevalence as possible through good coverage of the community, and achieving the highest possible cure/ success rate among them becomes the *sine qua non.*

Amidst the many operational problems mentioned above, a control programme should periodically compare the numbers cured with the estimated prevalence to get the measure of success achieved. But even this is problematic. Estimating the prevalence of cases in an area on the basis of the average NSS rate or by making an informed guess of the likely rate for an area, within the NSS confidence limits, is not

acceptable to some(Chakraborty A.K., *IndJTub.,* 2000, 47, 184) and a reduction in the prevalence rate cannot be expected for decades. A vertical programme, therefore, should preferably make efficiency of case-finding and treatment, together, as the programme objective instead of tuberculosis control.

Occasionally, issues are raised that the present technology for case finding as well as treatment is not sturdy enough for achieving control. Of course, sputum microscopy is as old as the discovery of the tubercle bacillus in 1882. There are several new microbiological, biochemical, immunological and molecular methods as well which have been tried out but not found good enough to replace quality microscopy being practised under programme conditions. The main obstacles in developing more sensitive and rapid diagnostic techniques are the comparatively few organisms present in clinical specimens, the slow rate of bacillary growth on culture and distinguishing tubercle bacilli from MOTT. Presently under development are immunomagnetic separation, DNA signal amplification and RNA ligase chain reaction amplification techniques which will need time for evaluation. In any case, the more complicated and expensive techniques have no role to play in control programmes. Regarding treatment, the currently available basket of effective anti-microbials for treating drug susceptible tuberculosis is adequate for programme use. No new more efficacious drug having a different mode of action has been recommended for decades because most multinationals do not consider investing in research for new drugs worthwhile or justified. But, the global rise in drug resistant tuberculosis is re-stimulating interest in newer drugs for treating resistant cases. Recently, several compounds with an imidazopyren nucleus have been synthesized which inhabit both protein and cell wall lipid metabolism of tubercle bacilli by interfering with the 420 CO factor. The effect is exerted on both replicating and dormant bacilli of susceptible as well as MDR-TB strains. However, the issue really is whether tuberculosis programmes should focus on preventing the emergence of multi-drug resistance and MDR-TB or formulate concrete policies for treating resistant cases?.

Emergence of drug resistance was reported as far back as 1970. It had led to great concern about potentially incurable cases rising up in the community as a result of the large numbers being treated both in public and private sectors. WHO is currently engaged in collecting reliable data, globally, on the rise in drug resistance communitywide including-its likely impact on tuberculosis control programmes. The question sometimes asked is : Do not drug resistant “chronic excretors” have a right to get treated properly under a national tuberculosis programme? One answer could be that national control programmes should concentrate on finding and treating the largest numbers of the treatable cases so effectively as to leave fewest numbers of the untreatable cases, who could be taken care of by the specialized hospitals and centres with separate resources made available to them. Only the specialized centres would be able to prevent the emergence of resistance to the highly expensive and more toxic second-line (secondary) drugs. Therefore, the recent international initiatives favouring greater attention to drug resistance and wider nation-wide focus on drug resistant cases suggests that the legitimate concerns of the resource-rich countries and the middle-and low-income countries may have to be viewed differently. Allowing national programmes to focus on fresh, treatable cases for the present in the latter countries is quite legitimate. Such selective prioritization need not be viewed as neglect of the public health dimension of drug resistance. A similar approach could also be adopted towards the additional threat from the HIV/AIDS epidemic for similar reasons. All national tuberculosis control programmes may not take up aggressively the management of dually infected cases. The size of the tuberculosis problem in a country, how well it is being tackled presently, the status of HIV/AIDS epidemic there and the addition being made to the tuberculosis cases will help decide the priority to be accorded to HIV/AIDS in each country.

D.R. NAGPAUL & K.K. CHOPRA

GLOBAL STATUS OF TUBERCULOSIS CONTROL*

Globally there are more than 8 million new cases of tuberculosis, each year. India and China alone account for more than 3 million of these cases. In 1993, WHO took the unprecedented step of declaring the tuberculosis epidemic to be a global emergency. The HIV epidemic and the rise in multi-drug-resistance threaten to make the tuberculosis epidemic even more severe.

Recent global trends include significant increases in tuberculosis rates in Eastern Europe and in HIV-affected areas, particularly of sub-Saharan Africa. In Eastern Europe, worsening socio-economic conditions coupled with decline of the tuberculosis treatment system have caused cases to increase by more than 50%. In countries of sub-Saharan Africa, which are heavily affected by HIV, tuberculosis cases have more than doubled. This highlights the importance of HIV prevention in tuberculosis control. If HIV spreads widely, there is no way that tuberculosis can be controlled with current technology.

Most aspects of the DOTS strategy are uncontroversial, if they are properly understood. Perhaps, the most contentious area is direct observation of treatment. Many —even most — patients may complete treatment without treatment observation. However, "most" is not sufficient to ensure control of tuberculosis. Classic studies from the Tuberculosis Research Centre, Chennai showed that direct observation is essential to ensure cure. A recent study from Kerala found that patients who did not receive treatment observation had a 15 fold higher rate of relapse or failure. *(Int J Tuberc Lung Dis 2000; 4:409-413)*

At the same time, the important issue of appropriate treatment observation should be emphasized. Health workers, volunteers, community leaders, cured patients, shop keepers, religious leaders, students, teachers, neighbours and others can successfully observe treatment. Treatment observation works if the patient is treated with kindness and respect and if the programme ensures that the patient's needs and concerns are addressed. Treatment observation succeeds by building a human bond between the patient and the health care system.

Regular and uninterrupted drug supply can result in treatment success rates of around 40-50%. Systematic monitoring and accountability in respect of all patients through cohort analysis can raise the treatment success to around 60%; excellent patient education and intensive case management without treatment observation can sometimes increase treatment success to around 70%. Virtually, any approach can succeed in a larger proportion of patients when dealing with small groups of patients, carefully monitored. But few or no programmes have attained consistent levels of treatment success of 85% or more on a large scale without treatment observation, mostly by someone outside of the family. In contrast, programmes which use treatment observation often achieve success rates of 85% or more. Enhanced treatment observation programmes, including use of incentives and enablers, can often obtain treatment success rates in excess of 90%.

Twenty-two countries account for approximately 80% of the global burden of tuberculosis. Of these countries, only two - Vietnam and Peru - have met global targets of at least 85% treatment success and at least 70% case detection. India's recent progress towards the targets has been notable. In 1999, India accounted for more than one third of the global increase in patients treated

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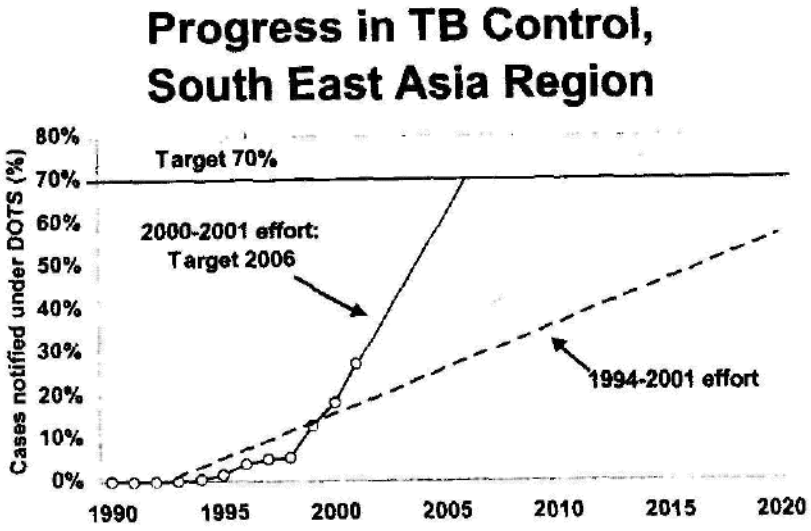

under DOTS. Progress appears likely to meet global targets for tuberculosis control within this year. If Rajasthan were a country, it would be the second largest country in the world, after Vietnam, to have met the targets.

Experience in Peru is instructive and encouraging. Peru improved case-holding, ensuring treatment observation convenient to patients, and massively increased case detection efforts. Starting with only 200,000 smears done per year in 1991, by the year 2000, approximately 2 million smears per year were being examined, a ten-fold increase. With treatment success rates above 90%, Peru was able to drastically reduce tuberculosis deaths - by 80% in 3 years - and cases. The incidence of tuberculosis in Peru is likely to be reduced by half in less than 10 years. Similarly, encouraging results have been documented in Beijing and elsewhere.

The good news globally is that the number of new smear-positive patients being treated under the DOTS strategy has increased steadily, from less than 0.25 million in 1994 to more than 1 million by the year 2000. But the bad news is that this is still less than 30% of the estimated number of cases - a far cry from the 70% target.

It is encouraging to note that there has been rapid progress in India and elsewhere in the past year (Figure). If the momentum, which has been developed in the past year can be sustained, then global targets for tuberculosis control in South-East Asia could be reached by 2006. However, this will require concerted, constructive and energetic efforts from all who care about tuberculosis patients.

REVISED NATIONAL TUBERCULOSIS CONTROL PROGRAMME- A SUCCESS STORY*

Prabha Jagota

At the outset, I express my gratitude to the Tuberculosis Association of India (TAI) for asking me to deliver the Lupin-TAI Oration. I am specially grateful to the TAI Chairman, Dr S.P. Agarwal, Vice Chairman, Dr M.M. Singh, Dr. K.Jagannath, Convener of 56th National Conference on Tuberculosis and Chest Diseases and his team,

I would first like to pay my humble tribute to my gurus: Dr D.R. Nagpaul, Dr Wallace Fox, Dr N.K. Menon, Dr.G.D. Gothi, Dr K.S. Aneja, Dr.B.C.Arora and Dr G.V.J. Baily. I am thankful to Dr G.R. Khatri for his constant guidance and encouragement, ever since he took over as DDG (TB), Dr.T.R.Frieden and my colleagues at the National Tuberculosis Institute (NTI), Bangalore.

TB is one of the most ancient diseases and has been referred to in the Vedas and Ayurvedic Samhitas. It continues to be one of the main causes of morbidity and mortality.

The global estimate for TB incidence and mortality, as reported by Raviglione, Snider and Koch! in 1995 were:

	1990	1995	2000
New Cases No.	7.5 million	8.8 million	10.2 million
Rate	(143/100,000)	(152/100,000)	(163/100,000)
Deaths No	2.5 million	3.0 million	3. 5 million

Christopher Dye, in 2000, in his review on TB for the decade 2000-2010 mentioned that there would be 8 million new cases and 2 million deaths due to TB per year [2].

India and its neighbouring countries, China, Pakistan, Bangladesh and Indonesia account for more than half the incidence. India has nearly 30% of the global burden of the disease.

It is estimated that 4 out of every 1000 persons are suffering from bacteriologically positive active disease and that TB decimates nearly 5000 people every day and one person every minute in India. TB is on the increase and there Js little hope of reversing the trend unless serious attention is paid to perception of the disease and its therapy by patients and their relatives as well as priority is given at government and international levels.

Research conducted in the 1960s, which facilitated the formulation of National TB Control Programme, included:

1. National Sample Survey (NSS) -(1955- 58).
2. Application of chemotherapy on domiciliary basis - 1960 by Tuberculosis Research Centre (TRC), Chennai[4].
3. Sociological study of the awareness of symptoms amongst pulmonary TB cases. - 1963 by NTI[5].
4. Potential yield of pulmonary TB cases by sputum microscopy -1967 by NTI[6].

Although epidemiological information from the mass BCG campaign carried out since 1951 and morbidity survey conducted in 1952 in rural population of Madanapalle by Frimodt Moller[7] had

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indicated that problem of TB was widespread in rural areas also, yet for a country as large as India, this sample was inadequate. Reliable information on the magnitude and extent of the disease in the various cross sections of the population was required. This was not an easy task. Apart from resources, trained personnel to conduct large scale surveys were not readily available.

A special committee of the ICMR was set up to address the issue of obtaining this information expeditiously and rationally. It was decided that a systematic survey on a country-wide basis should be undertaken. There were many obstacles, technical as well as non-technical. However, through the government's efforts, all obstacles were removed and the best of people got to work under the auspices of the TB sub-committee of ICMR. A rigorous time schedule was prescribed and the proposed field work was completed in about two years' time. Six teams equipped with mobile X-ray units and laboratory facilities started field work as per schedule in six zones. Seemingly insurmountable impediments were somehow overcome. Despite all odds, the field work was completed during 1955-57. It took one more year to write the report. The NSS revealed that there were 4 bacillary positive cases per 1000 (with range 2-8/1000). The disease, it was found, was equally prevalent in cities, towns and villages.

TRC was established in Chennai in 1956 to carry out research for the development of drug regimens for the treatment of TB. The first study carried out demonstrated that the time honoured virtues of sanatorium treatment such as bed rest, well-balanced diet and good living conditions were remarkably unimportant, provided adequate chemotherapy was prescribed and taken. Further, there was no evidence that close family contacts of patients treated at home had an increased risk of contracting TB. Therefore, it was concluded, it would be appropriate to treat infectious patients in their own homes.

Birth of National Tuberculosis Institute, Bangalore

The findings of NSS and TRC researches revealed that control of TB would require a totally new approach. It was decided that the focus should be on preventive aspects and finding and dealing effectively with infectious cases. Such work should be done on community-wide basis. It was proposed to establish a national institute to formulate the TB Control Programme and train personnel who would translate the decision as envisaged. Thus, was NTI born in 1959.

To establish this institution for the control of TB in the country, the help rendered by the then Government of Mysore, World Health Organization (WHO) and UNICEF was greatly appreciated by the Government of India.

Dr. Benjamin in the editorial *of lndJ Tub (1960)* wrote, "We believe the NTI will be a landmark in the history of anti-TB movement in this country and probably in some other countries also. Though it was well known for many years that TB is a social problem, efforts to control it were mainly directed towards diagnosis and treatment of the disease, and that too in hospitals and sanatoria. The Institute attempts a departure from this orthodox procedure. This venture is a novel and pioneering one"[8].

One of the main aims of NTI is to give due recognition to the social aspects of TB. The social awareness study conducted by NTI indicated that TB is not a silent disease since 95% of bacteriologically positive cases are aware of symptoms and 52% seek care at the various General Health Services (GHS), also known as Peripheral Health Institutions (PHIs), indicating that active case finding is not necessary.

The study on potential of case finding demonstrated that technicians in the periphery can perform sputum microscopy effectively with training and regular supervision. This simple primary tool for diagnosis of TB could yield 45% of the total prevalent pulmonary cases in a district, during one year, through District TB Programme (DTP). These two studies were the main pillars in the formulation of the DTP. District was selected as the basic unit of National Tuberculosis Control Programme (NTP). NTP was decentralized through DTP which operates

from District Tuberculosis Centre (DTC). District Tuberculosis Officer was made responsible for TB control activities at the DTC & PHIs. The other constituents of NTP are Central TB Division, in the Directorate General of Health Services, NTI, Bangalore and State TB Centres. Currently, there are 440 DTCs. In urban areas, there are 650 TB clinics with diagnosis and case management services.

National Tuberculosis Programme

The ultimate goal of NTP is to reduce the burden of TB gradually till it ceases to be a public health problem. (Nagpaul D.R. District Tuberculosis Programme in concept and outline, *Ind. J.Tub.* 1967,14,186).

The objectives and principles of the programme are:

1. Detection of maximum number of TB patients in the community;
2. Provision of effective treatment to all patients diagnosed;
3. To reduce their suffering and prevent disability and death;
4. To diagnose and treat patients nearest to their homes;
5. To integrate the TB services with the General Health Services(GHS) for the self-reporting patients; and
6. Free services.

Functions Of DTC

1. Case finding :(a)Sputum examination, (b) Chest X-ray , if 3 sputum specimens are negative.
2. Treatment : (a) Standard and Short Course Chemotherapy, (b) Follow up of cases.
3. Case Holding of patients : (a) Motivation, (b) Defaulter retrieval actions.
4. Management :(a) Planning, (b) Implementation of various activities, (c) Supervision of DTC and PHIs

The achievements of NTP :

1. Establishment of DTCs with facilities for X-ray, laboratory, BCG, treatment and statistics.
2. Posting of 6 key personnel at each DTC for supervision and training.
3. Implementation of TB control activities in the PHIs.
4. Reduction in human suffering and prevention of deaths.

DTP did not achieve the desired epidemiological impact on the magnitude of TB problem, although sociologically it saved a lot of human lives in terms of reducing the death rate from 225/100,000 to 47/ 100,000.

NTP was reviewed by three agencies: first by ICMR in 1975, by the Institute of Communication, Operations Research & Community Involvement (ICORCI) in 1988 and by Government of India, WHO and SIDA in 1992,[9,10]. The last review led to the formulation of Revised National Tuberculosis Control Programme (RNTCP)[11].

The 1992 NTP Review highlighted the following shortcomings of NTP: 1. Inadequate allocation of funds, shortage of drugs, lack of political will, 2. inability of GHS, with which NTP is integrated, to keep up with the population growth, 3. Over-diagnosis by X-ray, and 4. Low treatment completion rates. The strengths of NTP as observed were: Integration with the health services, Felt-need oriented programme, Priority to sputum positive patients, and Free TB services.

In the light of these recommendations, RNTCP was designed which recommended Directly Observed Treatment, Short course (DOTS) strategy, and was implemented in 1993, as the only strategy which had proven to be effective in controlling TB. As stated earlier, the RNTCP is based on principles of TB control which were established in India at the NTI, Bangalore and TRC, Chennai.

The five well known fundamental principles of RNTCP are: 1.Political and administrative will, 2.Good quality diagnosis - Case - finding primarily by microscopy of sputum of patients presenting at health facilities, 3.Good quality treatment - Short

Course Chemotherapy (SCC) given under direct observation, 4.Adequate drug supply, and 5.Systematic monitoring and accountability for every patient

The Success of RNTCP is evaluated by : 1. Expansion of RNTCP by the population coverage, 2. Case detection rates, 3. Ratio of smear positive to smear negative patients, and 4. Cure rates.

Starting in October 1993, the RNTCP was implemented in a population of 2.35 million in 5 sites in different states . The programme was expanded to a population of 13.85 million in 1995 and 20 million in 1996. Rapid scale-up began in late 1998 when another 100 million population was covered under RNTCP. Currently, over 425 million Indian population has been covered and the programme is second only to that in China. Despite this rapid expansion there has been no compromise on the quality of services and results remain technically acceptable and in many areas are excellent.

Cure Rate

The objective of revised strategy was to achieve a cure rate of 85% among new smear positive patients through intermittent 3 days a week supervised SCC or DOTS.

Treatment outcomes have been consistently good, with 8 out of 10 patients (80% cure rate) being successfully treated. Treatment success has increased for all types of patients between 1995 and the first two quarters of 1998.

Cohort analysis of the patients put on treatment in the latest quarter has shown an average success rate of 83% and 3 month sputum conversion rate of 88%. It is heartening to note that quality of diagnosis remaineds excellent.

Funds for RNTCP

As all the 5 principles of RNTCP are based on adequate funding, it has been given due importance. Funding for RNTCP has been made available from a 5 year soft loan of USS 142 million from the World Bank. Each district with population of 2 million has a District Tuberculosis Control Society which directly receives funds from the Central Government out of the World Bank

Treatment regimens used in RNTCP

Category	Type of Patient	Regimen
Category I	New sputum smear positive, Seriously ill, sputum smear negative, Seriously ill, extra- pulmonary	$2H_3R_3Z_3E_3/4H_3R_3$ - 6 months
Category II	Sputum smear-positive ,relapse, Sputum smear-positive, failure, Sputum smear-positive, treatment after default	$2H_3R_3Z_3E_3S_3/1H_3R_3Z_3E_3/5H_3R_3E_3$ - 8 months
Category II	Sputum smear-negative, not seriously ill Extra pulmonary, not seriously ill	$2H_3R_3Z_3/4H_3R_3$, - 6 months

assistance. State Governments provide the health infrastructure and staff. In rural areas, India's health infrastructure, has larger health centres for each 100,000 population and smaller centres for each 30,00 population.

DOTS - *Solution to TB Problem*

In as early as 1991, Murray et al reported that by using DOTS, cure rates of 86-90% could be achieved and the cost of per year of life saved with ambulatory short- course treatment was US$1[13]. The Advisory Council for the elimination of TB recommended in 1993 that DOTS should be considered for all patients because of the difficulty in predicting as to which patient would adhere to a prescribed treatment regimen.

Frieden et al, in 1995, observed that application of DOT doubled the cure rates and was associated with a decline in TB by more than 15% annually and in the rate of drug resistance. They also reported that TB can be controlled even in populations in which immuno-suppression is common and prevalence of drug-resistant organisms is high [l4].

Kumaresan et al in 1998 reported from Bangladesh that "despite being a low income country with high TB incidence, facing poverty, illiteracy and natural disasters, DOTS strategy was successful because of Government commitment, staff training, regular monitoring, decentralization of diagnosis and treatment by utilizing the existing primary health care centres,[15].

Kenyon et al, in 1999, reported from Botswana that DOTS could prevent drug resistant TB in context of a Human Immunodeficiency Virus (HIV) epidemic in low income countries[16].

In 2000, Zhang and Enarson reported from China that the prevalence of smear-positive cases of TB decreased by 87% between 1979 and 1999 as a result of DOTS. They also reported a decline in mortality from 11.2 to 2.2 per 100,000. It was also reported that DOTS could reduce the number of TB cases and deaths with minimal development of anti-TB drug resistance in a low income country at a low cost [17].

According to Balasubramanian et al, as reported in 2000 from Kerala, DOTS increased treatment success from 55% to more than 95%. They also observed that 86% of all failures and relapses were among patients who did not receive treatment observation [18].

In a recent report (May 2001), Olle-Goig and Alvarez demonstrated that by involving the community, DOTS was successful even in scattered rural population with high illiteracy rates and high HIV infection[19].

DOTS and HIV

HIV is the strongest known risk factor for the development of TB. HIV breaks down the immune system and makes patients highly susceptible to tuberculosis. These patients, in turn, can spread TB to others.There is a rising trend of HIV sero-positivity among TB patients in both urban and rural population in India[20-23] and the reported figures vary from 0.4%
to 15.28%. RNTCP can play a major role in treating patients of HIV with TB and DOTS is as effective among HIV infected TB patients as among those who are HIV negative. It has been reported that patients infected with HIV and TB survive longer, if they are given SCC with Rifampicin containing regimens and still longer, if SCC is given according to DOT. Chum et al from Tanzania reported in 1996 that despite high HIV infection, which was present in upto l/3rd of TB patients, there was no increase in relapse rates among HIV infected patients [24].

Dr. S.P.Agarwal, Director General of Health Services, Government of India, Ministry of Health & Family Welfare, has recently emphasized the importance of TB and the urgency of improvement in services in the light of threats of HIV and multi-drug resistance (MDR). He mentioned that TB would inevitably increase if HIV is not controlled and highlighted the need for effective coordination between AIDS and TB control programmes.

DOTS and MDR-TB

Considerable variation in the prevalence of drug resistance has been recorded among 35 countries in 5 continents. WHO has reported that median prevalence of primary MDR-TB was 1.4%, ranging from 0-14%.A higher prevalence of 2.5% has been reported from Nepal and. Thailand. Paramasivan et al (2000) observed that the 1988-89 level of 2% MDR-TB in the North Arcot district went upto 4% in the succeeding decade. They also reported that the level of drug resistance to H,R and HR was of the order of 15.4%, 4.4% and 3.4% respectively [25]

An alarmingly high proportion of acquired resistance has been reported in India. In Gujarat, resistance to Isonizid was 35-60% and for Rifampicin 3-37%. Reports from Wardha, New Delhi and Tamil Nadu showed a high level of drug resistance to Isoniazid (20.9%, 50.7% and 23.6% respectively) and MDR-TB (9.6%,33.7% and 23.3% respectively)

WHO in 1996 reported that the emergence of drug resistance is indicative of ineffective TB control programme. Patients infected with MDR strains require longer duration of therapy and may die of tuberculosis or continue to have TB despite optimal therapy. A large number of reports from different arts of the world have demonstrated that effective treatment programmes can prevent the development of drug resistance. Treatment of MDR-TB is difficult, expensive and often unsuccessful. Patients with MDR-TB need additional intervention besides the usual regimen. Espinal et al in 2000 reported that DOTS prevents the emergence of MDR-TB and helps reverse its trend in community in which it has emerged. Studies from a large number of countries have demonstrated that effective treatment can even result in a decrease in drug resistance if it has emerged.

A continuous surveillance of drug resistance will provide information, which will serve as a useful parameter in the evaluation of control programme and is at present being carried out by TRC, Chennai and NTI, Bangalore.

Achievements of RNTCP

1. More than 20 fold expansion of DOTS in last 3 years

- second largest programme in the world,
- in 1999 alone, India accounted for more than l/3rd of the global increase in DOTS coverage.

2. More than 40% of the population has access to DOTS now.

3. Every month around 1,60,000 persons are examined for TB, more than 40,000 patients are put on treatment and till date, more than 1 lakh lives have been saved and more than 15 lakh infections have been prevented.

In September, 2001, TB experts from medical colleges all over India, in a workshop held at NTI, Bangalore, concluded that within its eight years of implementation and three years of large scale service delivery, RNTCP has proved its credibility as the most effective and the only strategy to control TB in India. During this meeting, Dr.J.N.Pandey, Head of the Department of Medicine , AIIMS, concluded that " The RNTCP is one of the most encouraging successes in the field of health in the past many years. Greater involvement of medical colleges will enrich the programme still further, increase the number of patients benefitting, and put India again at the forefront of teaching and research on Tuberculosis."

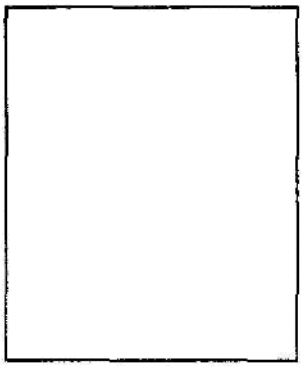
India is going in the right direction as far as the pace and quality of implementation of RNTCP is concerned and we hope to succeed in controlling TB epidemiologically as well as sociologically with an impact on the reduction of poverty.

REFERENCES

1. Raviglione MC, Sunder DE Jr. & Kochi A: *JAMA* 1995, 273, 220
2. Dye C: Tuberculosis 2000-2010: Control, but not Elimination; *Int J TB & Lung Dis,* 2000, 4, S146
3. Indian Council ofMedical Research: Tuberculosis in India; A National Sample Survey 1955-58. *ICMR Technical Report Series,* New Delhi. ICMR, 1959

4. Tuberculosis Chemotherapy Centre, Madras: A concurrent comparison of home and sanatorium treatment of pulmonary tuberculosis in south India; *Bull Wld Hlth Org* 1959.21, 51
5. Banerji D & Andersen S: A sociological study of the awareness of symptoms among persons with pulmonary tuberculosis; *Bull Wld Hlth Org,* 1963, 29, 665
6. Daily GVJ, Savic D, Gothi GD, Naidu VB & Nair SS: Potential yield of pulmonary tuberculosis by direct microscopy of sputum in a district of south India; *Bull Wld Hlth Org,* 1967, 37, 875
7. Frimodt Moller J, Benjamin P & Mathew P: Results of mass X-ray surveys in a village population at Madanapalle; *Proceedings of the 9th Tuberculosis Workers Conference* Lucknow. February. 1952, 133
8. Benjamin PV: National Tuberculosis Institute - Editorial; *IndJTB*. 1960;7. 73
9. Indian Council of Medical Research, New Delhi: Review of the National Tuberculosis Programme - *Report of the Expert Committee,* 1976
10. Institute of Communication, Operations Research & Community Involvement (ICORC1). Bangalore: In-depth study of National Tuberculosis Programme of India, 1988
11. TuberculosisProgrammeReview-India, 1992: World Health Organization, Geneva, 1992; National Tuberculosis Institute, *Summaries of NTl Studies,* 1997, 101
12. Khalri GR & Frieden TR: The status and prospects of tuberculosis control in India; *IntJTB & Lung Dis,* 2000, 4. 193
13. Murray CJ et al: Cost effectiveness of Chemotherapy for pulmonary tuberculosis in 3 Saharan countries; *Lancet* 1991. 338, 1305
14. Frieden TRet al: *New EnglJMed* 1955; 333, 229
15. Kumaresan JA, Ahsan Ali AK & Parkkali LM: Tuberculosis control in Bangladesh : Success of the DOTS strateg; *Int J TB & Lung Dis,* 1998,2,992
16. Kenyon TA et al.: Low levels of drug resistance amidst rapidly increasing tuberculosis and Human Immunodeficiency Virus co-epidemics in Botswana; *Int J TB A Lung Dis,* 1999,3,4
17. Zhang LX, Tu DH & Enarson DA: The impact of directly-observed treatment on the epidemiology of tuberculosis in Beijing; *Int J TB & Lung Dis,* 2000, 4, 904
18. Balasubramanian VN, Oommcn K & Samuel R: DOT or not? Direct observation of anti-tuberculosis treatment and patient outcomes, Kerala State. India; *Int J TD & Lung Dis,* 2000, 4, 409
19. Olle-Goig JE & Alvarez J: Treatment of tuberculosis in a rural Haiti: directly observed and non-observed regimens - The experience of Hopital Albert Scheweitzer; *Int J TB & LungDis,2001,5,* 137
20. Mohanty KC & Basheer PMM: Changing trend of IILV infection and Tuberculosis in a Bombay area since 1988; *IndJTB*. 1995,42, 117
21. Purohit SD, Gupta RC & Bhatara VK: Pulmonary tuberculosis and Human Immunodeficiency Virus infection in Ajmer; *Lung India,* 1996, 14, 113
22. Vasudevaiah V: HIV infection among tuberculosis patients; *IndJTB*. 1997.44,97
23. Rajasekaran S et al.: Trend of HIV infection in patients with tuberculosis in rural south India; *IndJ TB,* 2000, 47, 223
24. Chum *HJ et al:AIDS* 1996, 10, 299
25. Paramasivan CN et al.: Surveillance of drug resistance in Tuberculosis in the state of Tamilnadu; *IndJ TB,* 2000,47, 27

LEAVES FROM HISTORY - 11



Count Carlo Forlanini

Discoverer of Artificial Pneumothorax
(1837-1939)

Born in Milan in 1847, Count Carlo Forlanini, a surgeon practising in Pavia, Italy was stricken by pulmonary tuberculosis at the prime of his life and career. All his thoughts and efforts, therefore, turned towards his damaged lung. At that point in time, almost nothing was known about the disease except a host of folk prejudices wrapped around an overriding stigma. Time and again, he felt the damaged lung inside him, and decided that whatever caused the damage, the lungs had to be given rest, short of interfering with respiration. He recalled the case of a workman who had had a lung injury because of a broken rib and was brought to him in respiratory distress. To reduce his suffering, he had collapsed (rested) the lung by inserting a tube between the lung and the broken rib and then introduced a litre of nitrogen gas into the created space. But the patient died before the effect of rest could be observed. He decided to repeat the experiment in a similar case who, fortunately, survived. This strengthened his resolve to treat his own tuberculous lung similarly, and, thus, discovered a method for treating pulmonary tuberculosis.

Carlo Forlanini's discovery came to be known as Artificial Pneumothorax and began to be used, soon after 1882, after the discovery of tubercle bacillus by Robert Koch, As recognition of his services to medicine, Carlo Forlanini was invited to hold the chair of Clinical Medicine at the University of Pavia. In 1906, Forlanini published a book on artificial pneumothorax which reflected his obsession with the great need for scientific studies and education of the people about tuberculosis, if the scourge of tuberculosis had to be controlled.

Eugenio Morelli, his pupil, took over from him both the chair of Clinical Medicine as well as the struggle to control tuberculosis by establishing the world famous Carlo Forlanini Institute in Rome as a homage to the great benefactor who provided to the profession the only effective therapeutic measure before the advent of chemotherapy of tuberculosis.

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PRIVATE SECTOR INPUTS IN RNTCP TO MAXIMISE DOTS DIVIDENDS*

Shantilal B.Trivedi[1]

Before I start, I would like to thank all the office bearers of the Tuberculosis Association of India and the Selection Committee for doing me the honour of asking me to deliver the Ranbaxy- Robert Koch Oration. I feel very happy and proud for the confidence reposed in me and I hope to do full justice to the subject that I have chosen for this oration.

I have been in the field of tuberculosis now for more than forty years and all through that long period 1 have been in the Private Sector.

To start with, I worked as Surgeon - Superintendent of the K. J. Mehta Tuberculosis Hospital, at Amargadh, in Bhavnagar district of Gujarat. It is a large hospital with a bed strength of 747 beds, run by a registered trust with 'grant in-aid' from the State Government. I was there for 30 years. For the last 10 years, I am with the Gujarat State TB Association. All along, I have been helping the National Tuberculosis Programme. I have, therefore, selected the subject of Private Sector Inputs in RNTCP to maximize DOTS Dividends. The DOTS strategy is not just a national programme policy for any one country. It has been accepted as Global TB Control Programme Policy. The rapid and effective cure of the patient with DOTS leads to good financial relief to the patient and his family and quicker return to work of the cured patients gives a big boost to the national economy.

The DOTS strategy was adopted for India's National Tuberculosis Programme and the Revised National Tuberculosis Control Programme (RNTCP) was formulated. It was pilot tested in 1993, in a population of 2.35 million and then extended to cover a larger population in 1995. Encouraged by good results, the RNTCP has been undergoing phased expansion since 1997. The Government of India, the Central TB Division and the State Government deserve compliments and appreciation for a fairly rapid and effective expansion of the RNTCP to cover a population of more than 420 million by late 2001, coverage of more than 42% of the total population of the country (Chart 1) and putting in place the infrastructure.

Having said all this, in appreciation of the herculean efforts put in by the central and state governments to make the RNTCP available and accessible to such a large population, I do not know whether to feel happy or sad about it because optimum utilization of the available services is not there. The patients who need diagnosis and treatment for tuberculosis, somehow, do not reach the place where the facilities have been made accessible and available totally free of cost. This may be either due to total ignorance or may be because of the obstacles and hurdles on the way.

Tuberculosis is a grave problem. In the context of the present day world situation, when a day of terror left thousands dead, the world was shocked, then woke up and got united to fight terrorism. Tuberculosis is a much bigger terror and takes thousands of lives every day. It is, therefore, absolutely necessary for all the sectors-public, private, corporate and individuals - to get united to fight the scourge with all their might, not only for the benefit of the patients, but for the safety of our own selves and the future generatious.

The RNTCP is a public health programme meant for the health of the community. It is universally accepted that no public health programme can succeed without total involvement and participation of the community.

For involvement of the community, the first step is to create awakening and awareness regarding

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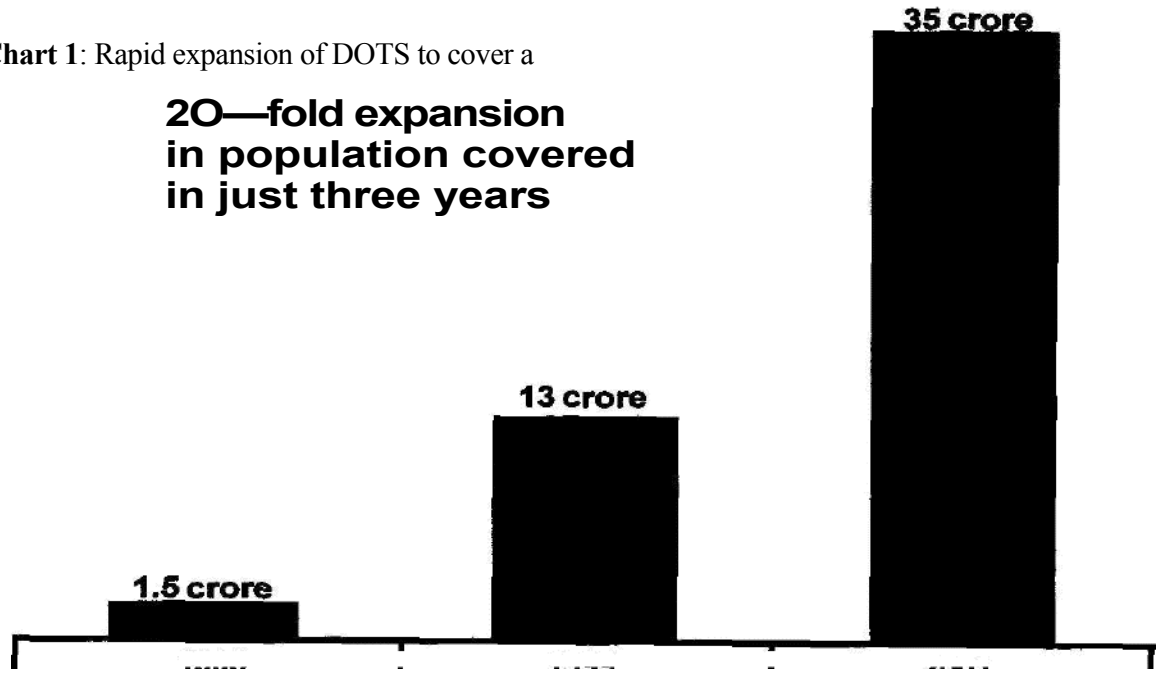
1 .Chairman, Gujarat **State** Tuberculosis **Association**

1998 | **1999** | **2001**

Chart 1: Rapid expansion of DOTS to cover a



Rapid expansion of DOTS to cover a population cover a population of 42 crores by 2001

Out come chart of Case dectection (2000) and success rates (1999) in RNTCP areas

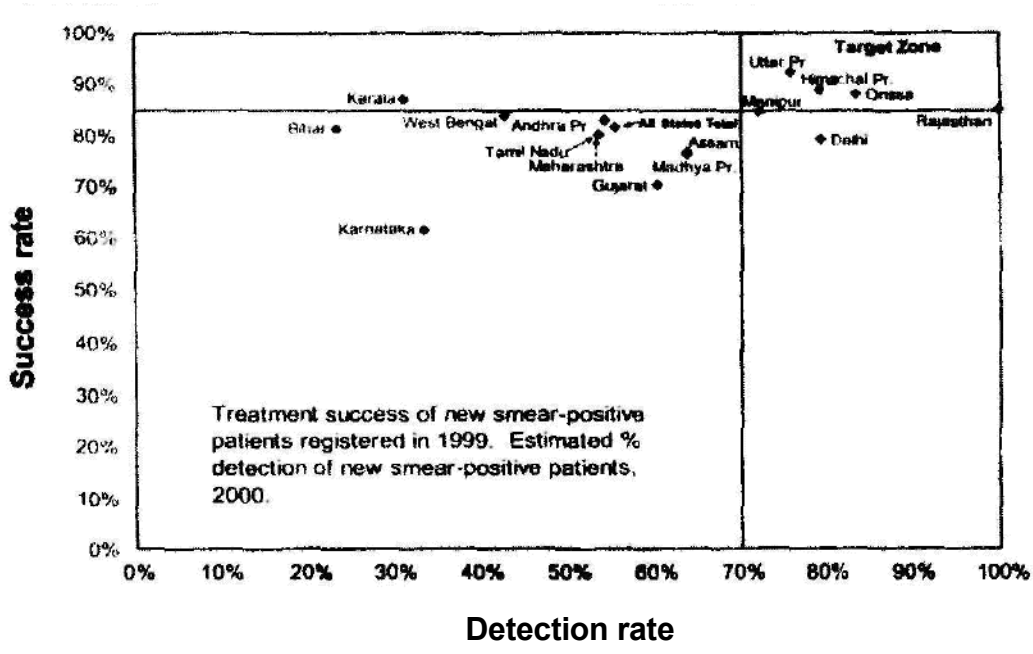


Chart 2 : Outcome in terms of Case Detection (2000) and Success Rates (1999) in RNTCP areas