SEVEN YEAR FINDINGS OF SHORT-COURSE CHEMOTHERAPY IN 18 DISTRICTS IN INDIA UNDER DISTRICT TUBERCULOSIS PROGRAMME

Tuberculosis Research Centre (Indian Council of Medical Research), Madras*
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Summary: **The ICMR undertook a study/ project to find out the feasibility of introducing Short-Course Chemotherapy (SCC) under the existing programme conditions and evaluate its acceptability. Sputum positive pulmonary tuberculosis patients aged 15 years or more who had not received more than two months of anti-tuberculosis chemotherapy, belonging to 18 districts spread over 9 states and one union territory of India, were treated with one of the following regimens:**

Regimen 1: Rifampicin, Isoniazid and Pyrazinamide for 2 months and Rifampicin and Isoniazed for the next 4 months, the drugs being given twice-a-week *under supervision.*

Regimen 2: Rifampicin, Isoniazid and Pyrazinamide daily for 2 months and Thioacetazone and Isoniazid for the next 6 months, drugs being *self-administered.*

Regimen 3: As in regimen 2 for 2 months and Rifampicin and Isoniazid for the next 4 months, the drugs being given twice-a-week *under supervision.*

In all, a population of 40 million was covered. Of the Peripheral Health Institutions where District Tuberculosis Programme had been implemented, 66% in 1985 and 93% in 1991 had implemented SCC. Of the newly-diagnosed patients, 83% were eligible for SCC and 62% of these were started on SCC. Of the remaining patients, with data available, the reasons for not starting SCC, were 'patient-related' in 58% and had organisational/ administrative related aspects in 35%.

Of those who were started on SCC, 49% in regimen 1, 54% in regimen 2 and 61% in regimen 3 received 80% or more of chemotherapy. Concurrent cohort analysis of SCC and standard regimens showed that the overall treatment completion for SCC was fairly constant (51-55%), but ranged from 29% to 45% for the standard regimen.

Conclusion: It is feasible to employ SCC under the existing programme conditions. However, additional efforts have to be made to improve case-finding and case-holding further.

INTRODUCTION

The major constraint in the National Tuberculosis Programme in India is poor treatment completion with the conventional 12-18 month regimens[1,2]. One of the main reasons for this poor treatment adherence is the prolonged treatment period. It is, therefore, logical to employ treatment regimens of shorter duration with an aim to improve the treatment adherence by patients. The efficacy of Short Course Chemotherapy (SCC) regimens, of 6-9 months' duration, containing powerful bactericidal and sterilising drugs, at least during the initial 2 months, has been established in the treatment of newly diagnosed sputum positive pulmonary tuberculosis and these regimens have been widely recommended[3,4,5]. Further, the drug regimens employed in SCC rendered the vast majority of patients non-infectious in a short period. Even if a patient with initially drug-sensitive organisms defaults after 3 months of chemotherapy with a regimen containing Streptomycin plus Isoniazid

* This report was prepared by T. Santha, V. Chandrasekaran, R. Parthasarathy, P.R.Somasundaram, C.N. Paramasivan and R. Prabhakar

Correspondence : Dr. C.N. Paramasivan, Officer-in-Charge, Tuberculosis Research Centre (ICMR), Spurtank Road, Chetput, Madras - 600031

plus Rifampicin plus Pyrazinamide daily, he stands a good chance ofattaining sputum conversion (about 95% by 3 months)[6], and remaining negative thereafter (about 80% up to 5 years of follow-up)[7].

Considering these advantages, the Government of India introduced SCC as a pilot project under the existing District Tuberculosis Programme (DTP) in 18 districts spread all over India. The objective was to find out the feasibility of introducing SCC regimens under the existing programme conditions in all districts and to evaluate their acceptability.

MATERIAL AND METHODS

The project was undertaken between 1983 and 1991. The 18 districts where SCC was implemented were widely distributed all over India, involving 9 states and one union territory. There were 3 districts each in 4 states, 1 each in 5 states and one in a Union Territory. The population, according to the 1981 census, was below 1 million in 3 districts, 1-2 million in 5 districts, 2-3 million in 6 districts, 3-4 million in 3 districts and above 4 million in one district; the total population covered being about 40 million (Annexure).

Eligibility for Treatment with SCC regimens

Chest symptomatics* aged 15 years or more, belonging to the districts concerned, with at least one sputum smear found positive for acid-fast bacilli (APB), who had not had more than 2 months of previous specific anti-tuberculosis chemotherapy and were attending the government health facilities on their own were considered eligible.

SCC regimens

The regimens prescribed were as follows:

Regimen 1: $2RHZ_2/4RH_2$: A fully supervised 6-month intermittent regimen consisting of Rifampicin 600mg, Isoniazid 600mg and Pyrazinamide 2.0g for 2 months, followed by Rifampicin 600mg and Isoniazid 600mg for the next 4 months, all the doses administered twice-weekly in the clinic under supervision.

Regimen 2: 2RHZ/6TH: A fully unsupervised daily 8-month regimen consisting of Rifampicin 450mg, Isoniazid 300mg and Pyrazinamide 1.5g for 2 months, followed by Thioacetazone 150mg and Isoniazid 300mg for the next 6 months, all the doses being collected by the patients twice-a-month for self administration

Regimen 3: $2RHZ/4RH_2$: A partly unsupervised and partly supervised regimen consisting of Rifampicin 450mg, Isoniazid 300mg and Pyrazinamide 1.5g daily for 2 months, the drugs collected twice-a-month for self-administration, followed by Rifampicin 600 mg and Isoniazid 600 mg twice-weekly for the next 4 months, the drugs administered twice-a-week in the clinic under supervision, because patients tend to become irregular in the later months.

In addition, where facilities were available, Streptomycin 0.75g i.m. could be given in the first 2 months in all the 3 regimens**

Treatment policies

The 18 districts were divided into 3 groups of 6 each and allotted to one of the 3 policies described below:-

Policy A: Patients were to be treated with regimen 1 requiring twice-weekly attendance throughout. However, if the patient was not able to attend so often, regimen 2 was offered.

Policy B: Patients were to be treated with regimen 2 only.

Policy C: Patients were to be treated with regimen 3, but as in policy A, regimen 2 could be offered to patients who were unable to attend the clinic twice a week.

Management of Patients

Patients startedon short course chemotherapy had to attend the treatment centre according to the

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* Defined as patients with complaints of cough for 2 weeks or more, chest pain and/or fever for 1 month or more, or haemoptysis at any time.

** In practice, Streptomycin was given only to less than 1% of the patients.

regimen prescribed. For patients who did not attend on the due date for drug administration/collection, defaulter action such as a letter, home visit or a message was to be taken on the next day. For patients who did not turn up within 7 days of the fist action, a second retrieval action (letter/home visit), was to be taken. Those who defaulted continuously for a period of one month were considered as "Lost" to SCC (patients who re-attended after after one month were managed on individual basis.)

One sputum smear examination for AFB was to be carried out at 3 months and another at the end of chemotherapy (6/8m). If the sputum examined at the end of treatment was found positive, a second specimen was to be examined. If this smear was also positive, treatment was to be continued with Thioacetazone 150 mg and Isoniazid 300 mg daily up to 9 months (i.e., for an additional 1 or 3 months) and another sputum examination was undertaken then. If that was also positive, the patient was to be referred to the District Tuberculosis Officer (DTO) for further management.

If a patient developed symptoms and/or signs of jaundice, Rifampicin and Pyrazinamide were to be terminatedand Isoniazid withheld, and the patient put on standard chemotherapy consisting of EH/TH or SHtw after jaundice had subsided. For mild arthralgia, analgesics were to be prescribed; if it was incapacitating or pain persisted despite analgesics, Pyrazinamide was to be withheld and re-introduced when the pain subsided. If arthralgia recurred, the patient was to be referred to the DTO for further management. Gastro-intestinal upsets and other minor reactions were to be managed symptomatically.

Conduct of the Project and Role of Tuberculosis Research Centre (TRC)

The TRC was given the responsibility of inplementation and monitoring of SCC in the 18 districts under the existing DTPs by the Government of India. Protocols and detailed work instructions were prepared by TRC and circulated to the Officers-in-charge of tuberculosis at the state level and the DTOs. The work instructions and guidelines were distributed to all the Peripheral Health Institutions (PHIs) of these districts through their respective DTOs. The DTOs and their teams were made responsible for the implementation and conduct of the project. Rifampicin and Pyrazinamide were supplied by the Government of India (courtesy Swedish International Development Agency), according to the requirements, indicated twice a year by the DTOs. Certain modifications in the format of the monthly returns routinely submitted to the National Tuberculosis Institute (NTI), Bangalore, such as, number of PHIs implemented with SCC, dividing section on treatment into 3 parts to get information on sputum positive cases started on SCC or standard regimen and sputumnegative cases started on standard treatment, putting an additional column to get information about the reasons for not starting eligible patients on SCC, etc. were made in consultation with the NTI, Bangalore. An additional statistician was posted to these 18 districts to monitor the programme, collect the required information and co-ordinate with the TRC.

The monthly and quarterly reports on tuberculosis and annual cohort reports were sent to the TRC by the DTOs. When reports were not received on time, reminders were sent to the concerned DTOs.

A team consisting of a medical officer, bacteriologist, statistician andmedical social worker from TRC visited the District Tuberculosis Centres (DTCs) and PHIs and held discussions to identify problems, if any, and suggest remedial measures. The microscopy facilities were also inspected and corrective measures such as minor repairs of the microscopes were undertaken. A sample of positive and negative sputum slides was read by the TRC staff. Training programmes were conducted at the district level for medical and paramedical workers to get more personnel at the PHI level trained in the various aspects of the programme. Workshops were conducted at least once a year, initially at the TRC and later at a central location combining 3 or 4 districts for in-service training (courtesy, ICMR/ WHO) of medical and paramedical workers involved in the programme.

Periodically, the DTOs and the state officers in-charge were briefed by the TRC about the performance of their districts and attempts were made to sort out any problems which had been identified. Thus, the role of the TRC, Madras was mainly in an advisory capacity to the programme

officers in addition to providing in-service training and monitoring.

FINDINGS

Documentation

The observations reported here are based on the information obtained from the monthly and quarterly returns on tuberculosis and the annual cohort reports from the various districts. These returns were received from all the districts every month, 57-77% received within one month and rest after reminders.

Implementation of SCC

Beginning in March 1983, with a district in Tamil Nadu, SCC was gradually introduced, and by March 1985 all the 18 districts had been covered. Efforts were made to make SCC available in all the PHIs in each of the 18 districts as quickly as possible.

By 1985, the implementation of SCC in PHIs was 75% or more in 8 of the 18 districts and less than 50% in 7 districts (Table 1). By 1989, 14 districts had implemented SCC in 75% or more of the PHIs, including 9 with 100% and none had less than 50% implementation. By 1991, 15 districts had implemented SCC in 75% or more of the PHIs, including 10 districts with 100% and 3 districts with 90-99% implementation of the PHIs. In the remaining 3 districts, SCC was implemented in 73%, 50% and 55% of the PHIs. A visit was undertaken by TRC team to 2 districts where the implementation was low. It was observed that the major reasons for non-implementation were long

Table 1. SCC implementation in PHIs

SCC imple-mented PHIS (%)	No. of districts with SCC implemented according to year						
	1985	1986	1987	1988	1989	1990	1991
100	6	5	4	5	9	9	10
90-99	1	1	2	2	2	2	3
75-89	1	1	0	1	3	4	2
50-74	3	3	6	8	4	3	3
<50	7	8	6	2	0	0	0

Note: The number of PHIs increased year to year in some districts, which could have resulted in a reduction in the percentage implemented

Table 2. Case finding activity and PHI contribution per district per year

Year	DTC sputa			PHI sputa				PHI contribution		
	Examined No. (a)	Positive No. (b)	Examined (%)+	Positive (%)+	Examined No. (c)	Positive No. (d)	Examined (%)+	Positive (%)+	Examined c/a+c (%)	Positive d/b+d (%)
1985	4629	531	100	100	10644	511	100	100	70	49
1986	4426	561	96	106	12015	618	113	121	73	52
1987	4777	543	103	102	12267	567	115	111	72	51
1988	4967	561	107	106	12191	515	115	101	71	48
1989	4345	542	94	102	11940	650	112	127	73	55
1990	4027	530	87	100	12518	729	118	143	76	58
1991	4062	554	88	104	12297	812	116	159	75	59

+ based on 1985 figure

distance and inaccessible PHIs. The overall implementation with SCC was 66% of the DTP-implemented PHIs in 1985 and 93% by 1991. And, as a proportion of the total PHIs, the implementation in respect of SCC was 54% in 1985 and 87% in 1991.

Case-finding activity

The case-finding activity in the districts was assessed by the total number of sputa examined and the sputum positive cases detected per year. Excluding 2 districts from where adequate information was not received for the initial 2-years period, theaverage sputum examination was 4629 per DTC in 1985 (Table 2). Considering 1985 as the baseline, there was no definite trend over the years as far as the DTCs were concerned (4629 in 1985 and 4062 in 1991). However, at the PHIs, the average sputum examination registered an increase from 10644 in 1985 to 12297 in 1991. Even though there was no increase in the sputum examinations at the DTC, the sputum positives detected remained fairly constant, the range being 530 to 561. The average number of sputum positive cases detected per year at the PHIs registered an increase from 511 in 1985 to 812 in 1991. The overall contribution of the PHIs towards sputum examinations was 70 and 75% of the total examinations and 49 and 59% with regards to sputum positive cases detected, respectively. Combining the DTCs and the PHIs, the increase in sputum examinations was 7% and in sputum positives detected 31%, between 1985 and 1991.

The total population of the 18 districts was 39.8 million, as per 1981 census. Considering the population aged 5 years or more to be around 85%, and the prevalence of sputum positive cases to be about 4 per 1000, and that about 50% of these cases attend a health centre and 80% of these cases can be detected by microscopy, the expected diagnosis of sputum positive cases was 54,128 per year, while the actual number diagnosed was 21,948 per year - an efficiency of 41%. However, there was a wide variation in case finding efficiency between the districts (range: 15% to 94%).

Condition of microscopes

Using aquestionnaire, it was reported from 10 of the 18 districts that 250 microscopes were defective. A TRC team detected 151 defective microscopes and undertook necessary repairs.

A total of 1010 sputum smear slides were collected during the supervisory visits to the districts and read at TRC later. It was found that there was 95% agreement between the readings, there being 4.5% under reading and 0.5% over reading of the smears in the districts.

Prescribed SCC

During the 7-year period, a total of 164,695 sputum positive cases were diagnosed in the 18 districts and 1,37,099 (83%) were eligible to be treated with SCC (Table 3). However, only 84,704 (62%) of the patients were started on SCC (66% in policy A, 52% in policy B and 67% in policy C districts). Of these, 75% of patients in policy A and 65% of patients in policy C districts were treated with regimen 2 (Annexure). Among the 6 policy A districts, excluding one district where only regimen 1 was implemented, 16% were treated with regimen 1. However, there was a wide variation between districts (1-50%).

Table 3. Policy-wise distribution of smear positive patients, eligible for SCC and started on SCC

Policy	Smear positives No. (a)	Eligible for SCC No. (b)	Eligible for SCC % of (a)	Put on SCC No.	Put on SCC % of (b)
A	68185	58152	85	38252	66
B	52446	42270	81	21815	52
C	44064	36677	83	24637	67
Total	164695	137099	83	84704	62

Reasons for not starting SCC

The reason(s) for not starting SCC was/were available for 43% of 52395 patients (Table 4) and have been classified as reasons attributable to patients (58%), organisational/administrative (35%) causes and other reasons (7%). Of the reasons attributable to patients, 23% were living too far away, 15% were likely to migrate from the given address and 10% were too old or sick. Of the organisational/administrative reasons,

non-availability of SCC drugs and non-implementation of SCC in the PHIs accounted for 13% and 11%, respectively.

Table 4. Reason(s) given for not starting SCC

		Patients No.	%
(a)	Eligible but not put on SCC	52395	
(b)	Reason available for} not being put on SCC}	22734	43(% of a)
A.	**Attributable to patients**	13167	58*
	Living too far away	5206	23
	Likely to migrate	3486	15
	Too old or sick	2237	10
	Initial defaulter	451	2
	Travel too expensive, non-availability of transport, loss of wages etc.	1787	8
B.	**Organisational/ Administrative Causes**	7939	35
	SCC drugs not available	2551	13
	SCC not implemented	2551	11
	Clinic hours not convenient	422	2
	Patients admitted in hospital	261	1
	Miscellanceous	1836	8
C.	**Others**	1628	7

*. This percentage and all subsequent ones are based on (b).

Cohort analysis for treatment completion

Analyses of treatment completion were done based on the treatment cards returned to the DTCs. Of the 74,930 patients started on SCC in 17 districts, excluding 1 district where only limited information on a few patients was available, 64,729 patients (86%) were included in the cohort analysis. The proportion of patients included was 90% or more in 13 districts.

Treatment completion

In policy A districts, 52% of the 24,945 patients included in the cohort analysis had received 80% or more of their chemotherapy; the corresponding figures were 55% of 18,450 in Policy B districts and 55% of 21334 in Policy C districts, the overall treatment completion being 54%. Detailed analyses showed that the treatment completion was 50% to 54% in policy A, 49% to 64% in policy B and 46% to 62% in policy C districts. In the 1990-91 cohort, the treatment completion was 50%, 64% and 62% for the 3 policies respectively (data not tabulated).

Since a proportion of patients in Policy A and C districts were treated with regimen 2, an analysis was undertaken to find out the treatment completion according to the regimen (Table 5). The proportion of patients receiving 80% or more of chemotherapy was 49% of 12929 patients (range 46-71%) treated with regimen 1 which was a fully supervised regimen, 54% of 44383 patients treated with regimen 2, a self-administered regimen (range 28-86%), and 61% of 7417 patients treated with regimen 3, a partially supervised. regimen (range 39-79%). Considering the 20,346 patients who were started on regimens 1 and 3, the proportion of patients completing 80% or more of chemotherapy was 54%, similar to the 54% of 44383 patients started on regimen 2.

In regimen 1, 39% of patients had received 50% or less of chemotherapy, including 22% receiving 25% or less. The corresponding figures were 38% and 27% for regimen2, and 33% and 17% for regimen 3.

The proportions of patients 'lost' from chemotherapy according to regimen were 45% with the fully supervised twice weekly regimen, 40% with the unsupervised regimen and 33% with the partially supervised regimen (data not tabulated).

Bacteriology at the end of chemotherapy

A sputum specimen was to be examined at the end of chemotherapy for all patients completing treatment. However, the coverage for sputum examination was 64% of patientson regimen 1, 80% on regimen 2 and 84% on regimen 3. Of those examined, 95%, 99% and 99% respectively were negative by smear (Table 5). Sputum smear results at the end of chemotherapy were available for 4 cohort periods for patients treated with standard chemotherapy. Of the 8847 patients eligible for

Table 5. Treatment completion rate and sputum smear status at the end of treatment, according to regimen

Regimen	Total patients# No.	Completed >80% Treatment		Patients available for sputum examination	End of treatment			
					Sputum examined		sputum negative	
		No.	%		No.	%	No.	
	(a)	(b)	(b/a)	(c)	(d)	(d/c)	(e)	(e/d)
1. **$2RHZ_2/4RH_2$**								
No. of Patients	12929	6349	49	5334	3441	64	3276	95
Range	89 - 8984	63 - 4089	46 - 71	59 - 3300	5 - 1716	8 - 100	5 - 1590	93 - 100
2. **2RHZ/6TH**								
No. of Patients	44383	23944	54	22609	18065	80	17842	99
Range	22 - 6371	19 - 4458	28 - 86	15 - 4232	14 - 4065	30 - 100	14 - 4039	95 - 100
3. **$2RHZ/4RH_2$**								
No. of Patients	7417	4541	61	4374	3665	84	3643	99
Range	49 - 2488	29 - 1696	39 - 79	22 - 1636	21 - 1425	75 - 96	21 - 1410	98 - 100

From inception of SCC programme up to June 1991.

sputum examination at the end of chemotherapy, 4002 (45%) had sputum examination done and of these, 96% were negative by smear (data not tabulated).

Comparison of treatment completion among 4 cohorts of SCC and standard chemotherapy

Concurrent analyses were done for 4 cohort periods to compare the treatment completion rates between SCC and standard regimen. The overall treatment completion with SCC regimens for the 4 cohort periods ranged from 51% to 55% (Table 6). Considering the standard chemotherapy cohorts, the treatment completion rate increased from 29% in 1986-87 cohort to 41% in 1987-88 cohort, 45% in 1988-89 cohort and 40% in 1989-90 cohort.

Considering the proportions of patients 'lost' from treatment in SCC and standard regimen (data not tabulated), 18% and 20% ofpatients, respectively were lost afterreceiving the number of doses due for the first month of treatment, 35% and 34%, respectively, up to 3 months and 44% in each regimen up to 5 months.

Adverse reactions

Information on adverse reactions was not available in the periodic returns from all the districts. However, one district had reported less than 1% each ofjaundice, vomiting and gastritis[8]. In addition, giddiness (1.6%) and arthralgia (1.7%) was also reported from the same district. Further, change of treatment for any reason (including adverse reactions, non-availability of SCC drugs and inability to attend frequently, etc.) was reported only in 4% of cases in regimens 1 and 3 and 2% in regimen 2.

DISCUSSION

The observations reported here cover a period of 7 years after introducing SCC in 18 districts spread all over India under the existing programme conditions. The SCC implementation was undertaken in a phased manner, and by March 1985, all the districts had implemented SCC. By 1985, the coverage for implementation was 66% of the PHIs which increased to 93% by 1991[9].

Considering the case-finding activity, the

Table 6. Comparison of treatment completion between SCC and Standard Chemotherapy

Policy	1986-87*				1987-88				1988-89				1989-90			
	SCC		Standard		SCC		Standard		SCC		Standard		SCC		Standard	
	No.	Completed Treatment (%)#	No.	Completed Treatment (%)#	No.	Completed Treatment (%)#	No.	Completed Treatment (%)#	No.	Completed Treatment (%)#	No.	Completed Treatment (%)#	No.	Completed Treatment (%)#	No.	Completed Treatment (%)#
A	3385	54	1902	28	2938	50	1740	38	2994	54	2087	34	4303	54	2265	31
B	2391	59	1885	31	2161	49	2177	46	2958	49	2264	52	3452	54	1952	48
C	2360	46	2336	27	2522	54	2537	40	3756	61	1947	49	4583	54	2029	45
Total	8136	53	2123	29	7621	51	6454	41	9708	55	6298	45	12338	54	6246	40

* July 1986 - June 1987 etc.; # > = 80% of Treatment.

overall efficiency was of the order of 41% . This rate is similar to the national average of about 30-36%[10,11] but substantially less than the expected potential of about 60-65%[11,12], which is very near the WHO target of 70%[13].

Combining DTCs and PHIs, the total number of sputum examinations had registered an increase of 7% and in sputum positives of 31% between 1985 and 1991. There was an increase in the number of sputum examinations by 16% at the PHIs and a decrease by 12% at the DTCs, a trend in the expected direction. The contribution of the PHIs during the 7-year period was in the range of 70-76% in respect of sputum examination and 4859% with respect to detection of smear positive cases. The national figures during the same period were similar, being 70-72% and 49-53% respectively[2,14-16]. Further, improvement is required in supplies given for sputum microscopy. The fact that a large number of the microscopes in the 18 districts needed repairs suggests the need for frequent supervision and service facilities. A check on the quality of sputum microscopy through random samples had shown 95% agreement between the readings at the district level and at TRC. Thus, the quality of the reading of sputum smears was found to be satisfactory. In addition, utilisation of volunteer workers like National Service Scheme (NSS) students, traditional birth attendants (Dais) and literate youth, in difficult terrains to improve detection of symptomatics is being evaluated at our Centre.

The proportion of eligible patients started on SCC was 62% in the present study. In a recent report from the NTI, Bangalore, it was observed that 49.4% of the smear positive cases diagnosed in 248 districtshad been started on SCC regimens: of these, only 2.8% were treated with a supervised twice weekly regimen of 6-month duration[9]. In the present report, of the 6 districts with policy A, one district only had the fully supervised regimen implemented. In the remaining 5 districts, 16% were started on a fully supervised twice-weekly regimen. However, there was a wide variation (1%-50%) between the 5 districts.

It was also observed that 38% of eligible patients were not started on SCC, even though they could be prescribed a regimen requiring only twice-a-month attendance for 8 months. The reasons for

not starting SCC were available only in 43% of the patients. Of these, 58% were attributable to the patients like living too far away, likely to migrate and too old or sick. It is possible to solve some of these problems by decentralising the treatment, utilising the sub-centres which cater to a relatively small population of 5000 whereas the PHCs cater to a population of 30,000. The patients likely to migrate also could be given SCC with improvement in the implementation of SCC. Considering the administrative/organisational reasons, non-implementation of SCC and non-availability of drugs (either due to inadequate supply or failure to indent for the drugs on time) were the main problems faced. The monthly meetings of the DTO with the PHI staff could be utilised to introduce the SCC regimens and motivate the staff to implement SCC at the respective PHIs. It is also possible to take stock of the drug position at the PHIs during these meetings and, if necessary, redistribute the excess stock in some PHIs to tide over the drug shortage elsewhere. Timely indenting and streamlining of drug supply are also essential.

With respect to case-holding, during the 7-year period, approximately 54% completed 80% or more of treatment, figures similar to the 53% completing 75% or more of treatment reported by NTI[9]. Detailed analyses have shown that there was no difference in treatment completion rates between the different cohort periods. These completion rates are better than the 27-34% reported in the NTP with 12-month regimens[1,2]. The completion rate with 12 month regimens for concurrent cohorts in these 18 districts was 29% in the 1986-87 cohort which increased to 40-45% in subsequent cohorts. It was found that the treatment completion was 54% in regimen 2 where patients had to attend twice a month, and 49% and 61% in regimens 1 and 3, respectively, where patients had to attend twice a week either throughout the 6-month period or for a 4-month period, respectively. The completion rates for the patients treated with the supervised regimen involving twice-weekly attendance either throughout or partially and for the unsupervised regimen in 12 districts, were similar. **Thus, the frequency of clinic attendance does not appear to have had any influence on the treatment completion rates.**

Considering the proportion of patients 'lost' fromtreatment, 18% in SCC and 20% in standard chemotherapy were lost after receiving the doses due for the 1st month, 35 % and 34%, respectively, for up to 3 months and 44% in each for up to 5 months. Thus, it appears that the duration for which treatment is given exerts more influence on patient compliance than the drugs given.

In an attempt to find out the reasons for patients discontinuing treatment, visits were made in 2 districts to the homes of patients who had been 'lost' to treatment[17]. It was found that in an appreciable proportion ofpatients, thereasons, such as adverse reactions, inaccurate or inadequate address and abatement of symptoms are correctable. This Centre had evolved an inexpensive and efficient system of obtaining accurate addresses of patients by utilising an "address card system"[18]. This system was employed under programme conditions in one district and it was found that the system was acceptable and could improve the accuracy of addresses[19]. This is essential because the defaulter retrieval procedure in the programme depends largely on letter posting.

In earlier studies, one-time motivation at the start of treatment was found to be inadequate[20] but motivation of the patients together with their family members every month during the initial three months of treatment resulted in better drug collection[2l]. A study at this Centre[22] had also shown that there was a 10% increase in the compliance rate among patients motivated initially only and by 20% among those motivated at 0, 1, 2 and 5 months, compared to patients who were not subjected to motivation.

Treatment completion of 80% or more with SCC has been reported from other countries, adopting special measures to improve treatment adherence. Some of the measures used were home visit by a health worker in Botswana[23], a parish priest in the Philippines[24] and a nursing officer in Beijing[25], whereas in Tanzania[26], patients were hospitalised during the initial period of treatment. Application of any of these measures on a nation-wide basis in India would require much more resources than are currently available. However, alternative approaches such as utilisation of the available community workers forretrieving patients is likely to improve case-holding without additional expenditure. This Centre is currently investigating different strategies, such as utilisation of

multipurpose workers (MPW), student volunteers of National Service Scheme (NSS), traditional birth attendants (Dais) at village level, drug supply through subcentres and patient-to-patient motivation in promoting patient compliance. The results of such studies will be useful in strategic planning of health care delivery.

A high proportion of patients for whom sputum examination was done at the end of treatment, namely 95-99% were smearnegative. When a sample of sputum specimens from 2 districts was examined by culture at this Centre, 80% of 408 were negative in a district where the fully supervised regimen was prescribed and 92% of 876 in a district where the partially supervised regimen was prescribed[27]. Studies are underway to estimate the relapse rates among patients put on SCC under DTP.

It was reported from this Centre that among a group of 2306 patients treated with SCC in the above districts with the fully supervised regimen, 42% had completed 80% or more of treatment[28]. A one-time sputum specimen was collected (corresponding to 6-36 months after the start of treatment) and 79% of the patients who had received 80% or more of chemotherapy were negative by culture. It was also observed that even among patients who had received less than 50% of the drugs, 52% were culture negative. However, this Centre is undertaking another study to corroborate this finding by collecting periodic sputum specimens from the same district.

The following key issues are vital for the success of the programme: proper documentation and timely reporting[2], motivated and trained personnel at the periphery leve1[10,29], uninterrupted drug supply, good maintenance of microscopes and regular check of sputum microscopy, periodic evaluation and surveillance at all levels, in-service training for both technical andmanagerial personnel, and availability of functioning transport with adequate fuel supply to facilitate mobility of supervisory staff.

A study of the relative importance of the 3 components of the programme, namely, case-finding, case-holding and chemotherapy has been reported[30]. In these 18 districts, the case-finding has been 41 %, thecase-holding to be 54% and the regimen used in the present project are of near 100 % efficacy (in clinical trials). In this situation, the overall impact of the programme could only be around 22 %. There is, thus, a need to evolve strategies to improve case-finding and case-holding, the two deficient components of the programme.

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Annexure: **Demographic data, case finding activity and application of SCC in 18 districts**

District	State	Population (000000)	No. of PHIs under DTP 1985	1991	New smears examined No.	Positive No.		Eligible for SCC No.	Put on SCC No.		1st Reg* %
Policy A											
N. Arcot	Tamil Nadu	4.50	87	94	42863	2034	5	1990	1142	57	91**
Puri	Orissa	2.92	74	82	14390	594	4	511	377	74	50
Baroda	Gujarat	2.56	70	85	18657	2557	14	1866	1119	60	20
Thane	Maharashtra	3.35	84	94	31460	1780	6	1746	1380	79	1
Ujjain	Madhya Pradesh	1.12	30	54	9150	867	9	551	373	68	50
Dehra Dun	Uttar Pradesh	0.76	23	27	10359	975	9	810	570	70	2
Policy B											
Karnal	Haryana	1.32	20	29	10130	751	7	636	326	51	
Kanpur	Uttar Pradesh	3.74	26	33	20282	1466	7	1032	353	34	
Nagpur	Maharashtra	2.59	85	53@	27346	2184	8	2035	988	49	
Rajkot	Gujarat	2.09	29	75	10914	921	8	682	462	68	
Raichur	Karnataka	1.78	26	73	13127	930	7	767	459	60	
Sagar	Madhya Pradesh	1.32	38	48	7743	716	9	446	330	74	
Policy C											
Pondicherry	Union Territory	0.44	52	58	19345	865	4	455	349	77	99
Vidisha	Madhya Pradesh	0.78	26	45	7009	561	8	469	379	81	23
Aurangabad	Maharashtra	2.43	40	50	13947	1276	9	1189	791	67	3
Varanasi	Uttar Pradesh	3.70	22	33	17174	914	5	697	464	67	69
Sabarkantha	Gujarat	1.50	41	69	19521	1392	7	1274	946	74	1
W. Godavari	Andhra Pradesh	2.87	37	61	16793	1165	7	1060	534	50	78

\# Figures given under these columns are mean values per year.
* Proportion prescribed the main regimen (in Policies A & C districts),
** 2nd regimen implemented in 1990
@ Due to administrative reasons, some PHIs were amalgamated.