Original Article

EVALUATION OF DIRECTLY OBSERVED TREATMENT PROVIDERS IN THE REVISED NATIONAL TUBERCULOSIS CONTROL PROGRAMME

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Summary:

Background: Non-governmental personnel such as *Anganwadi* workers and community volunteers have been used as directly observed treatment (DOT) providers in the Revised National Tuberculosis Control Programme (RNTCP), but their effectiveness has not been documented.

Aim: To assess the treatment outcome and problems encountered by patients managed by different DOT providers in the RNTCP.

Material and Methods: Patients diagnosed with tuberculosis at 17 Primary Health Institutions (PHIs) in Tiruvallur District during a 3-year period received DOT from one of the four types of trained DOT providers (PHI staff, governmental outreach workers, *Anganwadi* workers, community volunteers), and their treatment outcomes were compared. Of the 1131 new smear-positive patients treated between May 1999 through June 2002, 199 (18%) received DOT from PHI staff, 238(21%) from outreach workers, 496 (44%) from *Anganwadi* workers, and 170 (15%) from community volunteers. Twenty-eight patients (2%) collected drugs for self-administration.

***Results*:** Treatment success rates among patients treated by different DOT providers, *Anganwadi* workers (80%), governmental outreach workers (81%), community volunteers (76%) and PHI staff (76%), were statistically similar. Patients who received drugs for self-administration were significantly more likely to fail to treatment or die than patients who were treated by a DOT provider (5/28 *versus* 84/1103; odds ratio=4.1; 95% confidence interval=1.2-12.6; p=0.02).

Conclusion: In addition to governmental staff, *Anganwadi* workers and community volunteers can be effectively utilized as DOT providers. **[*Indian J Tuberc 2005; 52:73-77*]**

Key words: Tuberculosis, Directly observed treatment providers, Revised National Tuberculosis Control Programme.

INTRODUCTION

The necessity of directly observed treatment (DOT) for tuberculosis control was first demonstrated in India[1]. DOT is now recommended as the standard of care in treatment of tuberculosis worldwide[2-3]. By ensuring that patients take the right drugs, at the right intervals and in the right dosages, DOT reduces the chances of relapse or failure and prevents multi-drug resistant tuberculosis[4-6]. While DOT is central to the success of tuberculosis control programmes, it is not easy to implement. DOT needs to be given at a location, which is convenient to the patient, and, by a treatment provider who is accountable to the health system. Several types of providers have successfully carried out treatment observation in various countries. They include health workers in China, community volunteers in Africa, religious leaders in Philippines and members of non-governmental organizations in Bangladesh[7-11].

The Revised National Tuberculosis Programme (RNTCP) in India, based on the principles of Directly Observed Treatment, Short-course (DOTS), is one of the largest and fastest growing TB control programmes in the world [12]. The RNTCP places most responsibility of treatment observation on the governmental health workers at primary health Institutions (PHIs). To make DOT more convenient to patients, DOT providers from the non-governmental sector, such as *Anganwadi* workers and community volunteers have been deployed in some districts, but their effectiveness has not been documented. In this

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paper, we analyze the treatment outcomes, and problems encountered by patients managed by different DOT providers in the RNTCP.

MATERIAL AND METHODS

Study area and patients

We are reporting from a rural population of 580,000 in Tiruvallur District, Tamil Nadu. The RNTCP has been implemented in the area since May 1999 at 17 governmental Primary Health Institutions (PHIs) offering clinic based care and 102 sub-centres providing outreach care. Patients registered for anti-TB treatment at any of the governmental PHIs from May 1999 to June 2002 were included in the analysis. Patients were treated as per the RNTCP guidelines with one of the three regimens: $2H_3R_3Z_3E_3$/ $4H_3R_3$, $2H_3R_3Z_3E_3S_3$ / $1H_3R_3Z_3E_3$/$5H_3R_3E_3$, and $2H_3R_3Z_3$/ $4H_3R_3$. The treatment under RNTCP is given thrice weekly on alternate days. Every dose of treatment is given under direct observation in the initial intensive phase and at least the first of the three doses is directly observed during the continuation phase.

DOT providers

The RNTCP training modules for PHI medical officers emphasize the need to identify a suitable DOT provider for each patient. In the present study, medical officers assigned one of the four types of DOT providers to each patient depending upon the availability of a trained DOT provider and the proximity of the provider to the patient's home: 1) health workers from the governmental PHIs (pharmacists, and laboratory technicians); 2) outreach health workers in charge of the government run sub-centres (auxiliary nurse midwives, village health nurses and health inspectors); 3) *Anganwadi* workers providing non-formal education to pre-school children in the village under the Integrated Child Development Services Scheme; 4) community volunteers such as religious leaders, school teachers, shopkeepers residing in patient's village or a nearby village. Although the necessity of DOT is strongly emphasized in the RNTCP, a small proportion of patients collected their medications for self-administration.

Data collection

The treatment card of each patient was reviewed to obtain details about disease classification and treatment outcome. Trained paramedical worker contacted each patient approximately two months after start of treatment and obtained information on the type of provider, from whom the patient received directly observed treatment. Further information regarding the various kinds of problems encountered during treatment was collected from a subset of consecutive patients registered between November 2000 and June 2002. For the purpose of analysis, the types of problems encountered during treatment were categorized into four groups, namely those related to (i) the treatment drugs, (ii) the health centre (iii) the DOT provider, and (iv) those of a personal nature.

Statistical analysis

The data were computerized, cross-checked and edited for any mistakes and missing information. Univariate analysis was performed using EpiInfo version 6.04 (CDC, Atlanta, GA, July 1996). Differences in proportions were tested by the Chi square test. Fisher's exact test was used when an expected cell value was less than 5. Yate's corrected two-tailed p-value of <0.05 was considered significant.

RESULTS

Of the 3019 patients registered for anti-tuberculosis treatment during the period of the study, 88% (2661) could be contacted for an interview. Of these, 543 (20%) received DOT from staff working at the PHIs, 561 (21%) from governmental outreach workers, 1118 (42%) from *Anganwadi* workers, and 377 (14%) from community volunteers. Sixty two (2%) of the patients collected drugs for self- administration. The median age of patients was 43 years and 2237 (74%) were males; 1820 (68%) were employed.

In univariate analysis, patients assigned to the different types of DOT providers had similar socio-demographic characteristics. In all, 87% (2042/2343) patients found DOT convenient; this proportion did not differ significantly by the type of DOT provider. We are presenting treatment outcome for 1131 new smear positive patients treated in category I during the period according to the type of provider.

Among the 1131 new smear-positive patients, 199 (18%) received DOT from staff working at the PHIs, 238 (21%) from outreach workers, 496 (44%) from *Anganwadi* workers, and 170 (15%) from community volunteers. Twenty-eight patients (2%) collected drugs for self-administration (Table1). Of these, 864 (76%) were male and 782 (69%) were employed.

We analysed the treatment outcome among new smear-positive patients by type of DOT providers and found that the treatment success rate was the highest among patients receiving DOT from the governmental outreach workers (81%); for *Anganwadi* workers, the figure was 80%, followed by community volunteers (76%). Patients treated by PHI staff had the lowest observed treatment success rate 74% (Table 1). However, the differences in treatment success rates among patients treated by different DOT providers were not statistically significant. Patients who received drugs for self-administration had a treatment success of 75%. Patients treated by community volunteers had high default rates (18%), as did patients receiving DOT from PHI staff (17%). Patients who received drugs for self-administration were significantly more likely to be failures of treatment or die, than patients who were treated by a DOT provider (5/28 *versus* 84/1103; Odds Ratio=4.1; 95% Confidence Interval=1.2-12.6; p=0.02).

We interviewed 1662 (92%) of 1815 patients registered for treatment from November 2000 to June 2002, for problems related to taking drugs. Among these, 982 (59%) patients reported having some problems due to drugs, 22% had personal problems, 15% reported disruption in the work routine; only 2% patients found the location of the DOT centre inconvenient. Giddiness was the main complaint of patients reporting drug related problems. Patients receiving DOT from *Anganwadi* workers or community workers were more likely to report drug related problems than those receiving DOT from governmental outreach workers or PHI staff (Table 2). New smear-positive patients reporting drug related problems had similar treatment success rates compared with patients who did not have such problems (75.2% vs. 74.9%).

DISCUSSION

We found that tuberculosis patients, who

Table 1: Treatment outcome by type of DOT provider among new smear-positive patients

Type of provider	Treatment success*		Default		Died		Failure		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%
Governmental PHI health workers	147	74	34	17	7	4	11	4	199	19
Governmental out reach workers	193	81	27	11	7	3	11	5	238	25
Anganwadi workers	397	80	61	12	15	3	23	3	496	39
Community volunteers	129	76	31	18	3	0	7	3	170	12
Self-administration	21	75	2	7	3	13	2	9	28	5
Total	887	80	155	13	35	3	54	4	1131	100

* *includes patients who were cured or those who completed treatment*

received drugs for self-administration, had a significantly higher risk of treatment failure or death compared to patients who received treatment from a DOT provider. This finding is corroborated by an earlier study from Kerala, which demonstrated that patients who self-administered anti-TB drugs were 15 times more likely to be failures of treatment or have a relapse than those who received treatment under direct observation[4]. High treatment success rates can be achieved by identifying DOT providers, who are accessible and acceptable to patients. In Africa, volunteers and community health workers successfully delivered community-based DOT and were able to maintain higher treatment completion rates than the health worker in a clinic[8]. In this study, patients receiving DOT from PHI-based providers had the lowest treatment success rate, indicating that proximity and convenience of DOT is essential for improving treatment success rates. While a decentralized approach using a network of community-based DOT providers can take DOT delivery closer to patients' homes, use, training, and supervision of community-based DOT providers may not be optimal in the RNTCP as currently implemented. Medical officers in charge of PHIs monitor activities of the governmental staff through weekly review meetings. However, periodic supervision of *Anganwadi* workers and community volunteers is infrequent. To increase the accountability of community-based DOT providers, it is necessary to develop and test mechanisms for supervising these providers.

Although 59% of the patients in the study reported drug related problems, 75% of these patients completed treatment successfully. Poor treatment outcomes were no more common among patients who reported drug related problems than among those who did not. Patients treated by *Anganwadi* workers and community volunteers, however, were more likely to report drug related problems than those receiving treatment from government providers. Governmental DOT providers are skilled in tackling patients' drug related complaints, whereas *Anganwadi* workers and community volunteers have minimal training in health related issues. Therefore, the training of *Anganwadi* workers and community volunteers should include a strong component, on how to counsel patients who have drug related problems. *Anganwadi* workers and community volunteers may also be trained to dispense minor drugs such as antacids, analgesics and antihistamines. Volunteer health workers have been successfully trained to dispense similar drugs in primary health care programmes in India and elsewhere [13-14].

This study has at least three limitations. First, we were unable to collect information from all the patients about the type of provider from whom they received DOT; patients who could not be interviewed and thus, from whom this information was not available, were more likely to have a poor outcome than those who were interviewed. Treatment success rates categorized by type of DOT provider could differ from those reported here, if information on the type of DOT provider was available for all patients. Second, it is possible that the patients who reported that they received treatment under direct observation may not have actually received DOT strictly as per the RNTCP guidelines. Reliable

Table 2: Drug-related problems reported by patients

Type of DOT provider	Problem due to drugs (%)	No problem due to drugs (%)	P value
Governmental PHI workers	137 (48)	146 (52)	Controls
Governmental outreach workers	153 (47)	174 (53)	0.2
Anganwadi workers	431 (56)	333 (44)	0.003
Community volunteers	153 (54)	129 (46)	0.002
Self-administration	3 (50)	3 (50)	0.08
Total	877 (53)	785 (47)	

information on whether patients received DOT or not was unavailable. Finally, there may be confounding factors other than those studied here, which could affect treatment outcomes.

In summary, the findings of this study indicate that in addition to governmental DOT providers, *Anganwadi* workers and community volunteers can be effectively utilized as DOT providers in the RNTCP. This study again confirms that the TB drugs should not be handed over to patients for self-administration. The importance of participating in directly observed treatment should be effectively communicated to patients as well as DOT providers.

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ANTI TB WEEK – 17TH TO 23RD FEBRUARY, 2005

One of the important activities of the Tuberculosis Association of India, every year, is celebration of Anti-Tuberculosis Week throughout the country from 17th to 23rd February. This year also, we celebrated this week from 17th to 23rd February in the premises of TB Association of India. St. John Ambulance Brigade played a vital role in this programme in collaboration with Delhi TB Association. The special feature of this campaign was to create awareness of the TB disease amongst the public through school children. The Association also organised an exhibition on RNTCP/DOTS, which spell out programme as well as screening of film on Tuberculosis in the premises. Besides this, on 20th February, 2005 a painting competition for the school children was also organised.

Over 1500 children from 35 schools took part in the painting competition. The objective is to create awareness about tuberculosis through children to their families, who are considered strong communication channels. Dr. R.N. Baishya, Director of Health Services, Delhi Government inaugurated the competition. Dr. M.M. Singh, Vice Chairman, TB Association of India highlighted the need for the awareness programme to make the anti-TB programme successful and useful. The subject was depiction of various methods of prevention, control and spread of tuberculosis. The entire premises of the Tuberculosis Association of India were packed with competitors, their teachers and parents. The Association gave each participant a commendation certificate.

It intends to conduct such programmes in the near future in collaboration with the Delhi branch and educational institutions.